

bra: =  $\langle \frac{1}{2}, \frac{1}{2}; s |, \langle \frac{1}{2}, -\frac{1}{2}; s |$   
ket: =  $|\frac{1}{2}, \frac{1}{2}; s \rangle, |\frac{1}{2}, -\frac{1}{2}; s \rangle$

Table 1: (s,s) block.

| No. | multipole                          | matrix  |
|-----|------------------------------------|---|
| 1   | symmetry                           | 1   |
|     | $\mathbb{Q}_0^{(a)}(A_1)$          | $\begin{bmatrix} \frac{\sqrt{2}}{2} & 0 \\ 0 & \frac{\sqrt{2}}{2} \end{bmatrix}$    |
| 2   | symmetry                           | $x$   |
|     | $\mathbb{M}_{1,0}^{(1,-1;a)}(T_1)$ | $\begin{bmatrix} 0 & \frac{\sqrt{2}}{2} \\ \frac{\sqrt{2}}{2} & 0 \end{bmatrix}$    |
| 3   | symmetry                           | $y$   |
|     | $\mathbb{M}_{1,1}^{(1,-1;a)}(T_1)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{2}i}{2} \\ \frac{\sqrt{2}i}{2} & 0 \end{bmatrix}$ |
| 4   | symmetry                           | $z$   |
|     | $\mathbb{M}_{1,2}^{(1,-1;a)}(T_1)$ | $\begin{bmatrix} \frac{\sqrt{2}}{2} & 0 \\ 0 & -\frac{\sqrt{2}}{2} \end{bmatrix}$   |

bra: =  $\langle \frac{1}{2}, \frac{1}{2}; s |, \langle \frac{1}{2}, -\frac{1}{2}; s |$   
ket: =  $|\frac{1}{2}, \frac{1}{2}; p \rangle, |\frac{1}{2}, -\frac{1}{2}; p \rangle, |\frac{3}{2}, \frac{3}{2}; p \rangle, |\frac{3}{2}, \frac{1}{2}; p \rangle, |\frac{3}{2}, -\frac{1}{2}; p \rangle, |\frac{3}{2}, -\frac{3}{2}; p \rangle$

Table 2: (s,p) block.

| No. | multipole                     | matrix  |
|-----|-------------------------------|---|
| 5   | symmetry                      | $x$   |
|     | $\mathbb{Q}_{1,0}^{(a)}(T_1)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{3}}{6} & -\frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{6}}{12} & 0 \\ -\frac{\sqrt{3}}{6} & 0 & 0 & -\frac{\sqrt{6}}{12} & 0 & \frac{\sqrt{2}}{4} \end{bmatrix}$        |
| 6   | symmetry                      | $y$   |
|     | $\mathbb{Q}_{1,1}^{(a)}(T_1)$ | $\begin{bmatrix} 0 & \frac{\sqrt{3}i}{6} & -\frac{\sqrt{2}i}{4} & 0 & -\frac{\sqrt{6}i}{12} & 0 \\ -\frac{\sqrt{3}i}{6} & 0 & 0 & -\frac{\sqrt{6}i}{12} & 0 & -\frac{\sqrt{2}i}{4} \end{bmatrix}$ |

*continued ...*

Table 2

| No. | multipole                          | matrix  |
|-----|------------------------------------|---|
| 7   | symmetry                           | $z$   |
|     | $\mathbb{Q}_{1,2}^{(a)}(T_1)$      | $\begin{bmatrix} -\frac{\sqrt{3}}{6} & 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 \\ 0 & \frac{\sqrt{3}}{6} & 0 & 0 & \frac{\sqrt{6}}{6} & 0 \end{bmatrix}$                               |
| 8   | symmetry                           | $x$   |
|     | $\mathbb{Q}_{1,0}^{(1,0;a)}(T_1)$  | $\begin{bmatrix} 0 & \frac{\sqrt{6}}{6} & -\frac{1}{4} & 0 & \frac{\sqrt{3}}{12} & 0 \\ \frac{\sqrt{6}}{6} & 0 & 0 & -\frac{\sqrt{3}}{12} & 0 & \frac{1}{4} \end{bmatrix}$        |
| 9   | symmetry                           | $y$   |
|     | $\mathbb{Q}_{1,1}^{(1,0;a)}(T_1)$  | $\begin{bmatrix} 0 & -\frac{\sqrt{6}i}{6} & -\frac{i}{4} & 0 & -\frac{\sqrt{3}i}{12} & 0 \\ \frac{\sqrt{6}i}{6} & 0 & 0 & -\frac{\sqrt{3}i}{12} & 0 & -\frac{i}{4} \end{bmatrix}$ |
| 10  | symmetry                           | $z$   |
|     | $\mathbb{Q}_{1,2}^{(1,0;a)}(T_1)$  | $\begin{bmatrix} \frac{\sqrt{6}}{6} & 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 \\ 0 & -\frac{\sqrt{6}}{6} & 0 & 0 & \frac{\sqrt{3}}{6} & 0 \end{bmatrix}$                               |
| 11  | symmetry                           | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$  |
|     | $\mathbb{G}_{2,0}^{(1,-1;a)}(E)$   | $\begin{bmatrix} 0 & 0 & 0 & \frac{i}{2} & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{i}{2} & 0 \end{bmatrix}$   |
| 12  | symmetry                           | $\frac{\sqrt{3}(x-y)(x+y)}{2}$  |
|     | $\mathbb{G}_{2,1}^{(1,-1;a)}(E)$   | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{i}{2} \\ 0 & 0 & -\frac{i}{2} & 0 & 0 & 0 \end{bmatrix}$   |
| 13  | symmetry                           | $\sqrt{3}yz$  |
|     | $\mathbb{G}_{2,0}^{(1,-1;a)}(T_2)$ | $\begin{bmatrix} 0 & 0 & \frac{1}{4} & 0 & \frac{\sqrt{3}}{4} & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{3}}{4} & 0 & -\frac{1}{4} \end{bmatrix}$  |
| 14  | symmetry                           | $\sqrt{3}xz$  |
|     | $\mathbb{G}_{2,1}^{(1,-1;a)}(T_2)$ | $\begin{bmatrix} 0 & 0 & -\frac{i}{4} & 0 & \frac{\sqrt{3}i}{4} & 0 \\ 0 & 0 & 0 & \frac{\sqrt{3}i}{4} & 0 & -\frac{i}{4} \end{bmatrix}$  |
| 15  | symmetry                           | $\sqrt{3}xy$  |
|     | $\mathbb{G}_{2,2}^{(1,-1;a)}(T_2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & \frac{1}{2} & 0 & 0 & 0 \end{bmatrix}$  |
| 16  | symmetry                           | 1   |

continued ...

Table 2

| No. | multipole                         | matrix   |
|-----|-----------------------------------|--|
|     | $\mathbb{G}_0^{(1,1;a)}(A_1)$     | $\begin{bmatrix} -\frac{i}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{i}{2} & 0 & 0 & 0 & 0 \end{bmatrix}$   |
| 17  | symmetry                          | $x$  |
|     | $\mathbb{T}_{1,0}^{(a)}(T_1)$     | $\begin{bmatrix} 0 & -\frac{\sqrt{3}i}{6} & -\frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{6}i}{12} & 0 \\ -\frac{\sqrt{3}i}{6} & 0 & 0 & -\frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{2}i}{4} \end{bmatrix}$ |
| 18  | symmetry                          | $y$  |
|     | $\mathbb{T}_{1,1}^{(a)}(T_1)$     | $\begin{bmatrix} 0 & -\frac{\sqrt{3}}{6} & \frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{6}}{12} & 0 \\ \frac{\sqrt{3}}{6} & 0 & 0 & \frac{\sqrt{6}}{12} & 0 & \frac{\sqrt{2}}{4} \end{bmatrix}$          |
| 19  | symmetry                          | $z$  |
|     | $\mathbb{T}_{1,2}^{(a)}(T_1)$     | $\begin{bmatrix} -\frac{\sqrt{3}i}{6} & 0 & 0 & \frac{\sqrt{6}i}{6} & 0 & 0 \\ 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & \frac{\sqrt{6}i}{6} & 0 \end{bmatrix}$  |
| 20  | symmetry                          | $x$  |
|     | $\mathbb{T}_{1,0}^{(1,0;a)}(T_1)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{6}i}{6} & \frac{i}{4} & 0 & -\frac{\sqrt{3}i}{12} & 0 \\ -\frac{\sqrt{6}i}{6} & 0 & 0 & \frac{\sqrt{3}i}{12} & 0 & -\frac{i}{4} \end{bmatrix}$                 |
| 21  | symmetry                          | $y$  |
|     | $\mathbb{T}_{1,1}^{(1,0;a)}(T_1)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{6}}{6} & -\frac{1}{4} & 0 & -\frac{\sqrt{3}}{12} & 0 \\ \frac{\sqrt{6}}{6} & 0 & 0 & -\frac{\sqrt{3}}{12} & 0 & -\frac{1}{4} \end{bmatrix}$                    |
| 22  | symmetry                          | $z$  |
|     | $\mathbb{T}_{1,2}^{(1,0;a)}(T_1)$ | $\begin{bmatrix} -\frac{\sqrt{6}i}{6} & 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 \\ 0 & \frac{\sqrt{6}i}{6} & 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 \end{bmatrix}$  |
| 23  | symmetry                          | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$   |
|     | $\mathbb{M}_{2,0}^{(1,-1;a)}(E)$  | $\begin{bmatrix} 0 & 0 & 0 & \frac{1}{2} & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{1}{2} & 0 \end{bmatrix}$  |
| 24  | symmetry                          | $\frac{\sqrt{3}(x-y)(x+y)}{2}$   |
|     | $\mathbb{M}_{2,1}^{(1,-1;a)}(E)$  | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & -\frac{1}{2} & 0 & 0 & 0 \end{bmatrix}$  |
| 25  | symmetry                          | $\sqrt{3}yz$   |

continued ...

Table 2

| No. | multipole                          | matrix   |
|-----|------------------------------------|--|
|     | $\mathbb{M}_{2,0}^{(1,-1;a)}(T_2)$ | $\begin{bmatrix} 0 & 0 & -\frac{i}{4} & 0 & -\frac{\sqrt{3}i}{4} & 0 \\ 0 & 0 & 0 & \frac{\sqrt{3}i}{4} & 0 & \frac{i}{4} \end{bmatrix}$ |
| 26  | symmetry                           | $\sqrt{3}xz$   |
|     | $\mathbb{M}_{2,1}^{(1,-1;a)}(T_2)$ | $\begin{bmatrix} 0 & 0 & -\frac{1}{4} & 0 & \frac{\sqrt{3}}{4} & 0 \\ 0 & 0 & 0 & \frac{\sqrt{3}}{4} & 0 & -\frac{1}{4} \end{bmatrix}$   |
| 27  | symmetry                           | $\sqrt{3}xy$   |
|     | $\mathbb{M}_{2,2}^{(1,-1;a)}(T_2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{i}{2} \\ 0 & 0 & -\frac{i}{2} & 0 & 0 & 0 \end{bmatrix}$                                     |
| 28  | symmetry                           | 1  |
|     | $\mathbb{M}_0^{(1,1;a)}(A_1)$      | $\begin{bmatrix} -\frac{1}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{1}{2} & 0 & 0 & 0 & 0 \end{bmatrix}$                                     |

$$\text{bra:} = \langle \frac{1}{2}, \frac{1}{2}; s |, \langle \frac{1}{2}, -\frac{1}{2}; s |$$

$$\text{ket:} = | \frac{3}{2}, \frac{3}{2}; d \rangle, | \frac{3}{2}, \frac{1}{2}; d \rangle, | \frac{3}{2}, -\frac{1}{2}; d \rangle, | \frac{3}{2}, -\frac{3}{2}; d \rangle, | \frac{5}{2}, \frac{5}{2}; d \rangle, | \frac{5}{2}, \frac{3}{2}; d \rangle, | \frac{5}{2}, \frac{1}{2}; d \rangle, | \frac{5}{2}, -\frac{1}{2}; d \rangle, | \frac{5}{2}, -\frac{3}{2}; d \rangle, | \frac{5}{2}, -\frac{5}{2}; d \rangle$$

Table 3: (s,d) block.

| No. | multipole                     | matrix   |
|-----|-------------------------------|--|
| 29  | symmetry                      | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$   |
|     | $\mathbb{Q}_{2,0}^{(a)}(E)$   | $\begin{bmatrix} 0 & -\frac{\sqrt{10}}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{10} & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{10}}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{10} & 0 & 0 \end{bmatrix}$  |
| 30  | symmetry                      | $\frac{\sqrt{3}(x-y)(x+y)}{2}$   |
|     | $\mathbb{Q}_{2,1}^{(a)}(E)$   | $\begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{10}}{10} & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & \frac{\sqrt{10}}{20} & 0 \\ \frac{\sqrt{10}}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{20} & 0 & 0 & 0 & \frac{\sqrt{2}}{4} \end{bmatrix}$  |
| 31  | symmetry                      | $\sqrt{3}yz$   |
|     | $\mathbb{Q}_{2,0}^{(a)}(T_2)$ | $\begin{bmatrix} \frac{\sqrt{10}i}{20} & 0 & \frac{\sqrt{30}i}{20} & 0 & 0 & -\frac{\sqrt{10}i}{10} & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 \\ 0 & -\frac{\sqrt{30}i}{20} & 0 & -\frac{\sqrt{10}i}{20} & 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 & -\frac{\sqrt{10}i}{10} & 0 \end{bmatrix}$ |
| 32  | symmetry                      | $\sqrt{3}xz$   |

continued ...

Table 3

| No. | multipole                          | matrix   |
|-----|------------------------------------|--|
|     | $\mathbb{Q}_{2,1}^{(a)}(T_2)$      | $\begin{bmatrix} \frac{\sqrt{10}}{20} & 0 & -\frac{\sqrt{30}}{20} & 0 & 0 & -\frac{\sqrt{10}}{10} & 0 & \frac{\sqrt{5}}{10} & 0 & 0 \\ 0 & -\frac{\sqrt{30}}{20} & 0 & \frac{\sqrt{10}}{20} & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & \frac{\sqrt{10}}{10} & 0 \end{bmatrix}$             |
| 33  | symmetry                           | $\sqrt{3}xy$   |
|     | $\mathbb{Q}_{2,2}^{(a)}(T_2)$      | $\begin{bmatrix} 0 & 0 & 0 & \frac{\sqrt{10}i}{10} & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & -\frac{\sqrt{10}i}{20} & 0 \\ \frac{\sqrt{10}i}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{10}i}{20} & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} \end{bmatrix}$   |
| 34  | symmetry                           | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$   |
|     | $\mathbb{Q}_{2,0}^{(1,0;a)}(E)$    | $\begin{bmatrix} 0 & \frac{\sqrt{15}}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{10} & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{15}}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{10} & 0 & 0 \end{bmatrix}$  |
| 35  | symmetry                           | $\frac{\sqrt{3}(x-y)(x+y)}{2}$   |
|     | $\mathbb{Q}_{2,1}^{(1,0;a)}(E)$    | $\begin{bmatrix} 0 & 0 & 0 & \frac{\sqrt{15}}{10} & \frac{\sqrt{3}}{6} & 0 & 0 & 0 & \frac{\sqrt{15}}{30} & 0 \\ -\frac{\sqrt{15}}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{30} & 0 & 0 & 0 & \frac{\sqrt{3}}{6} \end{bmatrix}$  |
| 36  | symmetry                           | $\sqrt{3}yz$   |
|     | $\mathbb{Q}_{2,0}^{(1,0;a)}(T_2)$  | $\begin{bmatrix} -\frac{\sqrt{15}i}{20} & 0 & -\frac{3\sqrt{5}i}{20} & 0 & 0 & -\frac{\sqrt{15}i}{15} & 0 & -\frac{\sqrt{30}i}{30} & 0 & 0 \\ 0 & \frac{3\sqrt{5}i}{20} & 0 & \frac{\sqrt{15}i}{20} & 0 & 0 & -\frac{\sqrt{30}i}{30} & 0 & -\frac{\sqrt{15}i}{15} & 0 \end{bmatrix}$ |
| 37  | symmetry                           | $\sqrt{3}xz$   |
|     | $\mathbb{Q}_{2,1}^{(1,0;a)}(T_2)$  | $\begin{bmatrix} -\frac{\sqrt{15}}{20} & 0 & \frac{3\sqrt{5}}{20} & 0 & 0 & -\frac{\sqrt{15}}{15} & 0 & \frac{\sqrt{30}}{30} & 0 & 0 \\ 0 & \frac{3\sqrt{5}}{20} & 0 & -\frac{\sqrt{15}}{20} & 0 & 0 & -\frac{\sqrt{30}}{30} & 0 & \frac{\sqrt{15}}{15} & 0 \end{bmatrix}$           |
| 38  | symmetry                           | $\sqrt{3}xy$   |
|     | $\mathbb{Q}_{2,2}^{(1,0;a)}(T_2)$  | $\begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{15}i}{10} & \frac{\sqrt{3}i}{6} & 0 & 0 & 0 & -\frac{\sqrt{15}i}{30} & 0 \\ -\frac{\sqrt{15}i}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{30} & 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} \end{bmatrix}$   |
| 39  | symmetry                           | $\sqrt{15}xyz$   |
|     | $\mathbb{G}_3^{(1,-1;a)}(A_2)$     | $\begin{bmatrix} 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{12} & 0 & 0 & 0 & \frac{\sqrt{30}}{12} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{12} & 0 & 0 & 0 & -\frac{\sqrt{6}}{12} \end{bmatrix}$   |
| 40  | symmetry                           | $\frac{x(2x^2-3y^2-3z^2)}{2}$  |
|     | $\mathbb{G}_{3,0}^{(1,-1;a)}(T_1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{8} & 0 & -\frac{i}{4} & 0 & \frac{\sqrt{10}i}{8} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{10}i}{8} & 0 & -\frac{i}{4} & 0 & \frac{\sqrt{2}i}{8} & 0 \end{bmatrix}$   |
| 41  | symmetry                           | $-\frac{y(3x^2-2y^2+3z^2)}{2}$   |

continued ...

Table 3

| No. | multipole                          | matrix   |
|-----|------------------------------------|--|
|     | $\mathbb{G}_{3,1}^{(1,-1;a)}(T_1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{8} & 0 & -\frac{1}{4} & 0 & -\frac{\sqrt{10}}{8} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{8} & 0 & \frac{1}{4} & 0 & \frac{\sqrt{2}}{8} & 0 \end{bmatrix}$                            |
| 42  | symmetry                           | $-\frac{z(3x^2+3y^2-2z^2)}{2}$   |
|     | $\mathbb{G}_{3,2}^{(1,-1;a)}(T_1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & \frac{i}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{i}{2} & 0 & 0 \end{bmatrix}$  |
| 43  | symmetry                           | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$   |
|     | $\mathbb{G}_{3,0}^{(1,-1;a)}(T_2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{24} & 0 & -\frac{\sqrt{15}i}{12} & 0 & -\frac{\sqrt{6}i}{8} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{8} & 0 & -\frac{\sqrt{15}i}{12} & 0 & \frac{\sqrt{30}i}{24} & 0 \end{bmatrix}$ |
| 44  | symmetry                           | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$  |
|     | $\mathbb{G}_{3,1}^{(1,-1;a)}(T_2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{24} & 0 & \frac{\sqrt{15}}{12} & 0 & -\frac{\sqrt{6}}{8} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{8} & 0 & -\frac{\sqrt{15}}{12} & 0 & -\frac{\sqrt{30}}{24} & 0 \end{bmatrix}$        |
| 45  | symmetry                           | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$   |
|     | $\mathbb{G}_{3,2}^{(1,-1;a)}(T_2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{12} & 0 & 0 & 0 & \frac{\sqrt{30}i}{12} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{12} & 0 & 0 & 0 & -\frac{\sqrt{6}i}{12} \end{bmatrix}$   |
| 46  | symmetry                           | $x$  |
|     | $\mathbb{G}_{1,0}^{(1,1;a)}(T_1)$  | $\begin{bmatrix} \frac{\sqrt{3}i}{4} & 0 & -\frac{i}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{i}{4} & 0 & -\frac{\sqrt{3}i}{4} & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$   |
| 47  | symmetry                           | $y$  |
|     | $\mathbb{G}_{1,1}^{(1,1;a)}(T_1)$  | $\begin{bmatrix} -\frac{\sqrt{3}}{4} & 0 & -\frac{1}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{1}{4} & 0 & -\frac{\sqrt{3}}{4} & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$   |
| 48  | symmetry                           | $z$  |
|     | $\mathbb{G}_{1,2}^{(1,1;a)}(T_1)$  | $\begin{bmatrix} 0 & -\frac{i}{2} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{i}{2} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$   |
| 49  | symmetry                           | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$   |
|     | $\mathbb{T}_{2,0}^{(a)}(E)$        | $\begin{bmatrix} 0 & -\frac{\sqrt{10}i}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{10} & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{10}i}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{10} & 0 & 0 \end{bmatrix}$  |
| 50  | symmetry                           | $\frac{\sqrt{3}(x-y)(x+y)}{2}$   |

continued ...

Table 3

| No. | multipole                         | matrix   |
|-----|-----------------------------------|--|
|     | $\mathbb{T}_{2,1}^{(a)}(E)$       | $\begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{10}i}{10} & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & \frac{\sqrt{10}i}{20} & 0 \\ \frac{\sqrt{10}i}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{10}i}{20} & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} \end{bmatrix}$  |
| 51  | symmetry                          | $\sqrt{3}yz$   |
|     | $\mathbb{T}_{2,0}^{(a)}(T_2)$     | $\begin{bmatrix} -\frac{\sqrt{10}}{20} & 0 & -\frac{\sqrt{30}}{20} & 0 & 0 & \frac{\sqrt{10}}{10} & 0 & \frac{\sqrt{5}}{10} & 0 & 0 \\ 0 & \frac{\sqrt{30}}{20} & 0 & \frac{\sqrt{10}}{20} & 0 & 0 & \frac{\sqrt{5}}{10} & 0 & \frac{\sqrt{10}}{10} & 0 \end{bmatrix}$             |
| 52  | symmetry                          | $\sqrt{3}xz$   |
|     | $\mathbb{T}_{2,1}^{(a)}(T_2)$     | $\begin{bmatrix} \frac{\sqrt{10}i}{20} & 0 & -\frac{\sqrt{30}i}{20} & 0 & 0 & -\frac{\sqrt{10}i}{10} & 0 & \frac{\sqrt{5}i}{10} & 0 & 0 \\ 0 & -\frac{\sqrt{30}i}{20} & 0 & \frac{\sqrt{10}i}{20} & 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 & \frac{\sqrt{10}i}{10} & 0 \end{bmatrix}$   |
| 53  | symmetry                          | $\sqrt{3}xy$   |
|     | $\mathbb{T}_{2,2}^{(a)}(T_2)$     | $\begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{10}}{10} & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & \frac{\sqrt{10}}{20} & 0 \\ -\frac{\sqrt{10}}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{20} & 0 & 0 & 0 & \frac{\sqrt{2}}{4} \end{bmatrix}$   |
| 54  | symmetry                          | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$   |
|     | $\mathbb{T}_{2,0}^{(1,0;a)}(E)$   | $\begin{bmatrix} 0 & -\frac{\sqrt{15}i}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}i}{10} & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{15}i}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}i}{10} & 0 & 0 \end{bmatrix}$  |
| 55  | symmetry                          | $\frac{\sqrt{3}(x-y)(x+y)}{2}$   |
|     | $\mathbb{T}_{2,1}^{(1,0;a)}(E)$   | $\begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{15}i}{10} & -\frac{\sqrt{3}i}{6} & 0 & 0 & 0 & -\frac{\sqrt{15}i}{30} & 0 \\ \frac{\sqrt{15}i}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{30} & 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} \end{bmatrix}$  |
| 56  | symmetry                          | $\sqrt{3}yz$   |
|     | $\mathbb{T}_{2,0}^{(1,0;a)}(T_2)$ | $\begin{bmatrix} -\frac{\sqrt{15}}{20} & 0 & -\frac{3\sqrt{5}}{20} & 0 & 0 & -\frac{\sqrt{15}}{15} & 0 & -\frac{\sqrt{30}}{30} & 0 & 0 \\ 0 & \frac{3\sqrt{5}}{20} & 0 & \frac{\sqrt{15}}{20} & 0 & 0 & -\frac{\sqrt{30}}{30} & 0 & -\frac{\sqrt{15}}{15} & 0 \end{bmatrix}$       |
| 57  | symmetry                          | $\sqrt{3}xz$   |
|     | $\mathbb{T}_{2,1}^{(1,0;a)}(T_2)$ | $\begin{bmatrix} \frac{\sqrt{15}i}{20} & 0 & -\frac{3\sqrt{5}i}{20} & 0 & 0 & \frac{\sqrt{15}i}{15} & 0 & -\frac{\sqrt{30}i}{30} & 0 & 0 \\ 0 & -\frac{3\sqrt{5}i}{20} & 0 & \frac{\sqrt{15}i}{20} & 0 & 0 & \frac{\sqrt{30}i}{30} & 0 & -\frac{\sqrt{15}i}{15} & 0 \end{bmatrix}$ |
| 58  | symmetry                          | $\sqrt{3}xy$   |
|     | $\mathbb{T}_{2,2}^{(1,0;a)}(T_2)$ | $\begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{15}}{10} & \frac{\sqrt{3}}{6} & 0 & 0 & 0 & -\frac{\sqrt{15}}{30} & 0 \\ -\frac{\sqrt{15}}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{30} & 0 & 0 & 0 & -\frac{\sqrt{3}}{6} \end{bmatrix}$   |
| 59  | symmetry                          | $\sqrt{15}xyz$   |

*continued ...*

Table 3

| No. | multipole                          | matrix  |
|-----|------------------------------------|---|
|     | $\mathbb{M}_3^{(1,-1;a)}(A_2)$     | $\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{12} & 0 & 0 & 0 & -\frac{\sqrt{30}i}{12} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{12} & 0 & 0 & 0 & \frac{\sqrt{6}i}{12} \end{bmatrix}$  |
| 60  | symmetry                           | $\frac{x(2x^2-3y^2-3z^2)}{2}$   |
|     | $\mathbb{M}_{3,0}^{(1,-1;a)}(T_1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{8} & 0 & -\frac{1}{4} & 0 & \frac{\sqrt{10}}{8} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{8} & 0 & -\frac{1}{4} & 0 & \frac{\sqrt{2}}{8} & 0 \end{bmatrix}$                            |
| 61  | symmetry                           | $-\frac{y(3x^2-2y^2+3z^2)}{2}$  |
|     | $\mathbb{M}_{3,1}^{(1,-1;a)}(T_1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{8} & 0 & \frac{i}{4} & 0 & \frac{\sqrt{10}i}{8} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{10}i}{8} & 0 & -\frac{i}{4} & 0 & -\frac{\sqrt{2}i}{8} & 0 \end{bmatrix}$                       |
| 62  | symmetry                           | $-\frac{z(3x^2+3y^2-2z^2)}{2}$  |
|     | $\mathbb{M}_{3,2}^{(1,-1;a)}(T_1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{1}{2} & 0 & 0 \end{bmatrix}$   |
| 63  | symmetry                           | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$  |
|     | $\mathbb{M}_{3,0}^{(1,-1;a)}(T_2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{24} & 0 & -\frac{\sqrt{15}}{12} & 0 & -\frac{\sqrt{6}}{8} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{8} & 0 & -\frac{\sqrt{15}}{12} & 0 & \frac{\sqrt{30}}{24} & 0 \end{bmatrix}$      |
| 64  | symmetry                           | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$   |
|     | $\mathbb{M}_{3,1}^{(1,-1;a)}(T_2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{24} & 0 & -\frac{\sqrt{15}i}{12} & 0 & \frac{\sqrt{6}i}{8} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{8} & 0 & \frac{\sqrt{15}i}{12} & 0 & \frac{\sqrt{30}i}{24} & 0 \end{bmatrix}$ |
| 65  | symmetry                           | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$  |
|     | $\mathbb{M}_{3,2}^{(1,-1;a)}(T_2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & 0 & \frac{\sqrt{30}}{12} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{12} & 0 & 0 & 0 & -\frac{\sqrt{6}}{12} \end{bmatrix}$  |
| 66  | symmetry                           | $x$   |
|     | $\mathbb{M}_{1,0}^{(1,1;a)}(T_1)$  | $\begin{bmatrix} \frac{\sqrt{3}}{4} & 0 & -\frac{1}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{4} & 0 & -\frac{\sqrt{3}}{4} & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$  |
| 67  | symmetry                           | $y$   |
|     | $\mathbb{M}_{1,1}^{(1,1;a)}(T_1)$  | $\begin{bmatrix} \frac{\sqrt{3}i}{4} & 0 & \frac{i}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{i}{4} & 0 & \frac{\sqrt{3}i}{4} & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$  |
| 68  | symmetry                           | $z$   |

continued ...



Table 3

| No.                               | multipole | matrix   |
|-----------------------------------|-----------|--|
| $\mathbb{M}_{1,2}^{(1,1;a)}(T_1)$ |           | $\begin{bmatrix} 0 & -\frac{1}{2} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{1}{2} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
|                                   |           |  |

$$\text{bra:} = \langle \frac{1}{2}, \frac{1}{2}; s |, \langle \frac{1}{2}, -\frac{1}{2}; s |$$

$$\text{ket:} = | \frac{5}{2}, \frac{5}{2}; f \rangle, | \frac{5}{2}, \frac{3}{2}; f \rangle, | \frac{5}{2}, \frac{1}{2}; f \rangle, | \frac{5}{2}, -\frac{1}{2}; f \rangle, | \frac{5}{2}, -\frac{3}{2}; f \rangle, | \frac{5}{2}, -\frac{5}{2}; f \rangle, | \frac{7}{2}, \frac{7}{2}; f \rangle, | \frac{7}{2}, \frac{5}{2}; f \rangle, | \frac{7}{2}, \frac{3}{2}; f \rangle, | \frac{7}{2}, \frac{1}{2}; f \rangle, | \frac{7}{2}, -\frac{1}{2}; f \rangle, | \frac{7}{2}, -\frac{3}{2}; f \rangle, | \frac{7}{2}, -\frac{5}{2}; f \rangle, | \frac{7}{2}, -\frac{7}{2}; f \rangle$$

Table 4: (s,f) block.

| No. | multipole                     | matrix  |
|-----|-------------------------------|---|
| 69  | symmetry                      | $\sqrt{15}xyz$  |
|     | $\mathbb{Q}_3^{(a)}(A_2)$     | $\begin{bmatrix} -\frac{\sqrt{14}i}{28} & 0 & 0 & 0 & \frac{\sqrt{70}i}{28} & 0 & 0 & \frac{\sqrt{21}i}{14} & 0 & 0 & 0 & -\frac{\sqrt{7}i}{14} & 0 & 0 \\ 0 & \frac{\sqrt{70}i}{28} & 0 & 0 & 0 & -\frac{\sqrt{14}i}{28} & 0 & 0 & \frac{\sqrt{7}i}{14} & 0 & 0 & 0 & -\frac{\sqrt{21}i}{14} & 0 \end{bmatrix}$  |
| 70  | symmetry                      | $\frac{x(2x^2-3y^2-3z^2)}{2}$   |
|     | $\mathbb{Q}_{3,0}^{(a)}(T_1)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{42}}{56} & 0 & \frac{\sqrt{21}}{28} & 0 & -\frac{\sqrt{210}}{56} & -\frac{\sqrt{5}}{8} & 0 & \frac{\sqrt{105}}{56} & 0 & -\frac{3\sqrt{7}}{56} & 0 & \frac{\sqrt{35}}{56} & 0 \\ -\frac{\sqrt{210}}{56} & 0 & \frac{\sqrt{21}}{28} & 0 & -\frac{\sqrt{42}}{56} & 0 & 0 & -\frac{\sqrt{35}}{56} & 0 & \frac{3\sqrt{7}}{56} & 0 & -\frac{\sqrt{105}}{56} & 0 & \frac{\sqrt{5}}{8} \end{bmatrix}$              |
| 71  | symmetry                      | $-\frac{y(3x^2-2y^2+3z^2)}{2}$  |
|     | $\mathbb{Q}_{3,1}^{(a)}(T_1)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{42}i}{56} & 0 & -\frac{\sqrt{21}i}{28} & 0 & -\frac{\sqrt{210}i}{56} & \frac{\sqrt{5}i}{8} & 0 & \frac{\sqrt{105}i}{56} & 0 & \frac{3\sqrt{7}i}{56} & 0 & \frac{\sqrt{35}i}{56} & 0 \\ \frac{\sqrt{210}i}{56} & 0 & \frac{\sqrt{21}i}{28} & 0 & \frac{\sqrt{42}i}{56} & 0 & 0 & \frac{\sqrt{35}i}{56} & 0 & \frac{3\sqrt{7}i}{56} & 0 & \frac{\sqrt{105}i}{56} & 0 & \frac{\sqrt{5}i}{8} \end{bmatrix}$     |
| 72  | symmetry                      | $-\frac{z(3x^2+3y^2-2z^2)}{2}$  |
|     | $\mathbb{Q}_{3,2}^{(a)}(T_1)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{7} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{7} & 0 & 0 & 0 \end{bmatrix}$   |
| 73  | symmetry                      | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$  |
|     | $\mathbb{Q}_{3,0}^{(a)}(T_2)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{70}}{56} & 0 & \frac{\sqrt{35}}{28} & 0 & \frac{3\sqrt{14}}{56} & \frac{\sqrt{3}}{8} & 0 & \frac{5\sqrt{7}}{56} & 0 & -\frac{\sqrt{105}}{56} & 0 & -\frac{\sqrt{21}}{56} & 0 \\ \frac{3\sqrt{14}}{56} & 0 & \frac{\sqrt{35}}{28} & 0 & -\frac{\sqrt{70}}{56} & 0 & 0 & \frac{\sqrt{21}}{56} & 0 & \frac{\sqrt{105}}{56} & 0 & -\frac{5\sqrt{7}}{56} & 0 & -\frac{\sqrt{3}}{8} \end{bmatrix}$                |
| 74  | symmetry                      | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$   |
|     | $\mathbb{Q}_{3,1}^{(a)}(T_2)$ | $\begin{bmatrix} 0 & \frac{\sqrt{70}i}{56} & 0 & \frac{\sqrt{35}i}{28} & 0 & -\frac{3\sqrt{14}i}{56} & \frac{\sqrt{3}i}{8} & 0 & -\frac{5\sqrt{7}i}{56} & 0 & -\frac{\sqrt{105}i}{56} & 0 & \frac{\sqrt{21}i}{56} & 0 \\ \frac{3\sqrt{14}i}{56} & 0 & -\frac{\sqrt{35}i}{28} & 0 & -\frac{\sqrt{70}i}{56} & 0 & 0 & \frac{\sqrt{21}i}{56} & 0 & -\frac{\sqrt{105}i}{56} & 0 & -\frac{5\sqrt{7}i}{56} & 0 & \frac{\sqrt{3}i}{8} \end{bmatrix}$ |
| 75  | symmetry                      | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$  |

continued ...

Table 4

| No. | multipole                         | matrix  |
|-----|-----------------------------------|---|
|     | $\mathbb{Q}_{3,2}^{(a)}(T_2)$     | $\begin{bmatrix} -\frac{\sqrt{14}}{28} & 0 & 0 & 0 & -\frac{\sqrt{70}}{28} & 0 & 0 & \frac{\sqrt{21}}{14} & 0 & 0 & 0 & \frac{\sqrt{7}}{14} & 0 & 0 \\ 0 & \frac{\sqrt{70}}{28} & 0 & 0 & 0 & \frac{\sqrt{14}}{28} & 0 & 0 & \frac{\sqrt{7}}{14} & 0 & 0 & 0 & \frac{\sqrt{21}}{14} & 0 \end{bmatrix}$  |
| 76  | symmetry                          | $\sqrt{15}xyz$  |
|     | $\mathbb{Q}_3^{(1,0;a)}(A_2)$     | $\begin{bmatrix} \frac{\sqrt{42}i}{42} & 0 & 0 & 0 & -\frac{\sqrt{210}i}{42} & 0 & 0 & \frac{3\sqrt{7}i}{28} & 0 & 0 & 0 & -\frac{\sqrt{21}i}{28} & 0 & 0 \\ 0 & -\frac{\sqrt{210}i}{42} & 0 & 0 & 0 & \frac{\sqrt{42}i}{42} & 0 & 0 & \frac{\sqrt{21}i}{28} & 0 & 0 & 0 & -\frac{3\sqrt{7}i}{28} & 0 \end{bmatrix}$  |
| 77  | symmetry                          | $\frac{x(2x^2-3y^2-3z^2)}{2}$   |
|     | $\mathbb{Q}_{3,0}^{(1,0;a)}(T_1)$ | $\begin{bmatrix} 0 & \frac{\sqrt{14}}{28} & 0 & -\frac{\sqrt{7}}{14} & 0 & \frac{\sqrt{70}}{28} & -\frac{\sqrt{15}}{16} & 0 & \frac{3\sqrt{35}}{112} & 0 & -\frac{3\sqrt{21}}{112} & 0 & \frac{\sqrt{105}}{112} & 0 \\ \frac{\sqrt{70}}{28} & 0 & -\frac{\sqrt{7}}{14} & 0 & \frac{\sqrt{14}}{28} & 0 & 0 & -\frac{\sqrt{105}}{112} & 0 & \frac{3\sqrt{21}}{112} & 0 & -\frac{3\sqrt{35}}{112} & 0 & \frac{\sqrt{15}}{16} \end{bmatrix}$            |
| 78  | symmetry                          | $-\frac{y(3x^2-2y^2+3z^2)}{2}$  |
|     | $\mathbb{Q}_{3,1}^{(1,0;a)}(T_1)$ | $\begin{bmatrix} 0 & \frac{\sqrt{14}i}{28} & 0 & \frac{\sqrt{7}i}{14} & 0 & \frac{\sqrt{70}i}{28} & \frac{\sqrt{15}i}{16} & 0 & \frac{3\sqrt{35}i}{112} & 0 & \frac{3\sqrt{21}i}{112} & 0 & \frac{\sqrt{105}i}{112} & 0 \\ -\frac{\sqrt{70}i}{28} & 0 & -\frac{\sqrt{7}i}{14} & 0 & -\frac{\sqrt{14}i}{28} & 0 & 0 & \frac{\sqrt{105}i}{112} & 0 & \frac{3\sqrt{21}i}{112} & 0 & \frac{3\sqrt{35}i}{112} & 0 & \frac{\sqrt{15}i}{16} \end{bmatrix}$ |
| 79  | symmetry                          | $-\frac{z(3x^2+3y^2-2z^2)}{2}$  |
|     | $\mathbb{Q}_{3,2}^{(1,0;a)}(T_1)$ | $\begin{bmatrix} 0 & 0 & \frac{\sqrt{7}}{7} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{14} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{7}}{7} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{14} & 0 & 0 & 0 \end{bmatrix}$   |
| 80  | symmetry                          | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$  |
|     | $\mathbb{Q}_{3,0}^{(1,0;a)}(T_2)$ | $\begin{bmatrix} 0 & \frac{\sqrt{210}}{84} & 0 & -\frac{\sqrt{105}}{42} & 0 & -\frac{\sqrt{42}}{28} & \frac{3}{16} & 0 & \frac{5\sqrt{21}}{112} & 0 & -\frac{3\sqrt{35}}{112} & 0 & -\frac{3\sqrt{7}}{112} & 0 \\ -\frac{\sqrt{42}}{28} & 0 & -\frac{\sqrt{105}}{42} & 0 & \frac{\sqrt{210}}{84} & 0 & 0 & \frac{3\sqrt{7}}{112} & 0 & \frac{3\sqrt{35}}{112} & 0 & -\frac{5\sqrt{21}}{112} & 0 & -\frac{3}{16} \end{bmatrix}$                      |
| 81  | symmetry                          | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$   |
|     | $\mathbb{Q}_{3,1}^{(1,0;a)}(T_2)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{210}i}{84} & 0 & -\frac{\sqrt{105}i}{42} & 0 & \frac{\sqrt{42}i}{28} & \frac{3i}{16} & 0 & -\frac{5\sqrt{21}i}{112} & 0 & -\frac{3\sqrt{35}i}{112} & 0 & \frac{3\sqrt{7}i}{112} & 0 \\ -\frac{\sqrt{42}i}{28} & 0 & \frac{\sqrt{105}i}{42} & 0 & \frac{\sqrt{210}i}{84} & 0 & 0 & \frac{3\sqrt{7}i}{112} & 0 & -\frac{3\sqrt{35}i}{112} & 0 & -\frac{5\sqrt{21}i}{112} & 0 & \frac{3i}{16} \end{bmatrix}$         |
| 82  | symmetry                          | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$  |
|     | $\mathbb{Q}_{3,2}^{(1,0;a)}(T_2)$ | $\begin{bmatrix} \frac{\sqrt{42}}{42} & 0 & 0 & 0 & \frac{\sqrt{210}}{42} & 0 & 0 & \frac{3\sqrt{7}}{28} & 0 & 0 & 0 & \frac{\sqrt{21}}{28} & 0 & 0 \\ 0 & -\frac{\sqrt{210}}{42} & 0 & 0 & 0 & -\frac{\sqrt{42}}{42} & 0 & 0 & \frac{\sqrt{21}}{28} & 0 & 0 & 0 & \frac{3\sqrt{7}}{28} & 0 \end{bmatrix}$  |
| 83  | symmetry                          | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$  |
|     | $\mathbb{G}_4^{(1,-1;a)}(A_1)$    | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}i}{12} & 0 & 0 & 0 & \frac{\sqrt{15}i}{12} \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{12} & 0 & 0 & 0 & -\frac{\sqrt{21}i}{12} & 0 & 0 & 0 \end{bmatrix}$  |
| 84  | symmetry                          | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$  |

continued ...

Table 4

| No. | multipole                          | matrix   |
|-----|------------------------------------|--|
|     | $\mathbb{G}_{4,0}^{(1,-1;a)}(E)$   | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{12} & 0 & 0 & 0 & -\frac{\sqrt{21}i}{12} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}i}{12} & 0 & 0 & 0 & -\frac{\sqrt{15}i}{12} & 0 & 0 & 0 \end{bmatrix}$   |
| 85  | symmetry                           | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$   |
|     | $\mathbb{G}_{4,1}^{(1,-1;a)}(E)$   | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{i}{4} & 0 & 0 & 0 & -\frac{\sqrt{3}i}{4} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{4} & 0 & 0 & 0 & \frac{i}{4} & 0 \end{bmatrix}$   |
| 86  | symmetry                           | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$  |
|     | $\mathbb{G}_{4,0}^{(1,-1;a)}(T_1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & -\frac{1}{16} & 0 & -\frac{\sqrt{21}}{16} & 0 & -\frac{\sqrt{35}}{16} & 0 & -\frac{\sqrt{7}}{16} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{16} & 0 & \frac{\sqrt{35}}{16} & 0 & \frac{\sqrt{21}}{16} & 0 & \frac{1}{16} \end{bmatrix}$       |
| 87  | symmetry                           | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$   |
|     | $\mathbb{G}_{4,1}^{(1,-1;a)}(T_1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & \frac{i}{16} & 0 & -\frac{\sqrt{21}i}{16} & 0 & \frac{\sqrt{35}i}{16} & 0 & -\frac{\sqrt{7}i}{16} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}i}{16} & 0 & \frac{\sqrt{35}i}{16} & 0 & -\frac{\sqrt{21}i}{16} & 0 & \frac{i}{16} \end{bmatrix}$ |
| 88  | symmetry                           | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$  |
|     | $\mathbb{G}_{4,2}^{(1,-1;a)}(T_1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{2} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$   |
| 89  | symmetry                           | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$   |
|     | $\mathbb{G}_{4,0}^{(1,-1;a)}(T_2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{16} & 0 & -\frac{\sqrt{3}}{16} & 0 & -\frac{\sqrt{5}}{16} & 0 & \frac{7}{16} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{7}{16} & 0 & \frac{\sqrt{5}}{16} & 0 & \frac{\sqrt{3}}{16} & 0 & -\frac{\sqrt{7}}{16} \end{bmatrix}$           |
| 90  | symmetry                           | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$  |
|     | $\mathbb{G}_{4,1}^{(1,-1;a)}(T_2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}i}{16} & 0 & \frac{\sqrt{3}i}{16} & 0 & -\frac{\sqrt{5}i}{16} & 0 & -\frac{7i}{16} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{7i}{16} & 0 & -\frac{\sqrt{5}i}{16} & 0 & \frac{\sqrt{3}i}{16} & 0 & \frac{\sqrt{7}i}{16} \end{bmatrix}$   |
| 91  | symmetry                           | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$  |
|     | $\mathbb{G}_{4,2}^{(1,-1;a)}(T_2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{1}{4} & 0 & 0 & 0 & \frac{\sqrt{3}}{4} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{4} & 0 & 0 & 0 & -\frac{1}{4} & 0 \end{bmatrix}$   |
| 92  | symmetry                           | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$   |
|     | $\mathbb{G}_{2,0}^{(1,1;a)}(E)$    | $\begin{bmatrix} 0 & 0 & -\frac{i}{2} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{i}{2} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$   |
| 93  | symmetry                           | $\frac{\sqrt{3}(x-y)(x+y)}{2}$   |

continued ...

Table 4

| No. | multipole                         | matrix   |
|-----|-----------------------------------|--|
|     | $\mathbb{G}_{2,1}^{(1,1;a)}(E)$   | $\begin{bmatrix} -\frac{\sqrt{30}i}{12} & 0 & 0 & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & 0 & -\frac{\sqrt{30}i}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$   |
| 94  | symmetry                          | $\sqrt{3}yz$   |
|     | $\mathbb{G}_{2,0}^{(1,1;a)}(T_2)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{6}}{6} & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & -\frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$   |
| 95  | symmetry                          | $\sqrt{3}xz$   |
|     | $\mathbb{G}_{2,1}^{(1,1;a)}(T_2)$ | $\begin{bmatrix} 0 & \frac{\sqrt{6}i}{6} & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{3}i}{6} & 0 & -\frac{\sqrt{6}i}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$   |
| 96  | symmetry                          | $\sqrt{3}xy$   |
|     | $\mathbb{G}_{2,2}^{(1,1;a)}(T_2)$ | $\begin{bmatrix} \frac{\sqrt{30}}{12} & 0 & 0 & 0 & -\frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{6}}{12} & 0 & 0 & 0 & -\frac{\sqrt{30}}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$   |
| 97  | symmetry                          | $\sqrt{15}xyz$   |
|     | $\mathbb{T}_3^{(a)}(A_2)$         | $\begin{bmatrix} \frac{\sqrt{14}}{28} & 0 & 0 & 0 & -\frac{\sqrt{70}}{28} & 0 & 0 & -\frac{\sqrt{21}}{14} & 0 & 0 & 0 & \frac{\sqrt{7}}{14} & 0 & 0 \\ 0 & -\frac{\sqrt{70}}{28} & 0 & 0 & 0 & \frac{\sqrt{14}}{28} & 0 & 0 & -\frac{\sqrt{7}}{14} & 0 & 0 & 0 & \frac{\sqrt{21}}{14} & 0 \end{bmatrix}$   |
| 98  | symmetry                          | $\frac{x(2x^2-3y^2-3z^2)}{2}$  |
|     | $\mathbb{T}_{3,0}^{(a)}(T_1)$     | $\begin{bmatrix} 0 & -\frac{\sqrt{42}i}{56} & 0 & \frac{\sqrt{21}i}{28} & 0 & -\frac{\sqrt{210}i}{56} & -\frac{\sqrt{5}i}{8} & 0 & \frac{\sqrt{105}i}{56} & 0 & -\frac{3\sqrt{7}i}{56} & 0 & \frac{\sqrt{35}i}{56} & 0 \\ -\frac{\sqrt{210}i}{56} & 0 & \frac{\sqrt{21}i}{28} & 0 & -\frac{\sqrt{42}i}{56} & 0 & 0 & -\frac{\sqrt{35}i}{56} & 0 & \frac{3\sqrt{7}i}{56} & 0 & -\frac{\sqrt{105}i}{56} & 0 & \frac{\sqrt{5}i}{8} \end{bmatrix}$ |
| 99  | symmetry                          | $-\frac{y(3x^2-2y^2+3z^2)}{2}$   |
|     | $\mathbb{T}_{3,1}^{(a)}(T_1)$     | $\begin{bmatrix} 0 & \frac{\sqrt{42}}{56} & 0 & \frac{\sqrt{21}}{28} & 0 & \frac{\sqrt{210}}{56} & -\frac{\sqrt{5}}{8} & 0 & -\frac{\sqrt{105}}{56} & 0 & -\frac{3\sqrt{7}}{56} & 0 & -\frac{\sqrt{35}}{56} & 0 \\ -\frac{\sqrt{210}}{56} & 0 & -\frac{\sqrt{21}}{28} & 0 & -\frac{\sqrt{42}}{56} & 0 & 0 & -\frac{\sqrt{35}}{56} & 0 & -\frac{3\sqrt{7}}{56} & 0 & -\frac{\sqrt{105}}{56} & 0 & -\frac{\sqrt{5}}{8} \end{bmatrix}$            |
| 100 | symmetry                          | $-\frac{z(3x^2+3y^2-2z^2)}{2}$   |
|     | $\mathbb{T}_{3,2}^{(a)}(T_1)$     | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{21}i}{14} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}i}{7} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{21}i}{14} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}i}{7} & 0 & 0 & 0 \end{bmatrix}$  |
| 101 | symmetry                          | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$   |
|     | $\mathbb{T}_{3,0}^{(a)}(T_2)$     | $\begin{bmatrix} 0 & -\frac{\sqrt{70}i}{56} & 0 & \frac{\sqrt{35}i}{28} & 0 & \frac{3\sqrt{14}i}{56} & \frac{\sqrt{3}i}{8} & 0 & \frac{5\sqrt{7}i}{56} & 0 & -\frac{\sqrt{105}i}{56} & 0 & -\frac{\sqrt{21}i}{56} & 0 \\ \frac{3\sqrt{14}i}{56} & 0 & \frac{\sqrt{35}i}{28} & 0 & -\frac{\sqrt{70}i}{56} & 0 & 0 & \frac{\sqrt{21}i}{56} & 0 & \frac{\sqrt{105}i}{56} & 0 & -\frac{5\sqrt{7}i}{56} & 0 & -\frac{\sqrt{3}i}{8} \end{bmatrix}$   |
| 102 | symmetry                          | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$  |

continued ...

Table 4

| No. | multipole                         | matrix   |
|-----|-----------------------------------|--|
|     | $\mathbb{T}_{3,1}^{(a)}(T_2)$     | $\begin{bmatrix} 0 & -\frac{\sqrt{70}}{56} & 0 & -\frac{\sqrt{35}}{28} & 0 & \frac{3\sqrt{14}}{56} & -\frac{\sqrt{3}}{8} & 0 & \frac{5\sqrt{7}}{56} & 0 & \frac{\sqrt{105}}{56} & 0 & -\frac{\sqrt{21}}{56} & 0 \\ -\frac{3\sqrt{14}}{56} & 0 & \frac{\sqrt{35}}{28} & 0 & \frac{\sqrt{70}}{56} & 0 & 0 & -\frac{\sqrt{21}}{56} & 0 & \frac{\sqrt{105}}{56} & 0 & \frac{5\sqrt{7}}{56} & 0 & -\frac{\sqrt{3}}{8} \end{bmatrix}$                          |
| 103 | symmetry                          | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$   |
|     | $\mathbb{T}_{3,2}^{(a)}(T_2)$     | $\begin{bmatrix} -\frac{\sqrt{14}i}{28} & 0 & 0 & 0 & -\frac{\sqrt{70}i}{28} & 0 & 0 & \frac{\sqrt{21}i}{14} & 0 & 0 & 0 & \frac{\sqrt{7}i}{14} & 0 & 0 \\ 0 & \frac{\sqrt{70}i}{28} & 0 & 0 & 0 & \frac{\sqrt{14}i}{28} & 0 & 0 & \frac{\sqrt{7}i}{14} & 0 & 0 & 0 & \frac{\sqrt{21}i}{14} & 0 \end{bmatrix}$   |
| 104 | symmetry                          | $\sqrt{15}xyz$   |
|     | $\mathbb{T}_3^{(1,0;a)}(A_2)$     | $\begin{bmatrix} \frac{\sqrt{42}}{42} & 0 & 0 & 0 & -\frac{\sqrt{210}}{42} & 0 & 0 & \frac{3\sqrt{7}}{28} & 0 & 0 & 0 & -\frac{\sqrt{21}}{28} & 0 & 0 \\ 0 & -\frac{\sqrt{210}}{42} & 0 & 0 & 0 & \frac{\sqrt{42}}{42} & 0 & 0 & \frac{\sqrt{21}}{28} & 0 & 0 & 0 & -\frac{3\sqrt{7}}{28} & 0 \end{bmatrix}$   |
| 105 | symmetry                          | $\frac{x(2x^2-3y^2-3z^2)}{2}$  |
|     | $\mathbb{T}_{3,0}^{(1,0;a)}(T_1)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{14}i}{28} & 0 & \frac{\sqrt{7}i}{14} & 0 & -\frac{\sqrt{70}i}{28} & \frac{\sqrt{15}i}{16} & 0 & -\frac{3\sqrt{35}i}{112} & 0 & \frac{3\sqrt{21}i}{112} & 0 & -\frac{\sqrt{105}i}{112} & 0 \\ -\frac{\sqrt{70}i}{28} & 0 & \frac{\sqrt{7}i}{14} & 0 & -\frac{\sqrt{14}i}{28} & 0 & 0 & \frac{\sqrt{105}i}{112} & 0 & -\frac{3\sqrt{21}i}{112} & 0 & \frac{3\sqrt{35}i}{112} & 0 & -\frac{\sqrt{15}i}{16} \end{bmatrix}$ |
| 106 | symmetry                          | $-\frac{y(3x^2-2y^2+3z^2)}{2}$   |
|     | $\mathbb{T}_{3,1}^{(1,0;a)}(T_1)$ | $\begin{bmatrix} 0 & \frac{\sqrt{14}}{28} & 0 & \frac{\sqrt{7}}{14} & 0 & \frac{\sqrt{70}}{28} & \frac{\sqrt{15}}{16} & 0 & \frac{3\sqrt{35}}{112} & 0 & \frac{3\sqrt{21}}{112} & 0 & \frac{\sqrt{105}}{112} & 0 \\ -\frac{\sqrt{70}}{28} & 0 & -\frac{\sqrt{7}}{14} & 0 & -\frac{\sqrt{14}}{28} & 0 & 0 & \frac{\sqrt{105}}{112} & 0 & \frac{3\sqrt{21}}{112} & 0 & \frac{3\sqrt{35}}{112} & 0 & \frac{\sqrt{15}}{16} \end{bmatrix}$                    |
| 107 | symmetry                          | $-\frac{z(3x^2+3y^2-2z^2)}{2}$   |
|     | $\mathbb{T}_{3,2}^{(1,0;a)}(T_1)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{7}i}{7} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}i}{14} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{7}i}{7} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}i}{14} & 0 & 0 & 0 \end{bmatrix}$  |
| 108 | symmetry                          | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$   |
|     | $\mathbb{T}_{3,0}^{(1,0;a)}(T_2)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{210}i}{84} & 0 & \frac{\sqrt{105}i}{42} & 0 & \frac{\sqrt{42}i}{28} & -\frac{3i}{16} & 0 & -\frac{5\sqrt{21}i}{112} & 0 & \frac{3\sqrt{35}i}{112} & 0 & \frac{3\sqrt{7}i}{112} & 0 \\ \frac{\sqrt{42}i}{28} & 0 & \frac{\sqrt{105}i}{42} & 0 & -\frac{\sqrt{210}i}{84} & 0 & 0 & -\frac{3\sqrt{7}i}{112} & 0 & -\frac{3\sqrt{35}i}{112} & 0 & \frac{5\sqrt{21}i}{112} & 0 & \frac{3i}{16} \end{bmatrix}$               |
| 109 | symmetry                          | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$  |
|     | $\mathbb{T}_{3,1}^{(1,0;a)}(T_2)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{210}}{84} & 0 & -\frac{\sqrt{105}}{42} & 0 & \frac{\sqrt{42}}{28} & \frac{3}{16} & 0 & -\frac{5\sqrt{21}}{112} & 0 & -\frac{3\sqrt{35}}{112} & 0 & \frac{3\sqrt{7}}{112} & 0 \\ -\frac{\sqrt{42}}{28} & 0 & \frac{\sqrt{105}}{42} & 0 & \frac{\sqrt{210}}{84} & 0 & 0 & \frac{3\sqrt{7}}{112} & 0 & -\frac{3\sqrt{35}}{112} & 0 & -\frac{5\sqrt{21}}{112} & 0 & \frac{3}{16} \end{bmatrix}$                            |
| 110 | symmetry                          | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$   |
|     | $\mathbb{T}_{3,2}^{(1,0;a)}(T_2)$ | $\begin{bmatrix} -\frac{\sqrt{42}i}{42} & 0 & 0 & 0 & -\frac{\sqrt{210}i}{42} & 0 & 0 & -\frac{3\sqrt{7}i}{28} & 0 & 0 & 0 & -\frac{\sqrt{21}i}{28} & 0 & 0 \\ 0 & \frac{\sqrt{210}i}{42} & 0 & 0 & 0 & \frac{\sqrt{42}i}{42} & 0 & 0 & -\frac{\sqrt{21}i}{28} & 0 & 0 & 0 & -\frac{3\sqrt{7}i}{28} & 0 \end{bmatrix}$   |
| 111 | symmetry                          | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$   |

continued ...

Table 4

| No. | multipole                          | matrix   |
|-----|------------------------------------|--|
|     | $\mathbb{M}_4^{(1,-1;a)}(A_1)$     | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{12} & 0 & 0 & 0 & \frac{\sqrt{15}}{12} \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{12} & 0 & 0 & 0 & -\frac{\sqrt{21}}{12} & 0 & 0 & 0 \end{bmatrix}$   |
| 112 | symmetry                           | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$   |
|     | $\mathbb{M}_{4,0}^{(1,-1;a)}(E)$   | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{12} & 0 & 0 & 0 & -\frac{\sqrt{21}}{12} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{21}}{12} & 0 & 0 & 0 & -\frac{\sqrt{15}}{12} & 0 & 0 & 0 \end{bmatrix}$   |
| 113 | symmetry                           | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$   |
|     | $\mathbb{M}_{4,1}^{(1,-1;a)}(E)$   | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{1}{4} & 0 & 0 & 0 & -\frac{\sqrt{3}}{4} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{4} & 0 & 0 & 0 & \frac{1}{4} & 0 \end{bmatrix}$   |
| 114 | symmetry                           | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$  |
|     | $\mathbb{M}_{4,0}^{(1,-1;a)}(T_1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & \frac{i}{16} & 0 & \frac{\sqrt{21}i}{16} & 0 & \frac{\sqrt{35}i}{16} & 0 & \frac{\sqrt{7}i}{16} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}i}{16} & 0 & -\frac{\sqrt{35}i}{16} & 0 & -\frac{\sqrt{21}i}{16} & 0 & -\frac{i}{16} \end{bmatrix}$ |
| 115 | symmetry                           | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$   |
|     | $\mathbb{M}_{4,1}^{(1,-1;a)}(T_1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{16} & 0 & -\frac{\sqrt{21}}{16} & 0 & \frac{\sqrt{35}}{16} & 0 & -\frac{\sqrt{7}}{16} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{16} & 0 & \frac{\sqrt{35}}{16} & 0 & -\frac{\sqrt{21}}{16} & 0 & \frac{1}{16} \end{bmatrix}$       |
| 116 | symmetry                           | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$  |
|     | $\mathbb{M}_{4,2}^{(1,-1;a)}(T_1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{i}{2} \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{i}{2} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$   |
| 117 | symmetry                           | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$   |
|     | $\mathbb{M}_{4,0}^{(1,-1;a)}(T_2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}i}{16} & 0 & \frac{\sqrt{3}i}{16} & 0 & \frac{\sqrt{5}i}{16} & 0 & -\frac{7i}{16} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{7i}{16} & 0 & -\frac{\sqrt{5}i}{16} & 0 & -\frac{\sqrt{3}i}{16} & 0 & \frac{\sqrt{7}i}{16} \end{bmatrix}$   |
| 118 | symmetry                           | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$  |
|     | $\mathbb{M}_{4,1}^{(1,-1;a)}(T_2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{16} & 0 & \frac{\sqrt{3}}{16} & 0 & -\frac{\sqrt{5}}{16} & 0 & -\frac{7}{16} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{7}{16} & 0 & -\frac{\sqrt{5}}{16} & 0 & \frac{\sqrt{3}}{16} & 0 & \frac{\sqrt{7}}{16} \end{bmatrix}$           |
| 119 | symmetry                           | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$  |
|     | $\mathbb{M}_{4,2}^{(1,-1;a)}(T_2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{i}{4} & 0 & 0 & 0 & -\frac{\sqrt{3}i}{4} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{4} & 0 & 0 & 0 & \frac{i}{4} & 0 \end{bmatrix}$   |
| 120 | symmetry                           | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$   |

continued ...

Table 4

| No. | multipole                         | matrix   |
|-----|-----------------------------------|--|
|     | $\mathbb{M}_{2,0}^{(1,1;a)}(E)$   | $\begin{bmatrix} 0 & 0 & -\frac{1}{2} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{1}{2} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$   |
| 121 | symmetry                          | $\frac{\sqrt{3}(x-y)(x+y)}{2}$   |
|     | $\mathbb{M}_{2,1}^{(1,1;a)}(E)$   | $\begin{bmatrix} -\frac{\sqrt{30}}{12} & 0 & 0 & 0 & -\frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{6}}{12} & 0 & 0 & 0 & -\frac{\sqrt{30}}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$   |
| 122 | symmetry                          | $\sqrt{3}yz$   |
|     | $\mathbb{M}_{2,0}^{(1,1;a)}(T_2)$ | $\begin{bmatrix} 0 & \frac{\sqrt{6}i}{6} & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{3}i}{6} & 0 & \frac{\sqrt{6}i}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$         |
| 123 | symmetry                          | $\sqrt{3}xz$   |
|     | $\mathbb{M}_{2,1}^{(1,1;a)}(T_2)$ | $\begin{bmatrix} 0 & \frac{\sqrt{6}}{6} & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{3}}{6} & 0 & -\frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$           |
| 124 | symmetry                          | $\sqrt{3}xy$   |
|     | $\mathbb{M}_{2,2}^{(1,1;a)}(T_2)$ | $\begin{bmatrix} -\frac{\sqrt{30}i}{12} & 0 & 0 & 0 & \frac{\sqrt{6}i}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & 0 & \frac{\sqrt{30}i}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |

$$\begin{aligned} \text{bra:} &= \langle \tfrac{1}{2}, \tfrac{1}{2}; p |, \langle \tfrac{1}{2}, -\tfrac{1}{2}; p |, \langle \tfrac{3}{2}, \tfrac{3}{2}; p |, \langle \tfrac{3}{2}, \tfrac{1}{2}; p |, \langle \tfrac{3}{2}, -\tfrac{1}{2}; p |, \langle \tfrac{3}{2}, -\tfrac{3}{2}; p | \\ \text{ket:} &= | \tfrac{1}{2}, \tfrac{1}{2}; p \rangle, | \tfrac{1}{2}, -\tfrac{1}{2}; p \rangle, | \tfrac{3}{2}, \tfrac{3}{2}; p \rangle, | \tfrac{3}{2}, \tfrac{1}{2}; p \rangle, | \tfrac{3}{2}, -\tfrac{1}{2}; p \rangle, | \tfrac{3}{2}, -\tfrac{3}{2}; p \rangle \end{aligned}$$

Table 5: (p,p) block.

| No. | multipole                 | matrix   |
|-----|---------------------------|--|
| 125 | symmetry                  | 1  |
|     | $\mathbb{Q}_0^{(a)}(A_1)$ | $\begin{bmatrix} \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} \end{bmatrix}$ |

continued ...

Table 5

| No. | multipole | matrix  |
|-----|-----------|---|
| 126 | symmetry  | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ $\mathbb{Q}_{2,0}^{(a)}(E) \begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{6}}{6} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 \\ 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 \\ -\frac{\sqrt{6}}{6} & 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 \\ 0 & \frac{\sqrt{6}}{6} & 0 & 0 & \frac{\sqrt{3}}{6} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{6} \end{bmatrix}$   |
| 127 | symmetry  | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ $\mathbb{Q}_{2,1}^{(a)}(E) \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{6} \\ 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{6}}{6} & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{6} \\ 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 \\ -\frac{\sqrt{6}}{6} & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 \end{bmatrix}$   |
| 128 | symmetry  | $\sqrt{3}yz$ $\mathbb{Q}_{2,0}^{(a)}(T_2) \begin{bmatrix} 0 & 0 & \frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{2}i}{4} & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & -\frac{\sqrt{6}i}{12} \\ -\frac{\sqrt{6}i}{12} & 0 & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 \\ 0 & \frac{\sqrt{2}i}{4} & -\frac{\sqrt{3}i}{6} & 0 & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} \\ 0 & \frac{\sqrt{6}i}{12} & 0 & 0 & \frac{\sqrt{3}i}{6} & 0 \end{bmatrix}$ |
| 129 | symmetry  | $\sqrt{3}xz$ $\mathbb{Q}_{2,1}^{(a)}(T_2) \begin{bmatrix} 0 & 0 & \frac{\sqrt{6}}{12} & 0 & -\frac{\sqrt{2}}{4} & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{6}}{12} \\ \frac{\sqrt{6}}{12} & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 \\ 0 & -\frac{\sqrt{2}}{4} & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 \\ -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{6} \\ 0 & \frac{\sqrt{6}}{12} & 0 & 0 & \frac{\sqrt{3}}{6} & 0 \end{bmatrix}$             |
| 130 | symmetry  | $\sqrt{3}xy$  |

continued ...



Table 5

| No. | multipole                     | matrix   |
|-----|-------------------------------|--|
|     | $\mathbb{Q}_{2,2}^{(a)}(T_2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{6} \\ 0 & 0 & \frac{\sqrt{6}i}{6} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{6}i}{6} & 0 & 0 & \frac{\sqrt{3}i}{6} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{6} \\ 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & 0 \\ -\frac{\sqrt{6}i}{6} & 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 \end{bmatrix}$   |
| 131 | symmetry                      | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ $\mathbb{Q}_{2,0}^{(1,-1;a)}(E)$ $\begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{6} & 0 \\ 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 \\ -\frac{\sqrt{3}}{6} & 0 & 0 & -\frac{\sqrt{6}}{6} & 0 & 0 \\ 0 & \frac{\sqrt{3}}{6} & 0 & 0 & -\frac{\sqrt{6}}{6} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} \end{bmatrix}$                               |
| 132 | symmetry                      | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ $\mathbb{Q}_{2,1}^{(1,-1;a)}(E)$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{6} \\ 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{3}}{6} & 0 & 0 & \frac{\sqrt{6}}{6} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} \\ 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 \\ -\frac{\sqrt{3}}{6} & 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 \end{bmatrix}$   |
| 133 | symmetry                      | $\sqrt{3}yz$ $\mathbb{Q}_{2,0}^{(1,-1;a)}(T_2)$ $\begin{bmatrix} 0 & 0 & \frac{\sqrt{3}i}{12} & 0 & \frac{i}{4} & 0 \\ 0 & 0 & 0 & -\frac{i}{4} & 0 & -\frac{\sqrt{3}i}{12} \\ -\frac{\sqrt{3}i}{12} & 0 & 0 & -\frac{\sqrt{6}i}{6} & 0 & 0 \\ 0 & \frac{i}{4} & \frac{\sqrt{6}i}{6} & 0 & 0 & 0 \\ -\frac{i}{4} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{6} \\ 0 & \frac{\sqrt{3}i}{12} & 0 & 0 & -\frac{\sqrt{6}i}{6} & 0 \end{bmatrix}$ |
| 134 | symmetry                      | $\sqrt{3}xz$   |

continued ...

Table 5

| No. | multipole                          | matrix   |
|-----|------------------------------------|--|
|     | $\mathbb{Q}_{2,1}^{(1,-1;a)}(T_2)$ | $\begin{bmatrix} 0 & 0 & \frac{\sqrt{3}}{12} & 0 & -\frac{1}{4} & 0 \\ 0 & 0 & 0 & -\frac{1}{4} & 0 & \frac{\sqrt{3}}{12} \\ \frac{\sqrt{3}}{12} & 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 \\ 0 & -\frac{1}{4} & \frac{\sqrt{6}}{6} & 0 & 0 & 0 \\ -\frac{1}{4} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{6} \\ 0 & \frac{\sqrt{3}}{12} & 0 & 0 & -\frac{\sqrt{6}}{6} & 0 \end{bmatrix}$           |
| 135 | symmetry                           | $\sqrt{3}xy$ $\mathbb{Q}_{2,2}^{(1,-1;a)}(T_2)$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{6} \\ 0 & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & -\frac{\sqrt{6}i}{6} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{6} \\ 0 & 0 & \frac{\sqrt{6}i}{6} & 0 & 0 & 0 \\ -\frac{\sqrt{3}i}{6} & 0 & 0 & \frac{\sqrt{6}i}{6} & 0 & 0 \end{bmatrix}$ |
| 136 | symmetry                           | $1$ $\mathbb{Q}_0^{(1,1;a)}(A_1)$ $\begin{bmatrix} -\frac{\sqrt{3}}{3} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{3}}{3} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{6} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{6} \end{bmatrix}$   |
| 137 | symmetry                           | $x$ $\mathbb{G}_{1,0}^{(1,0;a)}(T_1)$ $\begin{bmatrix} 0 & 0 & \frac{\sqrt{3}i}{4} & 0 & -\frac{i}{4} & 0 \\ 0 & 0 & 0 & \frac{i}{4} & 0 & -\frac{\sqrt{3}i}{4} \\ -\frac{\sqrt{3}i}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{i}{4} & 0 & 0 & 0 & 0 \\ \frac{i}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{3}i}{4} & 0 & 0 & 0 & 0 \end{bmatrix}$   |
| 138 | symmetry                           | $y$  |

continued ...

Table 5

| No. | multipole                         | matrix   |
|-----|-----------------------------------|--|
|     | $\mathbb{G}_{1,1}^{(1,0;a)}(T_1)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{3}}{4} & 0 & -\frac{1}{4} & 0 \\ 0 & 0 & 0 & -\frac{1}{4} & 0 & -\frac{\sqrt{3}}{4} \\ -\frac{\sqrt{3}}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{1}{4} & 0 & 0 & 0 & 0 \\ -\frac{1}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{3}}{4} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 139 | symmetry                          | $z$ $\mathbb{G}_{1,2}^{(1,0;a)}(T_1)$ $\begin{bmatrix} 0 & 0 & 0 & -\frac{i}{2} & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{i}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{i}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{i}{2} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$                                     |
| 140 | symmetry                          | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ $\mathbb{T}_{2,0}^{(1,0;a)}(E)$ $\begin{bmatrix} 0 & 0 & 0 & \frac{i}{2} & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{i}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{i}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{i}{2} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$    |
| 141 | symmetry                          | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ $\mathbb{T}_{2,1}^{(1,0;a)}(E)$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{i}{2} \\ 0 & 0 & -\frac{i}{2} & 0 & 0 & 0 \\ 0 & \frac{i}{2} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{i}{2} & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$            |
| 142 | symmetry                          | $\sqrt{3}yz$   |

*continued ...*

Table 5

| No. | multipole                         | matrix   |
|-----|-----------------------------------|--|
|     | $\mathbb{T}_{2,0}^{(1,0;a)}(T_2)$ | $\begin{bmatrix} 0 & 0 & \frac{1}{4} & 0 & \frac{\sqrt{3}}{4} & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{3}}{4} & 0 & -\frac{1}{4} \\ \frac{1}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{3}}{4} & 0 & 0 & 0 & 0 \\ \frac{\sqrt{3}}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{1}{4} & 0 & 0 & 0 & 0 \end{bmatrix}$   |
| 143 | symmetry                          | $\begin{array}{c} \sqrt{3}xz \\ \mathbb{T}_{2,1}^{(1,0;a)}(T_2) \end{array}$ $\begin{bmatrix} 0 & 0 & -\frac{i}{4} & 0 & \frac{\sqrt{3}i}{4} & 0 \\ 0 & 0 & 0 & \frac{\sqrt{3}i}{4} & 0 & -\frac{i}{4} \\ \frac{i}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{3}i}{4} & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{3}i}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{i}{4} & 0 & 0 & 0 & 0 \end{bmatrix}$  |
| 144 | symmetry                          | $\begin{array}{c} \sqrt{3}xy \\ \mathbb{T}_{2,2}^{(1,0;a)}(T_2) \end{array}$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & \frac{1}{2} & 0 & 0 & 0 \\ 0 & \frac{1}{2} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{1}{2} & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$  |
| 145 | symmetry                          | $\begin{array}{c} x \\ \mathbb{M}_{1,0}^{(a)}(T_1) \end{array}$ $\begin{bmatrix} 0 & \frac{1}{3} & -\frac{\sqrt{6}}{12} & 0 & \frac{\sqrt{2}}{12} & 0 \\ \frac{1}{3} & 0 & 0 & -\frac{\sqrt{2}}{12} & 0 & \frac{\sqrt{6}}{12} \\ -\frac{\sqrt{6}}{12} & 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 \\ 0 & -\frac{\sqrt{2}}{12} & \frac{\sqrt{3}}{6} & 0 & \frac{1}{3} & 0 \\ \frac{\sqrt{2}}{12} & 0 & 0 & \frac{1}{3} & 0 & \frac{\sqrt{3}}{6} \\ 0 & \frac{\sqrt{6}}{12} & 0 & 0 & \frac{\sqrt{3}}{6} & 0 \end{bmatrix}$ |
| 146 | symmetry                          | $y$  |

continued ...

Table 5

| No. | multipole                     | matrix  |
|-----|-------------------------------|---|
|     | $\mathbb{M}_{1,1}^{(a)}(T_1)$ | $\begin{bmatrix} 0 & -\frac{i}{3} & -\frac{\sqrt{6}i}{12} & 0 & -\frac{\sqrt{2}i}{12} & 0 \\ \frac{i}{3} & 0 & 0 & -\frac{\sqrt{2}i}{12} & 0 & -\frac{\sqrt{6}i}{12} \\ \frac{\sqrt{6}i}{12} & 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 \\ 0 & \frac{\sqrt{2}i}{12} & \frac{\sqrt{3}i}{6} & 0 & -\frac{i}{3} & 0 \\ \frac{\sqrt{2}i}{12} & 0 & 0 & \frac{i}{3} & 0 & -\frac{\sqrt{3}i}{6} \\ 0 & \frac{\sqrt{6}i}{12} & 0 & 0 & \frac{\sqrt{3}i}{6} & 0 \end{bmatrix}$  |
| 147 | symmetry                      | $\begin{array}{c} z \\ \mathbb{M}_{1,2}^{(a)}(T_1) \end{array} \begin{bmatrix} \frac{1}{3} & 0 & 0 & \frac{\sqrt{2}}{6} & 0 & 0 \\ 0 & -\frac{1}{3} & 0 & 0 & \frac{\sqrt{2}}{6} & 0 \\ 0 & 0 & \frac{1}{2} & 0 & 0 & 0 \\ \frac{\sqrt{2}}{6} & 0 & 0 & \frac{1}{6} & 0 & 0 \\ 0 & \frac{\sqrt{2}}{6} & 0 & 0 & -\frac{1}{6} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{1}{2} \end{bmatrix}$   |
| 148 | symmetry                      | $\begin{array}{c} x \\ \mathbb{M}_{1,0}^{(1,-1;a)}(T_1) \end{array} \begin{bmatrix} 0 & -\frac{\sqrt{6}}{18} & \frac{1}{3} & 0 & -\frac{\sqrt{3}}{9} & 0 \\ -\frac{\sqrt{6}}{18} & 0 & 0 & \frac{\sqrt{3}}{9} & 0 & -\frac{1}{3} \\ \frac{1}{3} & 0 & 0 & \frac{\sqrt{2}}{6} & 0 & 0 \\ 0 & \frac{\sqrt{3}}{9} & \frac{\sqrt{2}}{6} & 0 & \frac{\sqrt{6}}{9} & 0 \\ -\frac{\sqrt{3}}{9} & 0 & 0 & \frac{\sqrt{6}}{9} & 0 & \frac{\sqrt{2}}{6} \\ 0 & -\frac{1}{3} & 0 & 0 & \frac{\sqrt{2}}{6} & 0 \end{bmatrix}$               |
| 149 | symmetry                      | $\begin{array}{c} y \\ \mathbb{M}_{1,1}^{(1,-1;a)}(T_1) \end{array} \begin{bmatrix} 0 & \frac{\sqrt{6}i}{18} & \frac{i}{3} & 0 & \frac{\sqrt{3}i}{9} & 0 \\ -\frac{\sqrt{6}i}{18} & 0 & 0 & \frac{\sqrt{3}i}{9} & 0 & \frac{i}{3} \\ -\frac{i}{3} & 0 & 0 & -\frac{\sqrt{2}i}{6} & 0 & 0 \\ 0 & -\frac{\sqrt{3}i}{9} & \frac{\sqrt{2}i}{6} & 0 & -\frac{\sqrt{6}i}{9} & 0 \\ -\frac{\sqrt{3}i}{9} & 0 & 0 & \frac{\sqrt{6}i}{9} & 0 & -\frac{\sqrt{2}i}{6} \\ 0 & -\frac{i}{3} & 0 & 0 & \frac{\sqrt{2}i}{6} & 0 \end{bmatrix}$ |
| 150 | symmetry                      | $\begin{array}{c} z \end{array}$  |

continued ...

Table 5

| No. | multipole                          | matrix   |
|-----|------------------------------------|--|
|     | $\mathbb{M}_{1,2}^{(1,-1;a)}(T_1)$ | $\begin{bmatrix} -\frac{\sqrt{6}}{18} & 0 & 0 & -\frac{2\sqrt{3}}{9} & 0 & 0 \\ 0 & \frac{\sqrt{6}}{18} & 0 & 0 & -\frac{2\sqrt{3}}{9} & 0 \\ 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 \\ -\frac{2\sqrt{3}}{9} & 0 & 0 & \frac{\sqrt{6}}{18} & 0 & 0 \\ 0 & -\frac{2\sqrt{3}}{9} & 0 & 0 & -\frac{\sqrt{6}}{18} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{6} \end{bmatrix}$  |
| 151 | symmetry                           | $\begin{aligned} & \sqrt{15}xyz \\ & \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{i}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{i}{2} \\ 0 & 0 & -\frac{i}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{i}{2} & 0 & 0 \end{bmatrix} \end{aligned}$   |
| 152 | symmetry                           | $\begin{aligned} & \frac{x(2x^2-3y^2-3z^2)}{2} \\ & \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{15}}{20} & 0 & -\frac{\sqrt{5}}{4} \\ 0 & 0 & \frac{\sqrt{15}}{20} & 0 & -\frac{3\sqrt{5}}{20} & 0 \\ 0 & 0 & 0 & -\frac{3\sqrt{5}}{20} & 0 & \frac{\sqrt{15}}{20} \\ 0 & 0 & -\frac{\sqrt{5}}{4} & 0 & \frac{\sqrt{15}}{20} & 0 \end{bmatrix} \end{aligned}$          |
| 153 | symmetry                           | $\begin{aligned} & -\frac{y(3x^2-2y^2+3z^2)}{2} \\ & \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{15}i}{20} & 0 & -\frac{\sqrt{5}i}{4} \\ 0 & 0 & \frac{\sqrt{15}i}{20} & 0 & \frac{3\sqrt{5}i}{20} & 0 \\ 0 & 0 & 0 & -\frac{3\sqrt{5}i}{20} & 0 & -\frac{\sqrt{15}i}{20} \\ 0 & 0 & \frac{\sqrt{5}i}{4} & 0 & \frac{\sqrt{15}i}{20} & 0 \end{bmatrix} \end{aligned}$ |
| 154 | symmetry                           | $-\frac{z(3x^2+3y^2-2z^2)}{2}$   |

continued ...

Table 5

| No. | multipole | matrix   |
|-----|-----------|--|
|     |           | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{3\sqrt{5}}{10} & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{3\sqrt{5}}{10} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{10} \end{bmatrix}$   |
| 155 | symmetry  | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{1}{4} & 0 & \frac{\sqrt{3}}{4} \\ 0 & 0 & \frac{1}{4} & 0 & -\frac{\sqrt{3}}{4} & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{3}}{4} & 0 & \frac{1}{4} \\ 0 & 0 & \frac{\sqrt{3}}{4} & 0 & \frac{1}{4} & 0 \end{bmatrix}$        |
| 156 | symmetry  | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{i}{4} & 0 & -\frac{\sqrt{3}i}{4} \\ 0 & 0 & -\frac{i}{4} & 0 & -\frac{\sqrt{3}i}{4} & 0 \\ 0 & 0 & 0 & \frac{\sqrt{3}i}{4} & 0 & \frac{i}{4} \\ 0 & 0 & \frac{\sqrt{3}i}{4} & 0 & -\frac{i}{4} & 0 \end{bmatrix}$ |
| 157 | symmetry  | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{1}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & -\frac{1}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{1}{2} & 0 & 0 \end{bmatrix}$  |
| 158 | symmetry  | $x$  |

continued ...

Table 5

| No. | multipole                         | matrix                   |                          |                          |                          |                          |                         |
|-----|-----------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|
|     | $\mathbb{M}_{1,0}^{(1,1;a)}(T_1)$ | 0                        | $\frac{\sqrt{30}}{9}$    | $\frac{\sqrt{5}}{12}$    | 0                        | $-\frac{\sqrt{15}}{36}$  | 0                       |
|     |                                   | $\frac{\sqrt{30}}{9}$    | 0                        | 0                        | $\frac{\sqrt{15}}{36}$   | 0                        | $-\frac{\sqrt{5}}{12}$  |
|     |                                   | $\frac{\sqrt{5}}{12}$    | 0                        | 0                        | $-\frac{\sqrt{10}}{30}$  | 0                        | 0                       |
|     |                                   | 0                        | $\frac{\sqrt{15}}{36}$   | $-\frac{\sqrt{10}}{30}$  | 0                        | $-\frac{\sqrt{30}}{45}$  | 0                       |
|     |                                   | $-\frac{\sqrt{15}}{36}$  | 0                        | 0                        | $-\frac{\sqrt{30}}{45}$  | 0                        | $-\frac{\sqrt{10}}{30}$ |
|     |                                   | 0                        | $-\frac{\sqrt{5}}{12}$   | 0                        | 0                        | $-\frac{\sqrt{10}}{30}$  | 0                       |
| 159 | symmetry                          | $y$                      |                          |                          |                          |                          |                         |
|     | $\mathbb{M}_{1,1}^{(1,1;a)}(T_1)$ | 0                        | $-\frac{\sqrt{30}i}{9}$  | $\frac{\sqrt{5}i}{12}$   | 0                        | $\frac{\sqrt{15}i}{36}$  | 0                       |
|     |                                   | $\frac{\sqrt{30}i}{9}$   | 0                        | 0                        | $\frac{\sqrt{15}i}{36}$  | 0                        | $\frac{\sqrt{5}i}{12}$  |
|     |                                   | $-\frac{\sqrt{5}i}{12}$  | 0                        | 0                        | $\frac{\sqrt{10}i}{30}$  | 0                        | 0                       |
|     |                                   | 0                        | $-\frac{\sqrt{15}i}{36}$ | $-\frac{\sqrt{10}i}{30}$ | 0                        | $\frac{\sqrt{30}i}{45}$  | 0                       |
|     |                                   | $-\frac{\sqrt{15}i}{36}$ | 0                        | 0                        | $-\frac{\sqrt{30}i}{45}$ | 0                        | $\frac{\sqrt{10}i}{30}$ |
|     |                                   | 0                        | $-\frac{\sqrt{5}i}{12}$  | 0                        | 0                        | $-\frac{\sqrt{10}i}{30}$ | 0                       |
| 160 | symmetry                          | $z$                      |                          |                          |                          |                          |                         |
|     | $\mathbb{M}_{1,2}^{(1,1;a)}(T_1)$ | $\frac{\sqrt{30}}{9}$    | 0                        | 0                        | $-\frac{\sqrt{15}}{18}$  | 0                        | 0                       |
|     |                                   | 0                        | $-\frac{\sqrt{30}}{9}$   | 0                        | 0                        | $-\frac{\sqrt{15}}{18}$  | 0                       |
|     |                                   | 0                        | 0                        | $-\frac{\sqrt{30}}{30}$  | 0                        | 0                        | 0                       |
|     |                                   | $-\frac{\sqrt{15}}{18}$  | 0                        | 0                        | $-\frac{\sqrt{30}}{90}$  | 0                        | 0                       |
|     |                                   | 0                        | $-\frac{\sqrt{15}}{18}$  | 0                        | 0                        | $\frac{\sqrt{30}}{90}$   | 0                       |
|     |                                   | 0                        | 0                        | 0                        | 0                        | 0                        | $\frac{\sqrt{30}}{30}$  |

$$\begin{aligned} \text{bra:} &= \langle \frac{1}{2}, \frac{1}{2}; p |, \langle \frac{1}{2}, -\frac{1}{2}; p |, \langle \frac{3}{2}, \frac{3}{2}; p |, \langle \frac{3}{2}, \frac{1}{2}; p |, \langle \frac{3}{2}, -\frac{1}{2}; p |, \langle \frac{3}{2}, -\frac{3}{2}; p | \\ \text{ket:} &= | \frac{3}{2}, \frac{3}{2}; d \rangle, | \frac{3}{2}, \frac{1}{2}; d \rangle, | \frac{3}{2}, -\frac{1}{2}; d \rangle, | \frac{3}{2}, -\frac{3}{2}; d \rangle, | \frac{5}{2}, \frac{5}{2}; d \rangle, | \frac{5}{2}, \frac{3}{2}; d \rangle, | \frac{5}{2}, \frac{1}{2}; d \rangle, | \frac{5}{2}, -\frac{1}{2}; d \rangle, | \frac{5}{2}, -\frac{3}{2}; d \rangle, | \frac{5}{2}, -\frac{5}{2}; d \rangle \end{aligned}$$

Table 6: (p,d) block.

| No. | multipole | matrix |
|-----|-----------|--------|
| 161 | symmetry  | $x$    |

continued ...



Table 6

| No. | multipole                     | matrix  |
|-----|-------------------------------|---|
|     | $\mathbb{Q}_{1,0}^{(a)}(T_1)$ | $\begin{bmatrix} -\frac{1}{4} & 0 & \frac{\sqrt{3}}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{3}}{12} & 0 & \frac{1}{4} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}}{20} & 0 & 0 & -\frac{\sqrt{30}}{20} & 0 & \frac{\sqrt{3}}{20} & 0 & 0 & 0 \\ -\frac{\sqrt{2}}{20} & 0 & -\frac{\sqrt{6}}{30} & 0 & 0 & -\frac{3\sqrt{2}}{20} & 0 & \frac{3}{20} & 0 & 0 \\ 0 & -\frac{\sqrt{6}}{30} & 0 & -\frac{\sqrt{2}}{20} & 0 & 0 & -\frac{3}{20} & 0 & \frac{3\sqrt{2}}{20} & 0 \\ 0 & 0 & -\frac{\sqrt{2}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{20} & 0 & \frac{\sqrt{30}}{20} \end{bmatrix}$  |
| 162 | symmetry                      | $\begin{matrix} & & & & & & & & & y \\ & & & & & & & & & \\ & & & & & & & & & \\ & & & & & & & & & \\ & & & & & & & & & \\ & & & & & & & & & \\ & & & & & & & & & \end{matrix} \begin{bmatrix} -\frac{i}{4} & 0 & -\frac{\sqrt{3}i}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{3}i}{12} & 0 & -\frac{i}{4} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}i}{20} & 0 & 0 & -\frac{\sqrt{30}i}{20} & 0 & -\frac{\sqrt{3}i}{20} & 0 & 0 & 0 \\ -\frac{\sqrt{2}i}{20} & 0 & \frac{\sqrt{6}i}{30} & 0 & 0 & -\frac{3\sqrt{2}i}{20} & 0 & -\frac{3i}{20} & 0 & 0 \\ 0 & -\frac{\sqrt{6}i}{30} & 0 & \frac{\sqrt{2}i}{20} & 0 & 0 & -\frac{3i}{20} & 0 & -\frac{3\sqrt{2}i}{20} & 0 \\ 0 & 0 & -\frac{\sqrt{2}i}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{20} & 0 & -\frac{\sqrt{30}i}{20} \end{bmatrix}$ |
| 163 | symmetry                      | $\begin{matrix} & & & & & & & & & z \\ & & & & & & & & & \\ & & & & & & & & & \\ & & & & & & & & & \\ & & & & & & & & & \\ & & & & & & & & & \\ & & & & & & & & & \end{matrix} \begin{bmatrix} 0 & \frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{6}}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{10} & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{6}}{60} & 0 & 0 & 0 & 0 & \frac{3}{10} & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}}{60} & 0 & 0 & 0 & 0 & \frac{3}{10} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{6}}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{10} & 0 \end{bmatrix}$  |
| 164 | symmetry                      | $\begin{matrix} & & & & & & & & & \sqrt{15}xyz \\ & & & & & & & & & \\ & & & & & & & & & \\ & & & & & & & & & \\ & & & & & & & & & \\ & & & & & & & & & \\ & & & & & & & & & \end{matrix} \begin{bmatrix} 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{12} & 0 & 0 & 0 & \frac{\sqrt{10}i}{12} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}i}{12} & 0 & 0 & 0 & -\frac{\sqrt{2}i}{12} \\ 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{30} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{5}i}{10} & \frac{i}{6} & 0 & 0 & 0 & \frac{\sqrt{5}i}{30} & 0 \\ \frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{30} & 0 & 0 & 0 & -\frac{i}{6} \\ 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{30} & 0 & 0 & 0 \end{bmatrix}$  |
| 165 | symmetry                      | $\frac{x(2x^2-3y^2-3z^2)}{2}$   |

continued ...

Table 6

| No. | multipole                     | matrix   |
|-----|-------------------------------|--|
|     | $\mathbb{Q}_{3,0}^{(a)}(T_1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{24} & 0 & \frac{\sqrt{3}}{12} & 0 & -\frac{\sqrt{30}}{24} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{24} & 0 & \frac{\sqrt{3}}{12} & 0 & -\frac{\sqrt{6}}{24} & 0 \\ 0 & -\frac{\sqrt{3}}{20} & 0 & \frac{1}{4} & -\frac{\sqrt{5}}{40} & 0 & \frac{3\sqrt{2}}{40} & 0 & -\frac{1}{8} & 0 \\ -\frac{\sqrt{3}}{20} & 0 & \frac{3}{20} & 0 & 0 & \frac{7\sqrt{3}}{120} & 0 & -\frac{\sqrt{6}}{120} & 0 & -\frac{\sqrt{15}}{24} \\ 0 & \frac{3}{20} & 0 & -\frac{\sqrt{3}}{20} & \frac{\sqrt{15}}{24} & 0 & \frac{\sqrt{6}}{120} & 0 & -\frac{7\sqrt{3}}{120} & 0 \\ \frac{1}{4} & 0 & -\frac{\sqrt{3}}{20} & 0 & 0 & \frac{1}{8} & 0 & -\frac{3\sqrt{2}}{40} & 0 & \frac{\sqrt{5}}{40} \end{bmatrix}$                                   |
| 166 | symmetry                      | $-\frac{y(3x^2-2y^2+3z^2)}{2}$   |
|     | $\mathbb{Q}_{3,1}^{(a)}(T_1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{24} & 0 & -\frac{\sqrt{3}i}{12} & 0 & -\frac{\sqrt{30}i}{24} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{24} & 0 & \frac{\sqrt{3}i}{12} & 0 & \frac{\sqrt{6}i}{24} & 0 \\ 0 & \frac{\sqrt{3}i}{20} & 0 & \frac{i}{4} & -\frac{\sqrt{5}i}{40} & 0 & -\frac{3\sqrt{2}i}{40} & 0 & -\frac{i}{8} & 0 \\ -\frac{\sqrt{3}i}{20} & 0 & -\frac{3i}{20} & 0 & 0 & \frac{7\sqrt{3}i}{120} & 0 & \frac{\sqrt{6}i}{120} & 0 & -\frac{\sqrt{15}i}{24} \\ 0 & \frac{3i}{20} & 0 & \frac{\sqrt{3}i}{20} & -\frac{\sqrt{15}i}{24} & 0 & \frac{\sqrt{6}i}{120} & 0 & \frac{7\sqrt{3}i}{120} & 0 \\ -\frac{i}{4} & 0 & -\frac{\sqrt{3}i}{20} & 0 & 0 & -\frac{i}{8} & 0 & -\frac{3\sqrt{2}i}{40} & 0 & -\frac{\sqrt{5}i}{40} \end{bmatrix}$            |
| 167 | symmetry                      | $-\frac{z(3x^2+3y^2-2z^2)}{2}$   |
|     | $\mathbb{Q}_{3,2}^{(a)}(T_1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 \\ \frac{1}{10} & 0 & 0 & 0 & 0 & -\frac{1}{5} & 0 & 0 & 0 & 0 \\ 0 & -\frac{3}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{15} & 0 & 0 & 0 \\ 0 & 0 & \frac{3}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{15} & 0 & 0 \\ 0 & 0 & 0 & -\frac{1}{10} & 0 & 0 & 0 & 0 & -\frac{1}{5} & 0 \end{bmatrix}$  |
| 168 | symmetry                      | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$   |
|     | $\mathbb{Q}_{3,0}^{(a)}(T_2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{24} & 0 & \frac{\sqrt{5}}{12} & 0 & \frac{\sqrt{2}}{8} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{8} & 0 & \frac{\sqrt{5}}{12} & 0 & -\frac{\sqrt{10}}{24} & 0 \\ 0 & -\frac{\sqrt{5}}{20} & 0 & -\frac{\sqrt{15}}{20} & -\frac{\sqrt{3}}{24} & 0 & \frac{\sqrt{30}}{40} & 0 & \frac{\sqrt{15}}{40} & 0 \\ -\frac{\sqrt{5}}{20} & 0 & \frac{\sqrt{15}}{20} & 0 & 0 & \frac{7\sqrt{5}}{120} & 0 & -\frac{\sqrt{10}}{120} & 0 & \frac{1}{8} \\ 0 & \frac{\sqrt{15}}{20} & 0 & -\frac{\sqrt{5}}{20} & -\frac{1}{8} & 0 & \frac{\sqrt{10}}{120} & 0 & -\frac{7\sqrt{5}}{120} & 0 \\ -\frac{\sqrt{15}}{20} & 0 & -\frac{\sqrt{5}}{20} & 0 & 0 & -\frac{\sqrt{15}}{40} & 0 & -\frac{\sqrt{30}}{40} & 0 & \frac{\sqrt{3}}{24} \end{bmatrix}$ |
| 169 | symmetry                      | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$  |

continued ...

Table 6

| No. | multipole                          | matrix                           |                          |                          |                         |                         |                           |                           |                           |                           |                         |
|-----|------------------------------------|----------------------------------|--------------------------|--------------------------|-------------------------|-------------------------|---------------------------|---------------------------|---------------------------|---------------------------|-------------------------|
|     | $\mathbb{Q}_{3,1}^{(a)}(T_2)$      | 0                                | 0                        | 0                        | 0                       | 0                       | $\frac{\sqrt{10}i}{24}$   | 0                         | $\frac{\sqrt{5}i}{12}$    | 0                         | $-\frac{\sqrt{2}i}{8}$  |
|     |                                    | 0                                | 0                        | 0                        | 0                       | $\frac{\sqrt{2}i}{8}$   | 0                         | $-\frac{\sqrt{5}i}{12}$   | 0                         | $-\frac{\sqrt{10}i}{24}$  | 0                       |
|     |                                    | 0                                | $-\frac{\sqrt{5}i}{20}$  | 0                        | $\frac{\sqrt{15}i}{20}$ | $\frac{\sqrt{3}i}{24}$  | 0                         | $\frac{\sqrt{30}i}{40}$   | 0                         | $-\frac{\sqrt{15}i}{40}$  | 0                       |
|     |                                    | $\frac{\sqrt{5}i}{20}$           | 0                        | $\frac{\sqrt{15}i}{20}$  | 0                       | 0                       | $-\frac{7\sqrt{5}i}{120}$ | 0                         | $-\frac{\sqrt{10}i}{120}$ | 0                         | $-\frac{i}{8}$          |
|     |                                    | 0                                | $-\frac{\sqrt{15}i}{20}$ | 0                        | $-\frac{\sqrt{5}i}{20}$ | $-\frac{i}{8}$          | 0                         | $-\frac{\sqrt{10}i}{120}$ | 0                         | $-\frac{7\sqrt{5}i}{120}$ | 0                       |
|     |                                    | $-\frac{\sqrt{15}i}{20}$         | 0                        | $\frac{\sqrt{5}i}{20}$   | 0                       | 0                       | $-\frac{\sqrt{15}i}{40}$  | 0                         | $\frac{\sqrt{30}i}{40}$   | 0                         | $\frac{\sqrt{3}i}{24}$  |
| 170 | symmetry                           | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ |                          |                          |                         |                         |                           |                           |                           |                           |                         |
|     | $\mathbb{Q}_{3,2}^{(a)}(T_2)$      | 0                                | 0                        | 0                        | 0                       | $-\frac{\sqrt{2}}{12}$  | 0                         | 0                         | 0                         | $-\frac{\sqrt{10}}{12}$   | 0                       |
|     |                                    | 0                                | 0                        | 0                        | 0                       | 0                       | $\frac{\sqrt{10}}{12}$    | 0                         | 0                         | 0                         | $\frac{\sqrt{2}}{12}$   |
|     |                                    | 0                                | 0                        | $\frac{\sqrt{5}}{10}$    | 0                       | 0                       | 0                         | 0                         | $-\frac{\sqrt{30}}{30}$   | 0                         | 0                       |
|     |                                    | 0                                | 0                        | 0                        | $-\frac{\sqrt{5}}{10}$  | $\frac{1}{6}$           | 0                         | 0                         | 0                         | $-\frac{\sqrt{5}}{30}$    | 0                       |
|     |                                    | $\frac{\sqrt{5}}{10}$            | 0                        | 0                        | 0                       | 0                       | $-\frac{\sqrt{5}}{30}$    | 0                         | 0                         | 0                         | $\frac{1}{6}$           |
|     |                                    | 0                                | $-\frac{\sqrt{5}}{10}$   | 0                        | 0                       | 0                       | 0                         | $-\frac{\sqrt{30}}{30}$   | 0                         | 0                         | 0                       |
| 171 | symmetry                           | $\sqrt{15}xyz$                   |                          |                          |                         |                         |                           |                           |                           |                           |                         |
|     | $\mathbb{Q}_3^{(1,-1;a)}(A_2)$     | 0                                | 0                        | 0                        | 0                       | $-\frac{\sqrt{3}i}{18}$ | 0                         | 0                         | 0                         | $\frac{\sqrt{15}i}{18}$   | 0                       |
|     |                                    | 0                                | 0                        | 0                        | 0                       | 0                       | $\frac{\sqrt{15}i}{18}$   | 0                         | 0                         | 0                         | $-\frac{\sqrt{3}i}{18}$ |
|     |                                    | 0                                | 0                        | $-\frac{\sqrt{30}i}{60}$ | 0                       | 0                       | 0                         | 0                         | $-\frac{2\sqrt{5}i}{15}$  | 0                         | 0                       |
|     |                                    | 0                                | 0                        | 0                        | $\frac{\sqrt{30}i}{60}$ | $-\frac{\sqrt{6}i}{9}$  | 0                         | 0                         | 0                         | $-\frac{\sqrt{30}i}{45}$  | 0                       |
|     |                                    | $\frac{\sqrt{30}i}{60}$          | 0                        | 0                        | 0                       | 0                       | $\frac{\sqrt{30}i}{45}$   | 0                         | 0                         | 0                         | $\frac{\sqrt{6}i}{9}$   |
|     |                                    | 0                                | $-\frac{\sqrt{30}i}{60}$ | 0                        | 0                       | 0                       | 0                         | $\frac{2\sqrt{5}i}{15}$   | 0                         | 0                         | 0                       |
| 172 | symmetry                           | $\frac{x(2x^2-3y^2-3z^2)}{2}$    |                          |                          |                         |                         |                           |                           |                           |                           |                         |
|     | $\mathbb{Q}_{3,0}^{(1,-1;a)}(T_1)$ | 0                                | 0                        | 0                        | 0                       | 0                       | $-\frac{1}{12}$           | 0                         | $\frac{\sqrt{2}}{12}$     | 0                         | $-\frac{\sqrt{5}}{12}$  |
|     |                                    | 0                                | 0                        | 0                        | 0                       | $-\frac{\sqrt{5}}{12}$  | 0                         | $\frac{\sqrt{2}}{12}$     | 0                         | $-\frac{1}{12}$           | 0                       |
|     |                                    | 0                                | $-\frac{\sqrt{2}}{40}$   | 0                        | $\frac{\sqrt{6}}{24}$   | $\frac{\sqrt{30}}{60}$  | 0                         | $-\frac{\sqrt{3}}{10}$    | 0                         | $\frac{\sqrt{6}}{12}$     | 0                       |
|     |                                    | $-\frac{\sqrt{2}}{40}$           | 0                        | $\frac{\sqrt{6}}{40}$    | 0                       | 0                       | $-\frac{7\sqrt{2}}{60}$   | 0                         | $\frac{1}{30}$            | 0                         | $\frac{\sqrt{10}}{12}$  |
|     |                                    | 0                                | $\frac{\sqrt{6}}{40}$    | 0                        | $-\frac{\sqrt{2}}{40}$  | $-\frac{\sqrt{10}}{12}$ | 0                         | $-\frac{1}{30}$           | 0                         | $\frac{7\sqrt{2}}{60}$    | 0                       |
|     |                                    | $\frac{\sqrt{6}}{24}$            | 0                        | $-\frac{\sqrt{2}}{40}$   | 0                       | 0                       | $-\frac{\sqrt{6}}{12}$    | 0                         | $\frac{\sqrt{3}}{10}$     | 0                         | $-\frac{\sqrt{30}}{60}$ |
| 173 | symmetry                           | $-\frac{y(3x^2-2y^2+3z^2)}{2}$   |                          |                          |                         |                         |                           |                           |                           |                           |                         |

continued ...

Table 6

| No. | multipole                          | matrix  |
|-----|------------------------------------|---|
|     | $\mathbb{Q}_{3,1}^{(1,-1;a)}(T_1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{i}{12} & 0 & -\frac{\sqrt{2}i}{12} & 0 & -\frac{\sqrt{5}i}{12} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{12} & 0 & \frac{\sqrt{2}i}{12} & 0 & \frac{i}{12} & 0 \\ 0 & \frac{\sqrt{2}i}{40} & 0 & \frac{\sqrt{6}i}{24} & \frac{\sqrt{30}i}{60} & 0 & \frac{\sqrt{3}i}{10} & 0 & \frac{\sqrt{6}i}{12} & 0 \\ -\frac{\sqrt{2}i}{40} & 0 & -\frac{\sqrt{6}i}{40} & 0 & 0 & -\frac{7\sqrt{2}i}{60} & 0 & -\frac{i}{30} & 0 & \frac{\sqrt{10}i}{12} \\ 0 & \frac{\sqrt{6}i}{40} & 0 & \frac{\sqrt{2}i}{40} & \frac{\sqrt{10}i}{12} & 0 & -\frac{i}{30} & 0 & -\frac{7\sqrt{2}i}{60} & 0 \\ -\frac{\sqrt{6}i}{24} & 0 & -\frac{\sqrt{2}i}{40} & 0 & 0 & \frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{3}i}{10} & 0 & \frac{\sqrt{30}i}{60} \end{bmatrix}$   |
| 174 | symmetry                           | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{6} & 0 & 0 \\ \frac{\sqrt{6}}{60} & 0 & 0 & 0 & 0 & \frac{2\sqrt{6}}{15} & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{6}}{20} & 0 & 0 & 0 & 0 & -\frac{4}{15} & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}}{20} & 0 & 0 & 0 & 0 & -\frac{4}{15} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{6}}{60} & 0 & 0 & 0 & 0 & \frac{2\sqrt{6}}{15} & 0 \end{bmatrix}$  |
| 175 | symmetry                           | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{36} & 0 & \frac{\sqrt{30}}{36} & 0 & \frac{\sqrt{3}}{12} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{12} & 0 & \frac{\sqrt{30}}{36} & 0 & -\frac{\sqrt{15}}{36} & 0 \\ 0 & -\frac{\sqrt{30}}{120} & 0 & -\frac{\sqrt{10}}{40} & \frac{\sqrt{2}}{12} & 0 & -\frac{\sqrt{5}}{10} & 0 & -\frac{\sqrt{10}}{20} & 0 \\ -\frac{\sqrt{30}}{120} & 0 & \frac{\sqrt{10}}{40} & 0 & 0 & -\frac{7\sqrt{30}}{180} & 0 & \frac{\sqrt{15}}{90} & 0 & -\frac{\sqrt{6}}{12} \\ 0 & \frac{\sqrt{10}}{40} & 0 & -\frac{\sqrt{30}}{120} & \frac{\sqrt{6}}{12} & 0 & -\frac{\sqrt{15}}{90} & 0 & \frac{7\sqrt{30}}{180} & 0 \\ -\frac{\sqrt{10}}{40} & 0 & -\frac{\sqrt{30}}{120} & 0 & 0 & \frac{\sqrt{10}}{20} & 0 & \frac{\sqrt{5}}{10} & 0 & -\frac{\sqrt{2}}{12} \end{bmatrix}$                         |
| 176 | symmetry                           | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{36} & 0 & \frac{\sqrt{30}i}{36} & 0 & -\frac{\sqrt{3}i}{12} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{12} & 0 & -\frac{\sqrt{30}i}{36} & 0 & -\frac{\sqrt{15}i}{36} & 0 \\ 0 & -\frac{\sqrt{30}i}{120} & 0 & \frac{\sqrt{10}i}{40} & -\frac{\sqrt{2}i}{12} & 0 & -\frac{\sqrt{5}i}{10} & 0 & \frac{\sqrt{10}i}{20} & 0 \\ \frac{\sqrt{30}i}{120} & 0 & \frac{\sqrt{10}i}{40} & 0 & 0 & \frac{7\sqrt{30}i}{180} & 0 & \frac{\sqrt{15}i}{90} & 0 & \frac{\sqrt{6}i}{12} \\ 0 & -\frac{\sqrt{10}i}{40} & 0 & -\frac{\sqrt{30}i}{120} & \frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{15}i}{90} & 0 & \frac{7\sqrt{30}i}{180} & 0 \\ -\frac{\sqrt{10}i}{40} & 0 & \frac{\sqrt{30}i}{120} & 0 & 0 & \frac{\sqrt{10}i}{20} & 0 & -\frac{\sqrt{5}i}{10} & 0 & -\frac{\sqrt{2}i}{12} \end{bmatrix}$ |
| 177 | symmetry                           | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$  |

continued ...

Table 6

| No. | multipole                          | matrix                 |                         |                          |                         |                          |                        |                          |                          |                         |                          |
|-----|------------------------------------|------------------------|-------------------------|--------------------------|-------------------------|--------------------------|------------------------|--------------------------|--------------------------|-------------------------|--------------------------|
|     | $\mathbb{Q}_{3,2}^{(1,-1;a)}(T_2)$ | 0                      | 0                       | 0                        | 0                       | $-\frac{\sqrt{3}}{18}$   | 0                      | 0                        | 0                        | $-\frac{\sqrt{15}}{18}$ | 0                        |
|     |                                    | 0                      | 0                       | 0                        | 0                       | 0                        | $\frac{\sqrt{15}}{18}$ | 0                        | 0                        | 0                       | $\frac{\sqrt{3}}{18}$    |
|     |                                    | 0                      | 0                       | $\frac{\sqrt{30}}{60}$   | 0                       | 0                        | 0                      | 0                        | $\frac{2\sqrt{5}}{15}$   | 0                       | 0                        |
|     |                                    | 0                      | 0                       | 0                        | $-\frac{\sqrt{30}}{60}$ | $-\frac{\sqrt{6}}{9}$    | 0                      | 0                        | 0                        | $\frac{\sqrt{30}}{45}$  | 0                        |
|     |                                    | $\frac{\sqrt{30}}{60}$ | 0                       | 0                        | 0                       | 0                        | $\frac{\sqrt{30}}{45}$ | 0                        | 0                        | 0                       | $-\frac{\sqrt{6}}{9}$    |
|     |                                    | 0                      | $-\frac{\sqrt{30}}{60}$ | 0                        | 0                       | 0                        | 0                      | $\frac{2\sqrt{5}}{15}$   | 0                        | 0                       | 0                        |
| 178 | symmetry                           | $x$                    |                         |                          |                         |                          |                        |                          |                          |                         |                          |
|     | $\mathbb{Q}_{1,0}^{(1,0;a)}(T_1)$  | $\frac{\sqrt{2}}{8}$   | 0                       | $-\frac{\sqrt{6}}{24}$   | 0                       | 0                        | 0                      | 0                        | 0                        | 0                       | 0                        |
|     |                                    | 0                      | $\frac{\sqrt{6}}{24}$   | 0                        | $-\frac{\sqrt{2}}{8}$   | 0                        | 0                      | 0                        | 0                        | 0                       | 0                        |
|     |                                    | 0                      | $\frac{1}{5}$           | 0                        | 0                       | $-\frac{\sqrt{15}}{20}$  | 0                      | $\frac{\sqrt{6}}{40}$    | 0                        | 0                       | 0                        |
|     |                                    | $\frac{1}{5}$          | 0                       | $\frac{2\sqrt{3}}{15}$   | 0                       | 0                        | $-\frac{3}{20}$        | 0                        | $\frac{3\sqrt{2}}{40}$   | 0                       | 0                        |
|     |                                    | 0                      | $\frac{2\sqrt{3}}{15}$  | 0                        | $\frac{1}{5}$           | 0                        | 0                      | $-\frac{3\sqrt{2}}{40}$  | 0                        | $\frac{3}{20}$          | 0                        |
|     |                                    | 0                      | 0                       | $\frac{1}{5}$            | 0                       | 0                        | 0                      | 0                        | $-\frac{\sqrt{6}}{40}$   | 0                       | $\frac{\sqrt{15}}{20}$   |
| 179 | symmetry                           | $y$                    |                         |                          |                         |                          |                        |                          |                          |                         |                          |
|     | $\mathbb{Q}_{1,1}^{(1,0;a)}(T_1)$  | $\frac{\sqrt{2}i}{8}$  | 0                       | $\frac{\sqrt{6}i}{24}$   | 0                       | 0                        | 0                      | 0                        | 0                        | 0                       | 0                        |
|     |                                    | 0                      | $\frac{\sqrt{6}i}{24}$  | 0                        | $\frac{\sqrt{2}i}{8}$   | 0                        | 0                      | 0                        | 0                        | 0                       | 0                        |
|     |                                    | 0                      | $-\frac{i}{5}$          | 0                        | 0                       | $-\frac{\sqrt{15}i}{20}$ | 0                      | $-\frac{\sqrt{6}i}{40}$  | 0                        | 0                       | 0                        |
|     |                                    | $\frac{i}{5}$          | 0                       | $-\frac{2\sqrt{3}i}{15}$ | 0                       | 0                        | $-\frac{3i}{20}$       | 0                        | $-\frac{3\sqrt{2}i}{40}$ | 0                       | 0                        |
|     |                                    | 0                      | $\frac{2\sqrt{3}i}{15}$ | 0                        | $-\frac{i}{5}$          | 0                        | 0                      | $-\frac{3\sqrt{2}i}{40}$ | 0                        | $-\frac{3i}{20}$        | 0                        |
|     |                                    | 0                      | 0                       | $\frac{i}{5}$            | 0                       | 0                        | 0                      | 0                        | $-\frac{\sqrt{6}i}{40}$  | 0                       | $-\frac{\sqrt{15}i}{20}$ |
| 180 | symmetry                           | $z$                    |                         |                          |                         |                          |                        |                          |                          |                         |                          |
|     | $\mathbb{Q}_{1,2}^{(1,0;a)}(T_1)$  | 0                      | $-\frac{\sqrt{6}}{12}$  | 0                        | 0                       | 0                        | 0                      | 0                        | 0                        | 0                       | 0                        |
|     |                                    | 0                      | 0                       | $-\frac{\sqrt{6}}{12}$   | 0                       | 0                        | 0                      | 0                        | 0                        | 0                       | 0                        |
|     |                                    | $\frac{\sqrt{3}}{5}$   | 0                       | 0                        | 0                       | 0                        | $\frac{\sqrt{3}}{10}$  | 0                        | 0                        | 0                       | 0                        |
|     |                                    | 0                      | $\frac{\sqrt{3}}{15}$   | 0                        | 0                       | 0                        | 0                      | $\frac{3\sqrt{2}}{20}$   | 0                        | 0                       | 0                        |
|     |                                    | 0                      | 0                       | $-\frac{\sqrt{3}}{15}$   | 0                       | 0                        | 0                      | 0                        | $\frac{3\sqrt{2}}{20}$   | 0                       | 0                        |
|     |                                    | 0                      | 0                       | 0                        | $-\frac{\sqrt{3}}{5}$   | 0                        | 0                      | 0                        | 0                        | $\frac{\sqrt{3}}{10}$   | 0                        |
| 181 | symmetry                           | $\sqrt{15}xyz$         |                         |                          |                         |                          |                        |                          |                          |                         |                          |

*continued ...*

Table 6

| No. | multipole                     | matrix   |
|-----|-------------------------------|--|
|     | $\mathbb{Q}_3^{(1,0;a)}(A_2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{18} & 0 & 0 & 0 & \frac{\sqrt{30}i}{18} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{18} & 0 & 0 & 0 & -\frac{\sqrt{6}i}{18} \\ 0 & 0 & \frac{\sqrt{15}i}{15} & 0 & 0 & 0 & 0 & \frac{\sqrt{10}i}{60} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{15}i}{15} & \frac{\sqrt{3}i}{36} & 0 & 0 & 0 & \frac{\sqrt{15}i}{180} & 0 \\ -\frac{\sqrt{15}i}{15} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{180} & 0 & 0 & 0 & -\frac{\sqrt{3}i}{36} \\ 0 & \frac{\sqrt{15}i}{15} & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}i}{60} & 0 & 0 & 0 \end{bmatrix}$  |
| 182 | symmetry                      | $\frac{x(2x^2-3y^2-3z^2)}{2}$ $\mathbb{Q}_{3,0}^{(1,0;a)}(T_1) \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{12} & 0 & \frac{1}{6} & 0 & -\frac{\sqrt{10}}{12} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{12} & 0 & \frac{1}{6} & 0 & -\frac{\sqrt{2}}{12} & 0 \\ 0 & \frac{1}{10} & 0 & -\frac{\sqrt{3}}{6} & -\frac{\sqrt{15}}{240} & 0 & \frac{\sqrt{6}}{80} & 0 & -\frac{\sqrt{3}}{48} & 0 \\ \frac{1}{10} & 0 & -\frac{\sqrt{3}}{10} & 0 & 0 & \frac{7}{240} & 0 & -\frac{\sqrt{2}}{240} & 0 & -\frac{\sqrt{5}}{48} \\ 0 & -\frac{\sqrt{3}}{10} & 0 & \frac{1}{10} & \frac{\sqrt{5}}{48} & 0 & \frac{\sqrt{2}}{240} & 0 & -\frac{7}{240} & 0 \\ -\frac{\sqrt{3}}{6} & 0 & \frac{1}{10} & 0 & 0 & \frac{\sqrt{3}}{48} & 0 & -\frac{\sqrt{6}}{80} & 0 & \frac{\sqrt{15}}{240} \end{bmatrix}$                       |
| 183 | symmetry                      | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ $\mathbb{Q}_{3,1}^{(1,0;a)}(T_1) \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{12} & 0 & -\frac{i}{6} & 0 & -\frac{\sqrt{10}i}{12} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{10}i}{12} & 0 & \frac{i}{6} & 0 & \frac{\sqrt{2}i}{12} & 0 \\ 0 & -\frac{i}{10} & 0 & -\frac{\sqrt{3}i}{6} & -\frac{\sqrt{15}i}{240} & 0 & -\frac{\sqrt{6}i}{80} & 0 & -\frac{\sqrt{3}i}{48} & 0 \\ \frac{i}{10} & 0 & \frac{\sqrt{3}i}{10} & 0 & 0 & \frac{7i}{240} & 0 & \frac{\sqrt{2}i}{240} & 0 & -\frac{\sqrt{5}i}{48} \\ 0 & -\frac{\sqrt{3}i}{10} & 0 & -\frac{i}{10} & -\frac{\sqrt{5}i}{48} & 0 & \frac{\sqrt{2}i}{240} & 0 & \frac{7i}{240} & 0 \\ \frac{\sqrt{3}i}{6} & 0 & \frac{i}{10} & 0 & 0 & -\frac{\sqrt{3}i}{48} & 0 & -\frac{\sqrt{6}i}{80} & 0 & -\frac{\sqrt{15}i}{240} \end{bmatrix}$ |
| 184 | symmetry                      | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ $\mathbb{Q}_{3,2}^{(1,0;a)}(T_1) \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & -\frac{1}{3} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{3} & 0 & 0 \\ -\frac{\sqrt{3}}{15} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{30} & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{3}}{5} & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{30} & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{3}}{5} & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{30} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{3}}{15} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{30} & 0 \end{bmatrix}$   |
| 185 | symmetry                      | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$   |

continued ...

Table 6

| No. | multipole                         | matrix                            |                         |                          |                         |                         |                            |                           |                           |                            |                         |
|-----|-----------------------------------|-----------------------------------|-------------------------|--------------------------|-------------------------|-------------------------|----------------------------|---------------------------|---------------------------|----------------------------|-------------------------|
|     | $\mathbb{Q}_{3,0}^{(1,0;a)}(T_2)$ | 0                                 | 0                       | 0                        | 0                       | 0                       | $-\frac{\sqrt{30}}{36}$    | 0                         | $\frac{\sqrt{15}}{18}$    | 0                          | $\frac{\sqrt{6}}{12}$   |
|     |                                   | 0                                 | 0                       | 0                        | 0                       | $\frac{\sqrt{6}}{12}$   | 0                          | $\frac{\sqrt{15}}{18}$    | 0                         | $-\frac{\sqrt{30}}{36}$    | 0                       |
|     |                                   | 0                                 | $\frac{\sqrt{15}}{30}$  | 0                        | $\frac{\sqrt{5}}{10}$   | $-\frac{1}{48}$         | 0                          | $\frac{\sqrt{10}}{80}$    | 0                         | $\frac{\sqrt{5}}{80}$      | 0                       |
|     |                                   | $\frac{\sqrt{15}}{30}$            | 0                       | $-\frac{\sqrt{5}}{10}$   | 0                       | 0                       | $\frac{7\sqrt{15}}{720}$   | 0                         | $-\frac{\sqrt{30}}{720}$  | 0                          | $\frac{\sqrt{3}}{48}$   |
|     |                                   | 0                                 | $-\frac{\sqrt{5}}{10}$  | 0                        | $\frac{\sqrt{15}}{30}$  | $-\frac{\sqrt{3}}{48}$  | 0                          | $\frac{\sqrt{30}}{720}$   | 0                         | $-\frac{7\sqrt{15}}{720}$  | 0                       |
|     |                                   | $\frac{\sqrt{5}}{10}$             | 0                       | $\frac{\sqrt{15}}{30}$   | 0                       | 0                       | $-\frac{\sqrt{5}}{80}$     | 0                         | $-\frac{\sqrt{10}}{80}$   | 0                          | $\frac{1}{48}$          |
| 186 | symmetry                          | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |                         |                          |                         |                         |                            |                           |                           |                            |                         |
|     | $\mathbb{Q}_{3,1}^{(1,0;a)}(T_2)$ | 0                                 | 0                       | 0                        | 0                       | 0                       | $\frac{\sqrt{30}i}{36}$    | 0                         | $\frac{\sqrt{15}i}{18}$   | 0                          | $-\frac{\sqrt{6}i}{12}$ |
|     |                                   | 0                                 | 0                       | 0                        | 0                       | $\frac{\sqrt{6}i}{12}$  | 0                          | $-\frac{\sqrt{15}i}{18}$  | 0                         | $-\frac{\sqrt{30}i}{36}$   | 0                       |
|     |                                   | 0                                 | $\frac{\sqrt{15}i}{30}$ | 0                        | $-\frac{\sqrt{5}i}{10}$ | $\frac{i}{48}$          | 0                          | $\frac{\sqrt{10}i}{80}$   | 0                         | $-\frac{\sqrt{5}i}{80}$    | 0                       |
|     |                                   | $-\frac{\sqrt{15}i}{30}$          | 0                       | $-\frac{\sqrt{5}i}{10}$  | 0                       | 0                       | $-\frac{7\sqrt{15}i}{720}$ | 0                         | $-\frac{\sqrt{30}i}{720}$ | 0                          | $-\frac{\sqrt{3}i}{48}$ |
|     |                                   | 0                                 | $\frac{\sqrt{5}i}{10}$  | 0                        | $\frac{\sqrt{15}i}{30}$ | $-\frac{\sqrt{3}i}{48}$ | 0                          | $-\frac{\sqrt{30}i}{720}$ | 0                         | $-\frac{7\sqrt{15}i}{720}$ | 0                       |
|     |                                   | $\frac{\sqrt{5}i}{10}$            | 0                       | $-\frac{\sqrt{15}i}{30}$ | 0                       | 0                       | $-\frac{\sqrt{5}i}{80}$    | 0                         | $\frac{\sqrt{10}i}{80}$   | 0                          | $\frac{i}{48}$          |
| 187 | symmetry                          | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$  |                         |                          |                         |                         |                            |                           |                           |                            |                         |
|     | $\mathbb{Q}_{3,2}^{(1,0;a)}(T_2)$ | 0                                 | 0                       | 0                        | 0                       | $-\frac{\sqrt{6}}{18}$  | 0                          | 0                         | 0                         | $-\frac{\sqrt{30}}{18}$    | 0                       |
|     |                                   | 0                                 | 0                       | 0                        | 0                       | 0                       | $\frac{\sqrt{30}}{18}$     | 0                         | 0                         | 0                          | $\frac{\sqrt{6}}{18}$   |
|     |                                   | 0                                 | 0                       | $-\frac{\sqrt{15}}{15}$  | 0                       | 0                       | 0                          | 0                         | $-\frac{\sqrt{10}}{60}$   | 0                          | 0                       |
|     |                                   | 0                                 | 0                       | 0                        | $\frac{\sqrt{15}}{15}$  | $\frac{\sqrt{3}}{36}$   | 0                          | 0                         | 0                         | $-\frac{\sqrt{15}}{180}$   | 0                       |
|     |                                   | $-\frac{\sqrt{15}}{15}$           | 0                       | 0                        | 0                       | 0                       | $-\frac{\sqrt{15}}{180}$   | 0                         | 0                         | 0                          | $\frac{\sqrt{3}}{36}$   |
|     |                                   | 0                                 | $\frac{\sqrt{15}}{15}$  | 0                        | 0                       | 0                       | 0                          | $-\frac{\sqrt{10}}{60}$   | 0                         | 0                          | 0                       |
| 188 | symmetry                          | $x$                               |                         |                          |                         |                         |                            |                           |                           |                            |                         |
|     | $\mathbb{Q}_{1,0}^{(1,1;a)}(T_1)$ | $\frac{\sqrt{6}}{8}$              | 0                       | $-\frac{\sqrt{2}}{8}$    | 0                       | 0                       | 0                          | 0                         | 0                         | 0                          | 0                       |
|     |                                   | 0                                 | $\frac{\sqrt{2}}{8}$    | 0                        | $-\frac{\sqrt{6}}{8}$   | 0                       | 0                          | 0                         | 0                         | 0                          | 0                       |
|     |                                   | 0                                 | $-\frac{\sqrt{3}}{10}$  | 0                        | 0                       | $-\frac{\sqrt{5}}{20}$  | 0                          | $\frac{\sqrt{2}}{40}$     | 0                         | 0                          | 0                       |
|     |                                   | $-\frac{\sqrt{3}}{10}$            | 0                       | $-\frac{1}{5}$           | 0                       | 0                       | $-\frac{\sqrt{3}}{20}$     | 0                         | $\frac{\sqrt{6}}{40}$     | 0                          | 0                       |
|     |                                   | 0                                 | $-\frac{1}{5}$          | 0                        | $-\frac{\sqrt{3}}{10}$  | 0                       | 0                          | $-\frac{\sqrt{6}}{40}$    | 0                         | $\frac{\sqrt{3}}{20}$      | 0                       |
|     |                                   | 0                                 | 0                       | $-\frac{\sqrt{3}}{10}$   | 0                       | 0                       | 0                          | 0                         | $-\frac{\sqrt{2}}{40}$    | 0                          | $\frac{\sqrt{5}}{20}$   |
| 189 | symmetry                          | $y$                               |                         |                          |                         |                         |                            |                           |                           |                            |                         |

continued ...

Table 6

| No. | multipole                         | matrix   |
|-----|-----------------------------------|--|
|     | $\mathbb{Q}_{1,1}^{(1,1;a)}(T_1)$ | $\begin{bmatrix} \frac{\sqrt{6}i}{8} & 0 & \frac{\sqrt{2}i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}i}{8} & 0 & \frac{\sqrt{6}i}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{3}i}{10} & 0 & 0 & -\frac{\sqrt{5}i}{20} & 0 & -\frac{\sqrt{2}i}{40} & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{3}i}{10} & 0 & \frac{i}{5} & 0 & 0 & -\frac{\sqrt{3}i}{20} & 0 & -\frac{\sqrt{6}i}{40} & 0 & 0 & 0 \\ 0 & -\frac{i}{5} & 0 & \frac{\sqrt{3}i}{10} & 0 & 0 & -\frac{\sqrt{6}i}{40} & 0 & -\frac{\sqrt{3}i}{20} & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{3}i}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{40} & 0 & -\frac{\sqrt{5}i}{20} & 0 \end{bmatrix}$  |
| 190 | symmetry                          | $\begin{matrix} z \\ \mathbb{Q}_{1,2}^{(1,1;a)}(T_1) \end{matrix} \begin{bmatrix} 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{3}{10} & 0 & 0 & 0 & 0 & \frac{1}{10} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{1}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{20} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{1}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{20} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{3}{10} & 0 & 0 & 0 & 0 & \frac{1}{10} & 0 & 0 \end{bmatrix}$  |
| 191 | symmetry                          | $\begin{matrix} -\frac{x^2}{2} - \frac{y^2}{2} + z^2 \\ \mathbb{G}_{2,0}^{(a)}(E) \end{matrix} \begin{bmatrix} 0 & \frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{30} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{30} & 0 & 0 & 0 \\ -\frac{\sqrt{10}i}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{10}i}{10} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{10}i}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{30} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{10}i}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{30} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{10}i}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}i}{10} & 0 & 0 \end{bmatrix}$  |
| 192 | symmetry                          | $\begin{matrix} \frac{\sqrt{3}(x-y)(x+y)}{2} \\ \mathbb{G}_{2,1}^{(a)}(E) \end{matrix} \begin{bmatrix} 0 & 0 & 0 & \frac{\sqrt{5}i}{10} & \frac{i}{6} & 0 & 0 & 0 & \frac{\sqrt{5}i}{30} & 0 & 0 \\ -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{30} & 0 & 0 & 0 & \frac{i}{6} & 0 \\ 0 & 0 & -\frac{\sqrt{10}i}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{30} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{10}i}{20} & -\frac{\sqrt{2}i}{6} & 0 & 0 & 0 & \frac{\sqrt{10}i}{15} & 0 & 0 \\ -\frac{\sqrt{10}i}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}i}{15} & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{6} \\ 0 & -\frac{\sqrt{10}i}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{30} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 193 | symmetry                          | $\sqrt{3}yz$   |

continued ...



Table 6

| No. | multipole                     | matrix   |
|-----|-------------------------------|--|
|     | $\mathbb{G}_{2,0}^{(a)}(T_2)$ | $\begin{bmatrix} \frac{\sqrt{5}}{20} & 0 & \frac{\sqrt{15}}{20} & 0 & 0 & \frac{\sqrt{5}}{15} & 0 & \frac{\sqrt{10}}{30} & 0 & 0 \\ 0 & -\frac{\sqrt{15}}{20} & 0 & -\frac{\sqrt{5}}{20} & 0 & 0 & \frac{\sqrt{10}}{30} & 0 & \frac{\sqrt{5}}{15} & 0 \\ 0 & -\frac{\sqrt{10}}{20} & 0 & 0 & \frac{\sqrt{6}}{12} & 0 & \frac{\sqrt{15}}{20} & 0 & 0 & 0 \\ \frac{\sqrt{10}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{60} & 0 & \frac{\sqrt{5}}{12} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{10}}{20} & 0 & 0 & -\frac{\sqrt{5}}{12} & 0 & \frac{\sqrt{10}}{60} & 0 \\ 0 & 0 & -\frac{\sqrt{10}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{20} & 0 & -\frac{\sqrt{6}}{12} \end{bmatrix}$   |
| 194 | symmetry                      | $\begin{matrix} \sqrt{3}xz \\ \mathbb{G}_{2,1}^{(a)}(T_2) \end{matrix}$ $\begin{bmatrix} -\frac{\sqrt{5}i}{20} & 0 & \frac{\sqrt{15}i}{20} & 0 & 0 & -\frac{\sqrt{5}i}{15} & 0 & \frac{\sqrt{10}i}{30} & 0 & 0 \\ 0 & \frac{\sqrt{15}i}{20} & 0 & -\frac{\sqrt{5}i}{20} & 0 & 0 & -\frac{\sqrt{10}i}{30} & 0 & \frac{\sqrt{5}i}{15} & 0 \\ 0 & -\frac{\sqrt{10}i}{20} & 0 & 0 & -\frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{15}i}{20} & 0 & 0 & 0 \\ -\frac{\sqrt{10}i}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{10}i}{60} & 0 & \frac{\sqrt{5}i}{12} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{10}i}{20} & 0 & 0 & \frac{\sqrt{5}i}{12} & 0 & \frac{\sqrt{10}i}{60} & 0 \\ 0 & 0 & \frac{\sqrt{10}i}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{20} & 0 & -\frac{\sqrt{6}i}{12} \end{bmatrix}$ |
| 195 | symmetry                      | $\begin{matrix} \sqrt{3}xy \\ \mathbb{G}_{2,2}^{(a)}(T_2) \end{matrix}$ $\begin{bmatrix} 0 & 0 & 0 & \frac{\sqrt{5}}{10} & -\frac{1}{6} & 0 & 0 & 0 & \frac{\sqrt{5}}{30} & 0 \\ \frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{30} & 0 & 0 & 0 & \frac{1}{6} \\ 0 & 0 & -\frac{\sqrt{10}}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{30} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{10}}{20} & \frac{\sqrt{2}}{6} & 0 & 0 & 0 & \frac{\sqrt{10}}{15} & 0 \\ \frac{\sqrt{10}}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{15} & 0 & 0 & 0 & \frac{\sqrt{2}}{6} \\ 0 & \frac{\sqrt{10}}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{30} & 0 & 0 & 0 \end{bmatrix}$   |
| 196 | symmetry                      | $\begin{matrix} -\frac{x^2}{2} - \frac{y^2}{2} + z^2 \\ \mathbb{G}_{2,0}^{(1,-1;a)}(E) \end{matrix}$ $\begin{bmatrix} 0 & -\frac{\sqrt{2}i}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{5} & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{2}i}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{5} & 0 & 0 \\ \frac{i}{10} & 0 & 0 & 0 & 0 & \frac{3i}{10} & 0 & 0 & 0 & 0 \\ 0 & -\frac{i}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{20} & 0 & 0 & 0 \\ 0 & 0 & -\frac{i}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{20} & 0 & 0 \\ 0 & 0 & 0 & \frac{i}{10} & 0 & 0 & 0 & 0 & -\frac{3i}{10} & 0 \end{bmatrix}$   |
| 197 | symmetry                      | $\frac{\sqrt{3}(x-y)(x+y)}{2}$   |

continued ...

Table 6

| No. | multipole                        | matrix   |
|-----|----------------------------------|--|
|     | $\mathbb{G}_{2,1}^{(1,-1;a)}(E)$ | $\begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{2}i}{20} & -\frac{\sqrt{10}i}{10} & 0 & 0 & 0 & -\frac{\sqrt{2}i}{10} & 0 \\ \frac{\sqrt{2}i}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{10} & 0 & 0 & 0 & -\frac{\sqrt{10}i}{10} \\ 0 & 0 & \frac{i}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{20} & 0 & 0 \\ 0 & 0 & 0 & \frac{i}{10} & -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 & \frac{i}{5} & 0 \\ \frac{i}{10} & 0 & 0 & 0 & 0 & -\frac{i}{5} & 0 & 0 & 0 & \frac{\sqrt{5}i}{10} \\ 0 & \frac{i}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{20} & 0 & 0 & 0 \end{bmatrix}$   |
| 198 | symmetry                         | $\begin{array}{c} \sqrt{3}yz \\ \mathbb{G}_{2,0}^{(1,-1;a)}(T_2) \end{array}$ $\begin{bmatrix} -\frac{\sqrt{2}}{40} & 0 & -\frac{\sqrt{6}}{40} & 0 & 0 & -\frac{\sqrt{2}}{5} & 0 & -\frac{1}{5} & 0 & 0 \\ 0 & \frac{\sqrt{6}}{40} & 0 & \frac{\sqrt{2}}{40} & 0 & 0 & -\frac{1}{5} & 0 & -\frac{\sqrt{2}}{5} & 0 \\ 0 & \frac{1}{10} & 0 & 0 & \frac{\sqrt{15}}{20} & 0 & \frac{3\sqrt{6}}{40} & 0 & 0 & 0 \\ -\frac{1}{10} & 0 & 0 & 0 & 0 & -\frac{1}{20} & 0 & \frac{\sqrt{2}}{8} & 0 & 0 \\ 0 & 0 & 0 & -\frac{1}{10} & 0 & 0 & -\frac{\sqrt{2}}{8} & 0 & \frac{1}{20} & 0 \\ 0 & 0 & \frac{1}{10} & 0 & 0 & 0 & 0 & -\frac{3\sqrt{6}}{40} & 0 & -\frac{\sqrt{15}}{20} \end{bmatrix}$         |
| 199 | symmetry                         | $\begin{array}{c} \sqrt{3}xz \\ \mathbb{G}_{2,1}^{(1,-1;a)}(T_2) \end{array}$ $\begin{bmatrix} \frac{\sqrt{2}i}{40} & 0 & -\frac{\sqrt{6}i}{40} & 0 & 0 & \frac{\sqrt{2}i}{5} & 0 & -\frac{i}{5} & 0 & 0 \\ 0 & -\frac{\sqrt{6}i}{40} & 0 & \frac{\sqrt{2}i}{40} & 0 & 0 & \frac{i}{5} & 0 & -\frac{\sqrt{2}i}{5} & 0 \\ 0 & \frac{i}{10} & 0 & 0 & -\frac{\sqrt{15}i}{20} & 0 & \frac{3\sqrt{6}i}{40} & 0 & 0 & 0 \\ \frac{i}{10} & 0 & 0 & 0 & 0 & \frac{i}{20} & 0 & \frac{\sqrt{2}i}{8} & 0 & 0 \\ 0 & 0 & 0 & -\frac{i}{10} & 0 & 0 & \frac{\sqrt{2}i}{8} & 0 & \frac{i}{20} & 0 \\ 0 & 0 & -\frac{i}{10} & 0 & 0 & 0 & 0 & \frac{3\sqrt{6}i}{40} & 0 & -\frac{\sqrt{15}i}{20} \end{bmatrix}$ |
| 200 | symmetry                         | $\begin{array}{c} \sqrt{3}xy \\ \mathbb{G}_{2,2}^{(1,-1;a)}(T_2) \end{array}$ $\begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{2}}{20} & \frac{\sqrt{10}}{10} & 0 & 0 & 0 & -\frac{\sqrt{2}}{10} & 0 \\ -\frac{\sqrt{2}}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{10} & 0 & 0 & 0 & -\frac{\sqrt{10}}{10} \\ 0 & 0 & \frac{1}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{20} & 0 & 0 \\ 0 & 0 & 0 & \frac{1}{10} & \frac{\sqrt{5}}{10} & 0 & 0 & 0 & \frac{1}{5} & 0 \\ -\frac{1}{10} & 0 & 0 & 0 & 0 & \frac{1}{5} & 0 & 0 & 0 & \frac{\sqrt{5}}{10} \\ 0 & -\frac{1}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{20} & 0 & 0 & 0 \end{bmatrix}$   |
| 201 | symmetry                         | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$   |

continued ...

Table 6

| No. | multipole                      | matrix  |
|-----|--------------------------------|---|
|     | $\mathbb{G}_4^{(1,-1;a)}(A_1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{12} & 0 & 0 & 0 & -\frac{\sqrt{15}i}{12} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{12} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{12} & 0 \end{bmatrix}$   |
| 202 | symmetry                       | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ $\mathbb{G}_{4,0}^{(1,-1;a)}(E)$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{105}i}{84} & 0 & 0 & 0 & \frac{\sqrt{21}i}{12} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{70}i}{28} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}i}{28} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{21}i}{12} & 0 & 0 & 0 & 0 & \frac{\sqrt{105}i}{84} & 0 \end{bmatrix}$   |
| 203 | symmetry                       | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ $\mathbb{G}_{4,1}^{(1,-1;a)}(E)$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{70}i}{28} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{21}i}{28} & 0 & 0 & 0 & -\frac{\sqrt{105}i}{28} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105}i}{28} & 0 & 0 & 0 & \frac{\sqrt{21}i}{28} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}i}{28} & 0 & 0 & 0 & 0 \end{bmatrix}$   |
| 204 | symmetry                       | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$ $\mathbb{G}_{4,0}^{(1,-1;a)}(T_1)$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{1}{16} & 0 & \frac{\sqrt{10}}{16} & 0 & \frac{\sqrt{5}}{16} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{16} & 0 & -\frac{\sqrt{30}}{16} & 0 & -\frac{\sqrt{3}}{16} & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{16} & 0 & \frac{\sqrt{30}}{16} & 0 & \frac{\sqrt{15}}{16} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{16} & 0 & -\frac{\sqrt{10}}{16} & 0 & -\frac{1}{16} & 0 \end{bmatrix}$ |
| 205 | symmetry                       | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$  |

continued ...

Table 6

| No. | multipole                          | matrix  |
|-----|------------------------------------|---|
|     | $\mathbb{G}_{4,1}^{(1,-1;a)}(T_1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{i}{16} & 0 & -\frac{\sqrt{10}i}{16} & 0 & \frac{\sqrt{5}i}{16} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{16} & 0 & \frac{\sqrt{30}i}{16} & 0 & -\frac{\sqrt{3}i}{16} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{16} & 0 & \frac{\sqrt{30}i}{16} & 0 & -\frac{\sqrt{15}i}{16} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{16} & 0 & -\frac{\sqrt{10}i}{16} & 0 & \frac{i}{16} \end{bmatrix}$  |
| 206 | symmetry                           | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$ $\mathbb{G}_{4,2}^{(1,-1;a)}(T_1) \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{1}{2} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{1}{2} & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$   |
| 207 | symmetry                           | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$ $\mathbb{G}_{4,0}^{(1,-1;a)}(T_2) \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{112} & 0 & \frac{\sqrt{70}}{112} & 0 & -\frac{\sqrt{35}}{16} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{105}}{112} & 0 & -\frac{\sqrt{210}}{112} & 0 & \frac{\sqrt{21}}{16} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{16} & 0 & \frac{\sqrt{210}}{112} & 0 & \frac{\sqrt{105}}{112} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{35}}{16} & 0 & -\frac{\sqrt{70}}{112} & 0 & -\frac{\sqrt{7}}{112} \end{bmatrix}$              |
| 208 | symmetry                           | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ $\mathbb{G}_{4,1}^{(1,-1;a)}(T_2) \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{7}i}{112} & 0 & \frac{\sqrt{70}i}{112} & 0 & \frac{\sqrt{35}i}{16} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105}i}{112} & 0 & -\frac{\sqrt{210}i}{112} & 0 & -\frac{\sqrt{21}i}{16} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{21}i}{16} & 0 & -\frac{\sqrt{210}i}{112} & 0 & \frac{\sqrt{105}i}{112} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{35}i}{16} & 0 & \frac{\sqrt{70}i}{112} & 0 & -\frac{\sqrt{7}i}{112} \end{bmatrix}$ |
| 209 | symmetry                           | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$   |

continued ...

Table 6

| No. | multipole | matrix   |
|-----|-----------|--|
|     |           | $ \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}}{28} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{28} & 0 & 0 & 0 & \frac{\sqrt{105}}{28} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105}}{28} & 0 & 0 & 0 & -\frac{\sqrt{21}}{28} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}}{28} & 0 & 0 & 0 & 0 \end{bmatrix} $   |
| 210 | symmetry  | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$   |
|     |           | $ \begin{bmatrix} 0 & \frac{\sqrt{30}i}{60} & 0 & 0 & 0 & 0 & -\frac{2\sqrt{5}i}{15} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{30}i}{60} & 0 & 0 & 0 & 0 & -\frac{2\sqrt{5}i}{15} & 0 & 0 & 0 \\ -\frac{\sqrt{15}i}{15} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{30} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{15}i}{15} & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}i}{60} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{15}i}{15} & 0 & 0 & 0 & 0 & \frac{\sqrt{10}i}{60} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{15}i}{15} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{30} & 0 & 0 \end{bmatrix} $  |
| 211 | symmetry  | $\frac{\sqrt{3}(x-y)(x+y)}{2}$   |
|     |           | $ \begin{bmatrix} 0 & 0 & 0 & \frac{\sqrt{30}i}{60} & -\frac{\sqrt{6}i}{9} & 0 & 0 & 0 & -\frac{\sqrt{30}i}{45} & 0 & 0 \\ -\frac{\sqrt{30}i}{60} & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{45} & 0 & 0 & 0 & -\frac{\sqrt{6}i}{9} & 0 \\ 0 & 0 & -\frac{\sqrt{15}i}{15} & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}i}{60} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{15}i}{15} & \frac{\sqrt{3}i}{18} & 0 & 0 & 0 & -\frac{\sqrt{15}i}{45} & 0 & 0 \\ -\frac{\sqrt{15}i}{15} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{45} & 0 & 0 & 0 & -\frac{\sqrt{3}i}{18} & 0 \\ 0 & -\frac{\sqrt{15}i}{15} & 0 & 0 & 0 & 0 & \frac{\sqrt{10}i}{60} & 0 & 0 & 0 & 0 \end{bmatrix} $   |
| 212 | symmetry  | $\sqrt{3}yz$   |
|     |           | $ \begin{bmatrix} \frac{\sqrt{30}}{120} & 0 & \frac{\sqrt{10}}{40} & 0 & 0 & -\frac{2\sqrt{30}}{45} & 0 & -\frac{2\sqrt{15}}{45} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{10}}{40} & 0 & -\frac{\sqrt{30}}{120} & 0 & 0 & -\frac{2\sqrt{15}}{45} & 0 & -\frac{2\sqrt{30}}{45} & 0 & 0 \\ 0 & -\frac{\sqrt{15}}{15} & 0 & 0 & -\frac{1}{12} & 0 & -\frac{\sqrt{10}}{40} & 0 & 0 & 0 & 0 \\ \frac{\sqrt{15}}{15} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{180} & 0 & -\frac{\sqrt{30}}{72} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{15}}{15} & 0 & 0 & \frac{\sqrt{30}}{72} & 0 & -\frac{\sqrt{15}}{180} & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{15}}{15} & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{40} & 0 & \frac{1}{12} & 0 \end{bmatrix} $ |
| 213 | symmetry  | $\sqrt{3}xz$   |

continued ...

Table 6

| No. | multipole                         | matrix                                 |                          |                          |                           |                        |                            |                           |                           |                           |                        |
|-----|-----------------------------------|--|--------------------------|--------------------------|---------------------------|------------------------|----------------------------|---------------------------|---------------------------|---------------------------|------------------------|
|     | $\mathbb{G}_{2,1}^{(1,0;a)}(T_2)$ | $-\frac{\sqrt{30}i}{120}$              | 0                        | $\frac{\sqrt{10}i}{40}$  | 0                         | 0                      | $\frac{2\sqrt{30}i}{45}$   | 0                         | $-\frac{2\sqrt{15}i}{45}$ | 0                         | 0                      |
|     |                                   | 0                                      | $\frac{\sqrt{10}i}{40}$  | 0                        | $-\frac{\sqrt{30}i}{120}$ | 0                      | 0                          | $\frac{2\sqrt{15}i}{45}$  | 0                         | $-\frac{2\sqrt{30}i}{45}$ | 0                      |
|     |                                   | 0                                      | $-\frac{\sqrt{15}i}{15}$ | 0                        | 0                         | $\frac{i}{12}$         | 0                          | $-\frac{\sqrt{10}i}{40}$  | 0                         | 0                         | 0                      |
|     |                                   | $-\frac{\sqrt{15}i}{15}$               | 0                        | 0                        | 0                         | 0                      | $-\frac{\sqrt{15}i}{180}$  | 0                         | $-\frac{\sqrt{30}i}{72}$  | 0                         | 0                      |
|     |                                   | 0                                      | 0                        | 0                        | $\frac{\sqrt{15}i}{15}$   | 0                      | 0                          | $-\frac{\sqrt{30}i}{72}$  | 0                         | $-\frac{\sqrt{15}i}{180}$ | 0                      |
|     |                                   | 0                                      | 0                        | $\frac{\sqrt{15}i}{15}$  | 0                         | 0                      | 0                          | 0                         | $-\frac{\sqrt{10}i}{40}$  | 0                         | $\frac{i}{12}$         |
| 214 | symmetry                          | $\sqrt{3}xy$                           |                          |                          |                           |                        |                            |                           |                           |                           |                        |
|     | $\mathbb{G}_{2,2}^{(1,0;a)}(T_2)$ | 0                                      | 0                        | 0                        | $\frac{\sqrt{30}}{60}$    | $\frac{\sqrt{6}}{9}$   | 0                          | 0                         | 0                         | $-\frac{\sqrt{30}}{45}$   | 0                      |
|     |                                   | $\frac{\sqrt{30}}{60}$                 | 0                        | 0                        | 0                         | 0                      | $\frac{\sqrt{30}}{45}$     | 0                         | 0                         | 0                         | $-\frac{\sqrt{6}}{9}$  |
|     |                                   | 0                                      | 0                        | $-\frac{\sqrt{15}}{15}$  | 0                         | 0                      | 0                          | 0                         | $-\frac{\sqrt{10}}{60}$   | 0                         | 0                      |
|     |                                   | 0                                      | 0                        | 0                        | $-\frac{\sqrt{15}}{15}$   | $-\frac{\sqrt{3}}{18}$ | 0                          | 0                         | 0                         | $-\frac{\sqrt{15}}{45}$   | 0                      |
|     |                                   | $\frac{\sqrt{15}}{15}$                 | 0                        | 0                        | 0                         | 0                      | $-\frac{\sqrt{15}}{45}$    | 0                         | 0                         | 0                         | $-\frac{\sqrt{3}}{18}$ |
|     |                                   | 0                                      | $\frac{\sqrt{15}}{15}$   | 0                        | 0                         | 0                      | 0                          | $-\frac{\sqrt{10}}{60}$   | 0                         | 0                         | 0                      |
| 215 | symmetry                          | 1                                      |                          |                          |                           |                        |                            |                           |                           |                           |                        |
|     | $\mathbb{G}_0^{(1,1;a)}(A_1)$     | 0                                      | 0                        | 0                        | 0                         | 0                      | 0                          | 0                         | 0                         | 0                         | 0                      |
|     |                                   | 0                                      | 0                        | 0                        | 0                         | 0                      | 0                          | 0                         | 0                         | 0                         | 0                      |
|     |                                   | $-\frac{\sqrt{2}i}{4}$                 | 0                        | 0                        | 0                         | 0                      | 0                          | 0                         | 0                         | 0                         | 0                      |
|     |                                   | 0                                      | $-\frac{\sqrt{2}i}{4}$   | 0                        | 0                         | 0                      | 0                          | 0                         | 0                         | 0                         | 0                      |
|     |                                   | 0                                      | 0                        | $-\frac{\sqrt{2}i}{4}$   | 0                         | 0                      | 0                          | 0                         | 0                         | 0                         | 0                      |
|     |                                   | 0                                      | 0                        | 0                        | $-\frac{\sqrt{2}i}{4}$    | 0                      | 0                          | 0                         | 0                         | 0                         | 0                      |
| 216 | symmetry                          | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |                          |                          |                           |                        |                            |                           |                           |                           |                        |
|     | $\mathbb{G}_{2,0}^{(1,1;a)}(E)$   | 0                                      | $\frac{\sqrt{42}i}{15}$  | 0                        | 0                         | 0                      | 0                          | $-\frac{\sqrt{7}i}{30}$   | 0                         | 0                         | 0                      |
|     |                                   | 0                                      | 0                        | $-\frac{\sqrt{42}i}{15}$ | 0                         | 0                      | 0                          | 0                         | $-\frac{\sqrt{7}i}{30}$   | 0                         | 0                      |
|     |                                   | $\frac{\sqrt{21}i}{30}$                | 0                        | 0                        | 0                         | 0                      | $-\frac{2\sqrt{21}i}{105}$ | 0                         | 0                         | 0                         | 0                      |
|     |                                   | 0                                      | $-\frac{\sqrt{21}i}{30}$ | 0                        | 0                         | 0                      | 0                          | $-\frac{\sqrt{14}i}{105}$ | 0                         | 0                         | 0                      |
|     |                                   | 0                                      | 0                        | $-\frac{\sqrt{21}i}{30}$ | 0                         | 0                      | 0                          | 0                         | $\frac{\sqrt{14}i}{105}$  | 0                         | 0                      |
|     |                                   | 0                                      | 0                        | 0                        | $\frac{\sqrt{21}i}{30}$   | 0                      | 0                          | 0                         | 0                         | $\frac{2\sqrt{21}i}{105}$ | 0                      |
| 217 | symmetry                          | $\frac{\sqrt{3}(x-y)(x+y)}{2}$         |                          |                          |                           |                        |                            |                           |                           |                           |                        |

continued ...

Table 6

| No. | multipole                         | matrix                   |                         |                          |                          |                            |                           |                           |                           |                            |                             |
|-----|-----------------------------------|--------------------------|-------------------------|--------------------------|--------------------------|----------------------------|---------------------------|---------------------------|---------------------------|----------------------------|-----------------------------|
|     | $\mathbb{G}_{2,1}^{(1,1;a)}(E)$   | 0                        | 0                       | 0                        | $\frac{\sqrt{42}i}{15}$  | $-\frac{\sqrt{210}i}{180}$ | 0                         | 0                         | 0                         | $-\frac{\sqrt{42}i}{180}$  | 0                           |
|     |                                   | $-\frac{\sqrt{42}i}{15}$ | 0                       | 0                        | 0                        | 0                          | $-\frac{\sqrt{42}i}{180}$ | 0                         | 0                         | 0                          | $-\frac{\sqrt{210}i}{180}$  |
|     |                                   | 0                        | 0                       | $\frac{\sqrt{21}i}{30}$  | 0                        | 0                          | 0                         | 0                         | $-\frac{\sqrt{14}i}{105}$ | 0                          | 0                           |
|     |                                   | 0                        | 0                       | 0                        | $\frac{\sqrt{21}i}{30}$  | $\frac{2\sqrt{105}i}{315}$ | 0                         | 0                         | 0                         | $-\frac{4\sqrt{21}i}{315}$ | 0                           |
|     |                                   | $\frac{\sqrt{21}i}{30}$  | 0                       | 0                        | 0                        | 0                          | $\frac{4\sqrt{21}i}{315}$ | 0                         | 0                         | 0                          | $-\frac{2\sqrt{105}i}{315}$ |
|     |                                   | 0                        | $\frac{\sqrt{21}i}{30}$ | 0                        | 0                        | 0                          | 0                         | $\frac{\sqrt{14}i}{105}$  | 0                         | 0                          | 0                           |
| 218 | symmetry                          | $\sqrt{3}yz$             |                         |                          |                          |                            |                           |                           |                           |                            |                             |
|     | $\mathbb{G}_{2,0}^{(1,1;a)}(T_2)$ | $\frac{\sqrt{42}}{30}$   | 0                       | $\frac{\sqrt{14}}{10}$   | 0                        | 0                          | $-\frac{\sqrt{42}}{90}$   | 0                         | $-\frac{\sqrt{21}}{90}$   | 0                          | 0                           |
|     |                                   | 0                        | $-\frac{\sqrt{14}}{10}$ | 0                        | $-\frac{\sqrt{42}}{30}$  | 0                          | 0                         | $-\frac{\sqrt{21}}{90}$   | 0                         | $-\frac{\sqrt{42}}{90}$    | 0                           |
|     |                                   | 0                        | $\frac{\sqrt{21}}{30}$  | 0                        | 0                        | $-\frac{\sqrt{35}}{105}$   | 0                         | $-\frac{\sqrt{14}}{70}$   | 0                         | 0                          | 0                           |
|     |                                   | $-\frac{\sqrt{21}}{30}$  | 0                       | 0                        | 0                        | 0                          | $\frac{\sqrt{21}}{315}$   | 0                         | $-\frac{\sqrt{42}}{126}$  | 0                          | 0                           |
|     |                                   | 0                        | 0                       | 0                        | $-\frac{\sqrt{21}}{30}$  | 0                          | 0                         | $\frac{\sqrt{42}}{126}$   | 0                         | $-\frac{\sqrt{21}}{315}$   | 0                           |
|     |                                   | 0                        | 0                       | $\frac{\sqrt{21}}{30}$   | 0                        | 0                          | 0                         | 0                         | $\frac{\sqrt{14}}{70}$    | 0                          | $\frac{\sqrt{35}}{105}$     |
| 219 | symmetry                          | $\sqrt{3}xz$             |                         |                          |                          |                            |                           |                           |                           |                            |                             |
|     | $\mathbb{G}_{2,1}^{(1,1;a)}(T_2)$ | $-\frac{\sqrt{42}i}{30}$ | 0                       | $\frac{\sqrt{14}i}{10}$  | 0                        | 0                          | $\frac{\sqrt{42}i}{90}$   | 0                         | $-\frac{\sqrt{21}i}{90}$  | 0                          | 0                           |
|     |                                   | 0                        | $\frac{\sqrt{14}i}{10}$ | 0                        | $-\frac{\sqrt{42}i}{30}$ | 0                          | 0                         | $\frac{\sqrt{21}i}{90}$   | 0                         | $-\frac{\sqrt{42}i}{90}$   | 0                           |
|     |                                   | 0                        | $\frac{\sqrt{21}i}{30}$ | 0                        | 0                        | $\frac{\sqrt{35}i}{105}$   | 0                         | $-\frac{\sqrt{14}i}{70}$  | 0                         | 0                          | 0                           |
|     |                                   | $\frac{\sqrt{21}i}{30}$  | 0                       | 0                        | 0                        | 0                          | $-\frac{\sqrt{21}i}{315}$ | 0                         | $-\frac{\sqrt{42}i}{126}$ | 0                          | 0                           |
|     |                                   | 0                        | 0                       | 0                        | $-\frac{\sqrt{21}i}{30}$ | 0                          | 0                         | $-\frac{\sqrt{42}i}{126}$ | 0                         | $-\frac{\sqrt{21}i}{315}$  | 0                           |
|     |                                   | 0                        | 0                       | $-\frac{\sqrt{21}i}{30}$ | 0                        | 0                          | 0                         | 0                         | $-\frac{\sqrt{14}i}{70}$  | 0                          | $\frac{\sqrt{35}i}{105}$    |
| 220 | symmetry                          | $\sqrt{3}xy$             |                         |                          |                          |                            |                           |                           |                           |                            |                             |
|     | $\mathbb{G}_{2,2}^{(1,1;a)}(T_2)$ | 0                        | 0                       | 0                        | $\frac{\sqrt{42}}{15}$   | $\frac{\sqrt{210}}{180}$   | 0                         | 0                         | 0                         | $-\frac{\sqrt{42}}{180}$   | 0                           |
|     |                                   | $\frac{\sqrt{42}}{15}$   | 0                       | 0                        | 0                        | 0                          | $\frac{\sqrt{42}}{180}$   | 0                         | 0                         | 0                          | $-\frac{\sqrt{210}}{180}$   |
|     |                                   | 0                        | 0                       | $\frac{\sqrt{21}}{30}$   | 0                        | 0                          | 0                         | 0                         | $-\frac{\sqrt{14}}{105}$  | 0                          | 0                           |
|     |                                   | 0                        | 0                       | 0                        | $\frac{\sqrt{21}}{30}$   | $-\frac{2\sqrt{105}}{315}$ | 0                         | 0                         | 0                         | $-\frac{4\sqrt{21}}{315}$  | 0                           |
|     |                                   | $-\frac{\sqrt{21}}{30}$  | 0                       | 0                        | 0                        | 0                          | $-\frac{4\sqrt{21}}{315}$ | 0                         | 0                         | 0                          | $-\frac{2\sqrt{105}}{315}$  |
|     |                                   | 0                        | $-\frac{\sqrt{21}}{30}$ | 0                        | 0                        | 0                          | 0                         | $-\frac{\sqrt{14}}{105}$  | 0                         | 0                          | 0                           |
| 221 | symmetry                          | $x$                      |                         |                          |                          |                            |                           |                           |                           |                            |                             |

continued ...

Table 6

| No. | multipole                     | matrix   |
|-----|-------------------------------|--|
|     | $\mathbb{T}_{1,0}^{(a)}(T_1)$ | $ \begin{bmatrix} -\frac{i}{4} & 0 & \frac{\sqrt{3}i}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{3}i}{12} & 0 & \frac{i}{4} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}i}{20} & 0 & 0 & -\frac{\sqrt{30}i}{20} & 0 & \frac{\sqrt{3}i}{20} & 0 & 0 & 0 \\ -\frac{\sqrt{2}i}{20} & 0 & -\frac{\sqrt{6}i}{30} & 0 & 0 & -\frac{3\sqrt{2}i}{20} & 0 & \frac{3i}{20} & 0 & 0 \\ 0 & -\frac{\sqrt{6}i}{30} & 0 & -\frac{\sqrt{2}i}{20} & 0 & 0 & -\frac{3i}{20} & 0 & \frac{3\sqrt{2}i}{20} & 0 \\ 0 & 0 & -\frac{\sqrt{2}i}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{20} & 0 & \frac{\sqrt{30}i}{20} \end{bmatrix} $                                     |
| 222 | symmetry                      | $ \begin{matrix} y \\ \mathbb{T}_{1,1}^{(a)}(T_1) \end{matrix} \begin{bmatrix} \frac{1}{4} & 0 & \frac{\sqrt{3}}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{3}}{12} & 0 & \frac{1}{4} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}}{20} & 0 & 0 & \frac{\sqrt{30}}{20} & 0 & \frac{\sqrt{3}}{20} & 0 & 0 & 0 \\ \frac{\sqrt{2}}{20} & 0 & -\frac{\sqrt{6}}{30} & 0 & 0 & \frac{3\sqrt{2}}{20} & 0 & \frac{3}{20} & 0 & 0 \\ 0 & \frac{\sqrt{6}}{30} & 0 & -\frac{\sqrt{2}}{20} & 0 & 0 & \frac{3}{20} & 0 & \frac{3\sqrt{2}}{20} & 0 \\ 0 & 0 & \frac{\sqrt{2}}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{20} & 0 & \frac{\sqrt{30}}{20} \end{bmatrix} $ |
| 223 | symmetry                      | $ \begin{matrix} z \\ \mathbb{T}_{1,2}^{(a)}(T_1) \end{matrix} \begin{bmatrix} 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{6}i}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{10} & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{6}i}{60} & 0 & 0 & 0 & 0 & \frac{3i}{10} & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}i}{60} & 0 & 0 & 0 & 0 & \frac{3i}{10} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{6}i}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{10} & 0 \end{bmatrix} $  |
| 224 | symmetry                      | $ \begin{matrix} \sqrt{15}xyz \\ \mathbb{T}_3^{(a)}(A_2) \end{matrix} \begin{bmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{12} & 0 & 0 & 0 & -\frac{\sqrt{10}}{12} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{12} & 0 & 0 & 0 & \frac{\sqrt{2}}{12} \\ 0 & 0 & \frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{30} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{5}}{10} & -\frac{1}{6} & 0 & 0 & 0 & -\frac{\sqrt{5}}{30} & 0 \\ -\frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{30} & 0 & 0 & 0 & \frac{1}{6} \\ 0 & \frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{30} & 0 & 0 & 0 \end{bmatrix} $  |
| 225 | symmetry                      | $ \frac{x(2x^2-3y^2-3z^2)}{2} $  |

continued ...



Table 6

| No. | multipole                     | matrix                            |                         |                         |                          |                          |                          |                          |                           |                           |                          |
|-----|-------------------------------|-----------------------------------|-------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------|---------------------------|--------------------------|
|     | $\mathbb{T}_{3,0}^{(a)}(T_1)$ | 0                                 | 0                       | 0                       | 0                        | 0                        | $-\frac{\sqrt{6}i}{24}$  | 0                        | $\frac{\sqrt{3}i}{12}$    | 0                         | $-\frac{\sqrt{30}i}{24}$ |
|     |                               | 0                                 | 0                       | 0                       | 0                        | $-\frac{\sqrt{30}i}{24}$ | 0                        | $\frac{\sqrt{3}i}{12}$   | 0                         | $-\frac{\sqrt{6}i}{24}$   | 0                        |
|     |                               | 0                                 | $-\frac{\sqrt{3}i}{20}$ | 0                       | $\frac{i}{4}$            | $-\frac{\sqrt{5}i}{40}$  | 0                        | $\frac{3\sqrt{2}i}{40}$  | 0                         | $-\frac{i}{8}$            | 0                        |
|     |                               | $-\frac{\sqrt{3}i}{20}$           | 0                       | $\frac{3i}{20}$         | 0                        | 0                        | $\frac{7\sqrt{3}i}{120}$ | 0                        | $-\frac{\sqrt{6}i}{120}$  | 0                         | $-\frac{\sqrt{15}i}{24}$ |
|     |                               | 0                                 | $\frac{3i}{20}$         | 0                       | $-\frac{\sqrt{3}i}{20}$  | $\frac{\sqrt{15}i}{24}$  | 0                        | $\frac{\sqrt{6}i}{120}$  | 0                         | $-\frac{7\sqrt{3}i}{120}$ | 0                        |
|     |                               | $\frac{i}{4}$                     | 0                       | $-\frac{\sqrt{3}i}{20}$ | 0                        | 0                        | $\frac{i}{8}$            | 0                        | $-\frac{3\sqrt{2}i}{40}$  | 0                         | $\frac{\sqrt{5}i}{40}$   |
| 226 | symmetry                      | $-\frac{y(3x^2-2y^2+3z^2)}{2}$    |                         |                         |                          |                          |                          |                          |                           |                           |                          |
|     | $\mathbb{T}_{3,1}^{(a)}(T_1)$ | 0                                 | 0                       | 0                       | 0                        | 0                        | $\frac{\sqrt{6}}{24}$    | 0                        | $\frac{\sqrt{3}}{12}$     | 0                         | $\frac{\sqrt{30}}{24}$   |
|     |                               | 0                                 | 0                       | 0                       | 0                        | $-\frac{\sqrt{30}}{24}$  | 0                        | $-\frac{\sqrt{3}}{12}$   | 0                         | $-\frac{\sqrt{6}}{24}$    | 0                        |
|     |                               | 0                                 | $-\frac{\sqrt{3}}{20}$  | 0                       | $-\frac{1}{4}$           | $\frac{\sqrt{5}}{40}$    | 0                        | $\frac{3\sqrt{2}}{40}$   | 0                         | $\frac{1}{8}$             | 0                        |
|     |                               | $\frac{\sqrt{3}}{20}$             | 0                       | $\frac{3}{20}$          | 0                        | 0                        | $-\frac{7\sqrt{3}}{120}$ | 0                        | $-\frac{\sqrt{6}}{120}$   | 0                         | $\frac{\sqrt{15}}{24}$   |
|     |                               | 0                                 | $-\frac{3}{20}$         | 0                       | $-\frac{\sqrt{3}}{20}$   | $\frac{\sqrt{15}}{24}$   | 0                        | $-\frac{\sqrt{6}}{120}$  | 0                         | $-\frac{7\sqrt{3}}{120}$  | 0                        |
|     |                               | $\frac{1}{4}$                     | 0                       | $\frac{\sqrt{3}}{20}$   | 0                        | 0                        | $\frac{1}{8}$            | 0                        | $\frac{3\sqrt{2}}{40}$    | 0                         | $\frac{\sqrt{5}}{40}$    |
| 227 | symmetry                      | $-\frac{z(3x^2+3y^2-2z^2)}{2}$    |                         |                         |                          |                          |                          |                          |                           |                           |                          |
|     | $\mathbb{T}_{3,2}^{(a)}(T_1)$ | 0                                 | 0                       | 0                       | 0                        | 0                        | 0                        | $-\frac{\sqrt{3}i}{6}$   | 0                         | 0                         | 0                        |
|     |                               | 0                                 | 0                       | 0                       | 0                        | 0                        | 0                        | 0                        | $\frac{\sqrt{3}i}{6}$     | 0                         | 0                        |
|     |                               | $\frac{i}{10}$                    | 0                       | 0                       | 0                        | 0                        | $-\frac{i}{5}$           | 0                        | 0                         | 0                         | 0                        |
|     |                               | 0                                 | $-\frac{3i}{10}$        | 0                       | 0                        | 0                        | 0                        | $\frac{\sqrt{6}i}{15}$   | 0                         | 0                         | 0                        |
|     |                               | 0                                 | 0                       | $\frac{3i}{10}$         | 0                        | 0                        | 0                        | 0                        | $\frac{\sqrt{6}i}{15}$    | 0                         | 0                        |
|     |                               | 0                                 | 0                       | 0                       | $-\frac{i}{10}$          | 0                        | 0                        | 0                        | 0                         | $-\frac{i}{5}$            | 0                        |
| 228 | symmetry                      | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$  |                         |                         |                          |                          |                          |                          |                           |                           |                          |
|     | $\mathbb{T}_{3,0}^{(a)}(T_2)$ | 0                                 | 0                       | 0                       | 0                        | 0                        | $-\frac{\sqrt{10}i}{24}$ | 0                        | $\frac{\sqrt{5}i}{12}$    | 0                         | $\frac{\sqrt{2}i}{8}$    |
|     |                               | 0                                 | 0                       | 0                       | 0                        | $\frac{\sqrt{2}i}{8}$    | 0                        | $\frac{\sqrt{5}i}{12}$   | 0                         | $-\frac{\sqrt{10}i}{24}$  | 0                        |
|     |                               | 0                                 | $-\frac{\sqrt{5}i}{20}$ | 0                       | $-\frac{\sqrt{15}i}{20}$ | $-\frac{\sqrt{3}i}{24}$  | 0                        | $\frac{\sqrt{30}i}{40}$  | 0                         | $\frac{\sqrt{15}i}{40}$   | 0                        |
|     |                               | $-\frac{\sqrt{5}i}{20}$           | 0                       | $\frac{\sqrt{15}i}{20}$ | 0                        | 0                        | $\frac{7\sqrt{5}i}{120}$ | 0                        | $-\frac{\sqrt{10}i}{120}$ | 0                         | $\frac{i}{8}$            |
|     |                               | 0                                 | $\frac{\sqrt{15}i}{20}$ | 0                       | $-\frac{\sqrt{5}i}{20}$  | $-\frac{i}{8}$           | 0                        | $\frac{\sqrt{10}i}{120}$ | 0                         | $-\frac{7\sqrt{5}i}{120}$ | 0                        |
|     |                               | $-\frac{\sqrt{15}i}{20}$          | 0                       | $-\frac{\sqrt{5}i}{20}$ | 0                        | 0                        | $-\frac{\sqrt{15}i}{40}$ | 0                        | $-\frac{\sqrt{30}i}{40}$  | 0                         | $\frac{\sqrt{3}i}{24}$   |
| 229 | symmetry                      | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |                         |                         |                          |                          |                          |                          |                           |                           |                          |

continued ...

Table 6

| No. | multipole | matrix   |  |  |  |  |  |  |  |  |  |
|-----|-----------|--|--|--|--|--|--|--|--|--|--|
|     |           | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{24} & 0 & -\frac{\sqrt{5}}{12} & 0 & \frac{\sqrt{2}}{8} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{8} & 0 & \frac{\sqrt{5}}{12} & 0 & \frac{\sqrt{10}}{24} & 0 \\ 0 & \frac{\sqrt{5}}{20} & 0 & -\frac{\sqrt{15}}{20} & -\frac{\sqrt{3}}{24} & 0 & -\frac{\sqrt{30}}{40} & 0 & \frac{\sqrt{15}}{40} & 0 \\ -\frac{\sqrt{5}}{20} & 0 & -\frac{\sqrt{15}}{20} & 0 & 0 & \frac{7\sqrt{5}}{120} & 0 & \frac{\sqrt{10}}{120} & 0 & \frac{1}{8} \\ 0 & \frac{\sqrt{15}}{20} & 0 & \frac{\sqrt{5}}{20} & \frac{1}{8} & 0 & \frac{\sqrt{10}}{120} & 0 & \frac{7\sqrt{5}}{120} & 0 \\ \frac{\sqrt{15}}{20} & 0 & -\frac{\sqrt{5}}{20} & 0 & 0 & \frac{\sqrt{15}}{40} & 0 & -\frac{\sqrt{30}}{40} & 0 & -\frac{\sqrt{3}}{24} \end{bmatrix}$    |  |  |  |  |  |  |  |  |  |
| 230 | symmetry  | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$   |  |  |  |  |  |  |  |  |  |
|     |           | $\begin{bmatrix} 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{12} & 0 & 0 & 0 & -\frac{\sqrt{10}i}{12} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}i}{12} & 0 & 0 & 0 & \frac{\sqrt{2}i}{12} \\ 0 & 0 & \frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{30} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{5}i}{10} & \frac{i}{6} & 0 & 0 & 0 & -\frac{\sqrt{5}i}{30} & 0 \\ \frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{30} & 0 & 0 & 0 & \frac{i}{6} \\ 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{30} & 0 & 0 & 0 \end{bmatrix}$   |  |  |  |  |  |  |  |  |  |
| 231 | symmetry  | $\sqrt{15}xyz$   |  |  |  |  |  |  |  |  |  |
|     |           | $\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{18} & 0 & 0 & 0 & -\frac{\sqrt{15}}{18} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{18} & 0 & 0 & 0 & \frac{\sqrt{3}}{18} \\ 0 & 0 & \frac{\sqrt{30}}{60} & 0 & 0 & 0 & 0 & \frac{2\sqrt{5}}{15} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{30}}{60} & \frac{\sqrt{6}}{9} & 0 & 0 & 0 & \frac{\sqrt{30}}{45} & 0 \\ -\frac{\sqrt{30}}{60} & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{45} & 0 & 0 & 0 & -\frac{\sqrt{6}}{9} \\ 0 & \frac{\sqrt{30}}{60} & 0 & 0 & 0 & 0 & -\frac{2\sqrt{5}}{15} & 0 & 0 & 0 \end{bmatrix}$  |  |  |  |  |  |  |  |  |  |
| 232 | symmetry  | $\frac{x(2x^2-3y^2-3z^2)}{2}$  |  |  |  |  |  |  |  |  |  |
|     |           | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{i}{12} & 0 & \frac{\sqrt{2}i}{12} & 0 & -\frac{\sqrt{5}i}{12} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{12} & 0 & \frac{\sqrt{2}i}{12} & 0 & -\frac{i}{12} & 0 \\ 0 & -\frac{\sqrt{2}i}{40} & 0 & \frac{\sqrt{6}i}{24} & \frac{\sqrt{30}i}{60} & 0 & -\frac{\sqrt{3}i}{10} & 0 & \frac{\sqrt{6}i}{12} & 0 \\ -\frac{\sqrt{2}i}{40} & 0 & \frac{\sqrt{6}i}{40} & 0 & 0 & -\frac{7\sqrt{2}i}{60} & 0 & \frac{i}{30} & 0 & \frac{\sqrt{10}i}{12} \\ 0 & \frac{\sqrt{6}i}{40} & 0 & -\frac{\sqrt{2}i}{40} & -\frac{\sqrt{10}i}{12} & 0 & -\frac{i}{30} & 0 & \frac{7\sqrt{2}i}{60} & 0 \\ \frac{\sqrt{6}i}{24} & 0 & -\frac{\sqrt{2}i}{40} & 0 & 0 & -\frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{3}i}{10} & 0 & -\frac{\sqrt{30}i}{60} \end{bmatrix}$ |  |  |  |  |  |  |  |  |  |
| 233 | symmetry  | $-\frac{y(3x^2-2y^2+3z^2)}{2}$   |  |  |  |  |  |  |  |  |  |

continued ...

Table 6

| No. | multipole                          | matrix   |
|-----|------------------------------------|--|
|     | $\mathbb{T}_{3,1}^{(1,-1;a)}(T_1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{1}{12} & 0 & \frac{\sqrt{2}}{12} & 0 & \frac{\sqrt{5}}{12} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{12} & 0 & -\frac{\sqrt{2}}{12} & 0 & -\frac{1}{12} & 0 \\ 0 & -\frac{\sqrt{2}}{40} & 0 & -\frac{\sqrt{6}}{24} & -\frac{\sqrt{30}}{60} & 0 & -\frac{\sqrt{3}}{10} & 0 & -\frac{\sqrt{6}}{12} & 0 \\ \frac{\sqrt{2}}{40} & 0 & \frac{\sqrt{6}}{40} & 0 & 0 & \frac{7\sqrt{2}}{60} & 0 & \frac{1}{30} & 0 & -\frac{\sqrt{10}}{12} \\ 0 & -\frac{\sqrt{6}}{40} & 0 & -\frac{\sqrt{2}}{40} & -\frac{\sqrt{10}}{12} & 0 & \frac{1}{30} & 0 & \frac{7\sqrt{2}}{60} & 0 \\ \frac{\sqrt{6}}{24} & 0 & \frac{\sqrt{2}}{40} & 0 & 0 & -\frac{\sqrt{6}}{12} & 0 & -\frac{\sqrt{3}}{10} & 0 & -\frac{\sqrt{30}}{60} \end{bmatrix}$  |
| 234 | symmetry                           | $-\frac{z(3x^2+3y^2-2z^2)}{2}$   |
|     | $\mathbb{T}_{3,2}^{(1,-1;a)}(T_1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{6} & 0 & 0 \\ \frac{\sqrt{6}i}{60} & 0 & 0 & 0 & 0 & \frac{2\sqrt{6}i}{15} & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{6}i}{20} & 0 & 0 & 0 & 0 & -\frac{4i}{15} & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}i}{20} & 0 & 0 & 0 & 0 & -\frac{4i}{15} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{6}i}{60} & 0 & 0 & 0 & 0 & \frac{2\sqrt{6}i}{15} & 0 \end{bmatrix}$  |
| 235 | symmetry                           | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$   |
|     | $\mathbb{T}_{3,0}^{(1,-1;a)}(T_2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{36} & 0 & \frac{\sqrt{30}i}{36} & 0 & \frac{\sqrt{3}i}{12} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{12} & 0 & \frac{\sqrt{30}i}{36} & 0 & -\frac{\sqrt{15}i}{36} & 0 \\ 0 & -\frac{\sqrt{30}i}{120} & 0 & -\frac{\sqrt{10}i}{40} & \frac{\sqrt{2}i}{12} & 0 & -\frac{\sqrt{5}i}{10} & 0 & -\frac{\sqrt{10}i}{20} & 0 \\ -\frac{\sqrt{30}i}{120} & 0 & \frac{\sqrt{10}i}{40} & 0 & 0 & -\frac{7\sqrt{30}i}{180} & 0 & \frac{\sqrt{15}i}{90} & 0 & -\frac{\sqrt{6}i}{12} \\ 0 & \frac{\sqrt{10}i}{40} & 0 & -\frac{\sqrt{30}i}{120} & \frac{\sqrt{6}i}{12} & 0 & -\frac{\sqrt{15}i}{90} & 0 & \frac{7\sqrt{30}i}{180} & 0 \\ -\frac{\sqrt{10}i}{40} & 0 & -\frac{\sqrt{30}i}{120} & 0 & 0 & \frac{\sqrt{10}i}{20} & 0 & \frac{\sqrt{5}i}{10} & 0 & -\frac{\sqrt{2}i}{12} \end{bmatrix}$ |
| 236 | symmetry                           | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$  |
|     | $\mathbb{T}_{3,1}^{(1,-1;a)}(T_2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{36} & 0 & -\frac{\sqrt{30}}{36} & 0 & \frac{\sqrt{3}}{12} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{12} & 0 & \frac{\sqrt{30}}{36} & 0 & \frac{\sqrt{15}}{36} & 0 \\ 0 & \frac{\sqrt{30}}{120} & 0 & -\frac{\sqrt{10}}{40} & \frac{\sqrt{2}}{12} & 0 & \frac{\sqrt{5}}{10} & 0 & -\frac{\sqrt{10}}{20} & 0 \\ -\frac{\sqrt{30}}{120} & 0 & -\frac{\sqrt{10}}{40} & 0 & 0 & -\frac{7\sqrt{30}}{180} & 0 & -\frac{\sqrt{15}}{90} & 0 & -\frac{\sqrt{6}}{12} \\ 0 & \frac{\sqrt{10}}{40} & 0 & \frac{\sqrt{30}}{120} & -\frac{\sqrt{6}}{12} & 0 & -\frac{\sqrt{15}}{90} & 0 & -\frac{7\sqrt{30}}{180} & 0 \\ \frac{\sqrt{10}}{40} & 0 & -\frac{\sqrt{30}}{120} & 0 & 0 & -\frac{\sqrt{10}}{20} & 0 & \frac{\sqrt{5}}{10} & 0 & \frac{\sqrt{2}}{12} \end{bmatrix}$                          |
| 237 | symmetry                           | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$   |

continued ...

Table 6

| No. | multipole                          | matrix                  |                          |                          |                          |                         |                         |                          |                          |                          |                          |
|-----|------------------------------------|-------------------------|--------------------------|--------------------------|--------------------------|-------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
|     | $\mathbb{T}_{3,2}^{(1,-1;a)}(T_2)$ | 0                       | 0                        | 0                        | 0                        | $-\frac{\sqrt{3}i}{18}$ | 0                       | 0                        | 0                        | $-\frac{\sqrt{15}i}{18}$ | 0                        |
|     |                                    | 0                       | 0                        | 0                        | 0                        | 0                       | $\frac{\sqrt{15}i}{18}$ | 0                        | 0                        | 0                        | $\frac{\sqrt{3}i}{18}$   |
|     |                                    | 0                       | 0                        | $\frac{\sqrt{30}i}{60}$  | 0                        | 0                       | 0                       | 0                        | $\frac{2\sqrt{5}i}{15}$  | 0                        | 0                        |
|     |                                    | 0                       | 0                        | 0                        | $-\frac{\sqrt{30}i}{60}$ | $-\frac{\sqrt{6}i}{9}$  | 0                       | 0                        | 0                        | $\frac{\sqrt{30}i}{45}$  | 0                        |
|     |                                    | $\frac{\sqrt{30}i}{60}$ | 0                        | 0                        | 0                        | 0                       | $\frac{\sqrt{30}i}{45}$ | 0                        | 0                        | 0                        | $-\frac{\sqrt{6}i}{9}$   |
|     |                                    | 0                       | $-\frac{\sqrt{30}i}{60}$ | 0                        | 0                        | 0                       | 0                       | $\frac{2\sqrt{5}i}{15}$  | 0                        | 0                        | 0                        |
| 238 | symmetry                           | $x$                     |                          |                          |                          |                         |                         |                          |                          |                          |                          |
|     | $\mathbb{T}_{1,0}^{(1,0;a)}(T_1)$  | $-\frac{\sqrt{2}i}{8}$  | 0                        | $\frac{\sqrt{6}i}{24}$   | 0                        | 0                       | 0                       | 0                        | 0                        | 0                        | 0                        |
|     |                                    | 0                       | $-\frac{\sqrt{6}i}{24}$  | 0                        | $\frac{\sqrt{2}i}{8}$    | 0                       | 0                       | 0                        | 0                        | 0                        | 0                        |
|     |                                    | 0                       | $-\frac{i}{5}$           | 0                        | 0                        | $\frac{\sqrt{15}i}{20}$ | 0                       | $-\frac{\sqrt{6}i}{40}$  | 0                        | 0                        | 0                        |
|     |                                    | $-\frac{i}{5}$          | 0                        | $-\frac{2\sqrt{3}i}{15}$ | 0                        | 0                       | $\frac{3i}{20}$         | 0                        | $-\frac{3\sqrt{2}i}{40}$ | 0                        | 0                        |
|     |                                    | 0                       | $-\frac{2\sqrt{3}i}{15}$ | 0                        | $-\frac{i}{5}$           | 0                       | 0                       | $\frac{3\sqrt{2}i}{40}$  | 0                        | $-\frac{3i}{20}$         | 0                        |
|     |                                    | 0                       | 0                        | $-\frac{i}{5}$           | 0                        | 0                       | 0                       | 0                        | $\frac{\sqrt{6}i}{40}$   | 0                        | $-\frac{\sqrt{15}i}{20}$ |
| 239 | symmetry                           | $y$                     |                          |                          |                          |                         |                         |                          |                          |                          |                          |
|     | $\mathbb{T}_{1,1}^{(1,0;a)}(T_1)$  | $\frac{\sqrt{2}}{8}$    | 0                        | $\frac{\sqrt{6}}{24}$    | 0                        | 0                       | 0                       | 0                        | 0                        | 0                        | 0                        |
|     |                                    | 0                       | $\frac{\sqrt{6}}{24}$    | 0                        | $\frac{\sqrt{2}}{8}$     | 0                       | 0                       | 0                        | 0                        | 0                        | 0                        |
|     |                                    | 0                       | $-\frac{1}{5}$           | 0                        | 0                        | $-\frac{\sqrt{15}}{20}$ | 0                       | $-\frac{\sqrt{6}}{40}$   | 0                        | 0                        | 0                        |
|     |                                    | $\frac{1}{5}$           | 0                        | $-\frac{2\sqrt{3}}{15}$  | 0                        | 0                       | $-\frac{3}{20}$         | 0                        | $-\frac{3\sqrt{2}}{40}$  | 0                        | 0                        |
|     |                                    | 0                       | $\frac{2\sqrt{3}}{15}$   | 0                        | $-\frac{1}{5}$           | 0                       | 0                       | $-\frac{3\sqrt{2}}{40}$  | 0                        | $-\frac{3}{20}$          | 0                        |
|     |                                    | 0                       | 0                        | $\frac{1}{5}$            | 0                        | 0                       | 0                       | 0                        | $-\frac{\sqrt{6}}{40}$   | 0                        | $-\frac{\sqrt{15}}{20}$  |
| 240 | symmetry                           | $z$                     |                          |                          |                          |                         |                         |                          |                          |                          |                          |
|     | $\mathbb{T}_{1,2}^{(1,0;a)}(T_1)$  | 0                       | $\frac{\sqrt{6}i}{12}$   | 0                        | 0                        | 0                       | 0                       | 0                        | 0                        | 0                        | 0                        |
|     |                                    | 0                       | 0                        | $\frac{\sqrt{6}i}{12}$   | 0                        | 0                       | 0                       | 0                        | 0                        | 0                        | 0                        |
|     |                                    | $-\frac{\sqrt{3}i}{5}$  | 0                        | 0                        | 0                        | 0                       | $-\frac{\sqrt{3}i}{10}$ | 0                        | 0                        | 0                        | 0                        |
|     |                                    | 0                       | $-\frac{\sqrt{3}i}{15}$  | 0                        | 0                        | 0                       | 0                       | $-\frac{3\sqrt{2}i}{20}$ | 0                        | 0                        | 0                        |
|     |                                    | 0                       | 0                        | $\frac{\sqrt{3}i}{15}$   | 0                        | 0                       | 0                       | 0                        | $-\frac{3\sqrt{2}i}{20}$ | 0                        | 0                        |
|     |                                    | 0                       | 0                        | 0                        | $\frac{\sqrt{3}i}{5}$    | 0                       | 0                       | 0                        | 0                        | $-\frac{\sqrt{3}i}{10}$  | 0                        |
| 241 | symmetry                           | $\sqrt{15}xyz$          |                          |                          |                          |                         |                         |                          |                          |                          |                          |

continued ...

Table 6

| No. | multipole                     | matrix   |
|-----|-------------------------------|--|
|     | $\mathbb{T}_3^{(1,0;a)}(A_2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{18} & 0 & 0 & 0 & \frac{\sqrt{30}}{18} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{18} & 0 & 0 & 0 & -\frac{\sqrt{6}}{18} \\ 0 & 0 & \frac{\sqrt{15}}{15} & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{60} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{15}}{15} & \frac{\sqrt{3}}{36} & 0 & 0 & 0 & \frac{\sqrt{15}}{180} & 0 \\ -\frac{\sqrt{15}}{15} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{180} & 0 & 0 & 0 & -\frac{\sqrt{3}}{36} \\ 0 & \frac{\sqrt{15}}{15} & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{60} & 0 & 0 & 0 \end{bmatrix}$  |
| 242 | symmetry                      | $\frac{x(2x^2-3y^2-3z^2)}{2}$ $\mathbb{T}_{3,0}^{(1,0;a)}(T_1) = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{12} & 0 & -\frac{i}{6} & 0 & \frac{\sqrt{10}i}{12} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{10}i}{12} & 0 & -\frac{i}{6} & 0 & \frac{\sqrt{2}i}{12} & 0 \\ 0 & -\frac{i}{10} & 0 & \frac{\sqrt{3}i}{6} & \frac{\sqrt{15}i}{240} & 0 & -\frac{\sqrt{6}i}{80} & 0 & \frac{\sqrt{3}i}{48} & 0 \\ -\frac{i}{10} & 0 & \frac{\sqrt{3}i}{10} & 0 & 0 & -\frac{7i}{240} & 0 & \frac{\sqrt{2}i}{240} & 0 & \frac{\sqrt{5}i}{48} \\ 0 & \frac{\sqrt{3}i}{10} & 0 & -\frac{i}{10} & -\frac{\sqrt{5}i}{48} & 0 & -\frac{\sqrt{2}i}{240} & 0 & \frac{7i}{240} & 0 \\ \frac{\sqrt{3}i}{6} & 0 & -\frac{i}{10} & 0 & 0 & -\frac{\sqrt{3}i}{48} & 0 & \frac{\sqrt{6}i}{80} & 0 & -\frac{\sqrt{15}i}{240} \end{bmatrix}$ |
| 243 | symmetry                      | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ $\mathbb{T}_{3,1}^{(1,0;a)}(T_1) = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{12} & 0 & -\frac{1}{6} & 0 & -\frac{\sqrt{10}}{12} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{12} & 0 & \frac{1}{6} & 0 & \frac{\sqrt{2}}{12} & 0 \\ 0 & -\frac{1}{10} & 0 & -\frac{\sqrt{3}}{6} & -\frac{\sqrt{15}}{240} & 0 & -\frac{\sqrt{6}}{80} & 0 & -\frac{\sqrt{3}}{48} & 0 \\ \frac{1}{10} & 0 & \frac{\sqrt{3}}{10} & 0 & 0 & \frac{7}{240} & 0 & \frac{\sqrt{2}}{240} & 0 & -\frac{\sqrt{5}}{48} \\ 0 & -\frac{\sqrt{3}}{10} & 0 & -\frac{1}{10} & -\frac{\sqrt{5}}{48} & 0 & \frac{\sqrt{2}}{240} & 0 & \frac{7}{240} & 0 \\ \frac{\sqrt{3}}{6} & 0 & \frac{1}{10} & 0 & 0 & -\frac{\sqrt{3}}{48} & 0 & -\frac{\sqrt{6}}{80} & 0 & -\frac{\sqrt{15}}{240} \end{bmatrix}$                 |
| 244 | symmetry                      | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ $\mathbb{T}_{3,2}^{(1,0;a)}(T_1) = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & \frac{i}{3} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{i}{3} & 0 & 0 \\ \frac{\sqrt{3}i}{15} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{30} & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{3}i}{5} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{30} & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{3}i}{5} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{30} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{3}i}{15} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{30} & 0 \end{bmatrix}$   |
| 245 | symmetry                      | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$   |

continued ...

Table 6

| No. | multipole                         | matrix                            |                          |                          |                          |                         |                            |                           |                          |                           |                         |
|-----|-----------------------------------|-----------------------------------|--------------------------|--------------------------|--------------------------|-------------------------|----------------------------|---------------------------|--------------------------|---------------------------|-------------------------|
|     | $\mathbb{T}_{3,0}^{(1,0;a)}(T_2)$ | 0                                 | 0                        | 0                        | 0                        | 0                       | $\frac{\sqrt{30}i}{36}$    | 0                         | $-\frac{\sqrt{15}i}{18}$ | 0                         | $-\frac{\sqrt{6}i}{12}$ |
|     |                                   | 0                                 | 0                        | 0                        | 0                        | $-\frac{\sqrt{6}i}{12}$ | 0                          | $-\frac{\sqrt{15}i}{18}$  | 0                        | $\frac{\sqrt{30}i}{36}$   | 0                       |
|     |                                   | 0                                 | $-\frac{\sqrt{15}i}{30}$ | 0                        | $-\frac{\sqrt{5}i}{10}$  | $\frac{i}{48}$          | 0                          | $-\frac{\sqrt{10}i}{80}$  | 0                        | $-\frac{\sqrt{5}i}{80}$   | 0                       |
|     |                                   | $-\frac{\sqrt{15}i}{30}$          | 0                        | $\frac{\sqrt{5}i}{10}$   | 0                        | 0                       | $-\frac{7\sqrt{15}i}{720}$ | 0                         | $\frac{\sqrt{30}i}{720}$ | 0                         | $-\frac{\sqrt{3}i}{48}$ |
|     |                                   | 0                                 | $\frac{\sqrt{5}i}{10}$   | 0                        | $-\frac{\sqrt{15}i}{30}$ | $\frac{\sqrt{3}i}{48}$  | 0                          | $-\frac{\sqrt{30}i}{720}$ | 0                        | $\frac{7\sqrt{15}i}{720}$ | 0                       |
|     |                                   | $-\frac{\sqrt{5}i}{10}$           | 0                        | $-\frac{\sqrt{15}i}{30}$ | 0                        | 0                       | $\frac{\sqrt{5}i}{80}$     | 0                         | $\frac{\sqrt{10}i}{80}$  | 0                         | $-\frac{i}{48}$         |
| 246 | symmetry                          | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |                          |                          |                          |                         |                            |                           |                          |                           |                         |
|     | $\mathbb{T}_{3,1}^{(1,0;a)}(T_2)$ | 0                                 | 0                        | 0                        | 0                        | 0                       | $\frac{\sqrt{30}}{36}$     | 0                         | $\frac{\sqrt{15}}{18}$   | 0                         | $-\frac{\sqrt{6}}{12}$  |
|     |                                   | 0                                 | 0                        | 0                        | 0                        | $\frac{\sqrt{6}}{12}$   | 0                          | $-\frac{\sqrt{15}}{18}$   | 0                        | $-\frac{\sqrt{30}}{36}$   | 0                       |
|     |                                   | 0                                 | $\frac{\sqrt{15}}{30}$   | 0                        | $-\frac{\sqrt{5}}{10}$   | $\frac{1}{48}$          | 0                          | $\frac{\sqrt{10}}{80}$    | 0                        | $-\frac{\sqrt{5}}{80}$    | 0                       |
|     |                                   | $-\frac{\sqrt{15}}{30}$           | 0                        | $-\frac{\sqrt{5}}{10}$   | 0                        | 0                       | $-\frac{7\sqrt{15}}{720}$  | 0                         | $-\frac{\sqrt{30}}{720}$ | 0                         | $-\frac{\sqrt{3}}{48}$  |
|     |                                   | 0                                 | $\frac{\sqrt{5}}{10}$    | 0                        | $\frac{\sqrt{15}}{30}$   | $-\frac{\sqrt{3}}{48}$  | 0                          | $-\frac{\sqrt{30}}{720}$  | 0                        | $-\frac{7\sqrt{15}}{720}$ | 0                       |
|     |                                   | $\frac{\sqrt{5}}{10}$             | 0                        | $-\frac{\sqrt{15}}{30}$  | 0                        | 0                       | $-\frac{\sqrt{5}}{80}$     | 0                         | $\frac{\sqrt{10}}{80}$   | 0                         | $\frac{1}{48}$          |
| 247 | symmetry                          | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$  |                          |                          |                          |                         |                            |                           |                          |                           |                         |
|     | $\mathbb{T}_{3,2}^{(1,0;a)}(T_2)$ | 0                                 | 0                        | 0                        | 0                        | $\frac{\sqrt{6}i}{18}$  | 0                          | 0                         | 0                        | $\frac{\sqrt{30}i}{18}$   | 0                       |
|     |                                   | 0                                 | 0                        | 0                        | 0                        | 0                       | $-\frac{\sqrt{30}i}{18}$   | 0                         | 0                        | 0                         | $-\frac{\sqrt{6}i}{18}$ |
|     |                                   | 0                                 | 0                        | $\frac{\sqrt{15}i}{15}$  | 0                        | 0                       | 0                          | 0                         | $\frac{\sqrt{10}i}{60}$  | 0                         | 0                       |
|     |                                   | 0                                 | 0                        | 0                        | $-\frac{\sqrt{15}i}{15}$ | $-\frac{\sqrt{3}i}{36}$ | 0                          | 0                         | 0                        | $\frac{\sqrt{15}i}{180}$  | 0                       |
|     |                                   | $\frac{\sqrt{15}i}{15}$           | 0                        | 0                        | 0                        | 0                       | $\frac{\sqrt{15}i}{180}$   | 0                         | 0                        | 0                         | $-\frac{\sqrt{3}i}{36}$ |
|     |                                   | 0                                 | $-\frac{\sqrt{15}i}{15}$ | 0                        | 0                        | 0                       | 0                          | $\frac{\sqrt{10}i}{60}$   | 0                        | 0                         | 0                       |
| 248 | symmetry                          | $x$                               |                          |                          |                          |                         |                            |                           |                          |                           |                         |
|     | $\mathbb{T}_{1,0}^{(1,1;a)}(T_1)$ | $\frac{\sqrt{6}i}{8}$             | 0                        | $-\frac{\sqrt{2}i}{8}$   | 0                        | 0                       | 0                          | 0                         | 0                        | 0                         | 0                       |
|     |                                   | 0                                 | $\frac{\sqrt{2}i}{8}$    | 0                        | $-\frac{\sqrt{6}i}{8}$   | 0                       | 0                          | 0                         | 0                        | 0                         | 0                       |
|     |                                   | 0                                 | $-\frac{\sqrt{3}i}{10}$  | 0                        | 0                        | $-\frac{\sqrt{5}i}{20}$ | 0                          | $\frac{\sqrt{2}i}{40}$    | 0                        | 0                         | 0                       |
|     |                                   | $-\frac{\sqrt{3}i}{10}$           | 0                        | $-\frac{i}{5}$           | 0                        | 0                       | $-\frac{\sqrt{3}i}{20}$    | 0                         | $\frac{\sqrt{6}i}{40}$   | 0                         | 0                       |
|     |                                   | 0                                 | $-\frac{i}{5}$           | 0                        | $-\frac{\sqrt{3}i}{10}$  | 0                       | 0                          | $-\frac{\sqrt{6}i}{40}$   | 0                        | $\frac{\sqrt{3}i}{20}$    | 0                       |
|     |                                   | 0                                 | 0                        | $-\frac{\sqrt{3}i}{10}$  | 0                        | 0                       | 0                          | 0                         | $-\frac{\sqrt{2}i}{40}$  | 0                         | $\frac{\sqrt{5}i}{20}$  |
| 249 | symmetry                          | $y$                               |                          |                          |                          |                         |                            |                           |                          |                           |                         |

continued ...

Table 6

| No. | multipole                         | matrix  |
|-----|-----------------------------------|---|
|     | $\mathbb{T}_{1,1}^{(1,1;a)}(T_1)$ | $\begin{bmatrix} -\frac{\sqrt{6}}{8} & 0 & -\frac{\sqrt{2}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}}{8} & 0 & -\frac{\sqrt{6}}{8} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{3}}{10} & 0 & 0 & \frac{\sqrt{5}}{20} & 0 & \frac{\sqrt{2}}{40} & 0 & 0 & 0 & 0 \\ \frac{\sqrt{3}}{10} & 0 & -\frac{1}{5} & 0 & 0 & \frac{\sqrt{3}}{20} & 0 & \frac{\sqrt{6}}{40} & 0 & 0 & 0 \\ 0 & \frac{1}{5} & 0 & -\frac{\sqrt{3}}{10} & 0 & 0 & \frac{\sqrt{6}}{40} & 0 & \frac{\sqrt{3}}{20} & 0 & 0 \\ 0 & 0 & \frac{\sqrt{3}}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{40} & 0 & \frac{\sqrt{5}}{20} & 0 \end{bmatrix}$   |
| 250 | symmetry                          | $\begin{array}{c} z \\ \mathbb{T}_{1,2}^{(1,1;a)}(T_1) \end{array} \begin{bmatrix} 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{3i}{10} & 0 & 0 & 0 & 0 & \frac{i}{10} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{i}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{20} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{i}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{20} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{3i}{10} & 0 & 0 & 0 & 0 & \frac{i}{10} & 0 & 0 \end{bmatrix}$  |
| 251 | symmetry                          | $\begin{array}{c} -\frac{x^2}{2} - \frac{y^2}{2} + z^2 \\ \mathbb{M}_{2,0}^{(a)}(E) \end{array} \begin{bmatrix} 0 & \frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{30} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{30} & 0 & 0 & 0 \\ -\frac{\sqrt{10}}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{10} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{10}}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{30} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{10}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{30} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{10}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{10} & 0 & 0 \end{bmatrix}$  |
| 252 | symmetry                          | $\begin{array}{c} \frac{\sqrt{3}(x-y)(x+y)}{2} \\ \mathbb{M}_{2,1}^{(a)}(E) \end{array} \begin{bmatrix} 0 & 0 & 0 & \frac{\sqrt{5}}{10} & \frac{1}{6} & 0 & 0 & 0 & \frac{\sqrt{5}}{30} & 0 & 0 \\ -\frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{30} & 0 & 0 & 0 & \frac{1}{6} & 0 \\ 0 & 0 & -\frac{\sqrt{10}}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{30} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{10}}{20} & -\frac{\sqrt{2}}{6} & 0 & 0 & 0 & \frac{\sqrt{10}}{15} & 0 & 0 \\ -\frac{\sqrt{10}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{15} & 0 & 0 & 0 & \frac{\sqrt{2}}{6} & 0 \\ 0 & -\frac{\sqrt{10}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{30} & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 253 | symmetry                          | $\sqrt{3}yz$  |

continued ...

Table 6

| No. | multipole                     | matrix   |
|-----|-------------------------------|--|
|     | $\mathbb{M}_{2,0}^{(a)}(T_2)$ | $\begin{bmatrix} -\frac{\sqrt{5}i}{20} & 0 & -\frac{\sqrt{15}i}{20} & 0 & 0 & -\frac{\sqrt{5}i}{15} & 0 & -\frac{\sqrt{10}i}{30} & 0 & 0 \\ 0 & \frac{\sqrt{15}i}{20} & 0 & \frac{\sqrt{5}i}{20} & 0 & 0 & -\frac{\sqrt{10}i}{30} & 0 & -\frac{\sqrt{5}i}{15} & 0 \\ 0 & \frac{\sqrt{10}i}{20} & 0 & 0 & -\frac{\sqrt{6}i}{12} & 0 & -\frac{\sqrt{15}i}{20} & 0 & 0 & 0 \\ -\frac{\sqrt{10}i}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{10}i}{60} & 0 & -\frac{\sqrt{5}i}{12} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{10}i}{20} & 0 & 0 & \frac{\sqrt{5}i}{12} & 0 & -\frac{\sqrt{10}i}{60} & 0 \\ 0 & 0 & \frac{\sqrt{10}i}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{20} & 0 & \frac{\sqrt{6}i}{12} \end{bmatrix}$   |
| 254 | symmetry                      | $\begin{matrix} \sqrt{3}xz \\ \mathbb{M}_{2,1}^{(a)}(T_2) \end{matrix}$ $\begin{bmatrix} -\frac{\sqrt{5}}{20} & 0 & \frac{\sqrt{15}}{20} & 0 & 0 & -\frac{\sqrt{5}}{15} & 0 & \frac{\sqrt{10}}{30} & 0 & 0 \\ 0 & \frac{\sqrt{15}}{20} & 0 & -\frac{\sqrt{5}}{20} & 0 & 0 & -\frac{\sqrt{10}}{30} & 0 & \frac{\sqrt{5}}{15} & 0 \\ 0 & -\frac{\sqrt{10}}{20} & 0 & 0 & -\frac{\sqrt{6}}{12} & 0 & \frac{\sqrt{15}}{20} & 0 & 0 & 0 \\ -\frac{\sqrt{10}}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{60} & 0 & \frac{\sqrt{5}}{12} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{10}}{20} & 0 & 0 & \frac{\sqrt{5}}{12} & 0 & \frac{\sqrt{10}}{60} & 0 \\ 0 & 0 & \frac{\sqrt{10}}{20} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{20} & 0 & -\frac{\sqrt{6}}{12} \end{bmatrix}$ |
| 255 | symmetry                      | $\begin{matrix} \sqrt{3}xy \\ \mathbb{M}_{2,2}^{(a)}(T_2) \end{matrix}$ $\begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{5}i}{10} & \frac{i}{6} & 0 & 0 & 0 & -\frac{\sqrt{5}i}{30} & 0 \\ -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{30} & 0 & 0 & 0 & -\frac{i}{6} \\ 0 & 0 & \frac{\sqrt{10}i}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{30} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{10}i}{20} & -\frac{\sqrt{2}i}{6} & 0 & 0 & 0 & -\frac{\sqrt{10}i}{15} & 0 \\ -\frac{\sqrt{10}i}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}i}{15} & 0 & 0 & 0 & -\frac{\sqrt{2}i}{6} \\ 0 & -\frac{\sqrt{10}i}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{30} & 0 & 0 & 0 \end{bmatrix}$   |
| 256 | symmetry                      | $\begin{matrix} -\frac{x^2}{2} - \frac{y^2}{2} + z^2 \\ \mathbb{M}_{2,0}^{(1,-1;a)}(E) \end{matrix}$ $\begin{bmatrix} 0 & -\frac{\sqrt{2}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{5} & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{2}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{5} & 0 & 0 \\ \frac{1}{10} & 0 & 0 & 0 & 0 & \frac{3}{10} & 0 & 0 & 0 & 0 \\ 0 & -\frac{1}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{20} & 0 & 0 & 0 \\ 0 & 0 & -\frac{1}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{20} & 0 & 0 \\ 0 & 0 & 0 & \frac{1}{10} & 0 & 0 & 0 & 0 & -\frac{3}{10} & 0 \end{bmatrix}$   |
| 257 | symmetry                      | $\begin{matrix} \frac{\sqrt{3}(x-y)(x+y)}{2} \end{matrix}$   |

continued ...



Table 6

| No. | multipole                        | matrix  |
|-----|----------------------------------|---|
|     | $\mathbb{M}_{2,1}^{(1,-1;a)}(E)$ | $\begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{2}}{20} & -\frac{\sqrt{10}}{10} & 0 & 0 & 0 & -\frac{\sqrt{2}}{10} & 0 \\ \frac{\sqrt{2}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{10} & 0 & 0 & 0 & -\frac{\sqrt{10}}{10} \\ 0 & 0 & \frac{1}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{20} & 0 & 0 \\ 0 & 0 & 0 & \frac{1}{10} & -\frac{\sqrt{5}}{10} & 0 & 0 & 0 & \frac{1}{5} & 0 \\ \frac{1}{10} & 0 & 0 & 0 & 0 & -\frac{1}{5} & 0 & 0 & 0 & \frac{\sqrt{5}}{10} \\ 0 & \frac{1}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{20} & 0 & 0 & 0 \end{bmatrix}$  |
| 258 | symmetry                         | $\begin{matrix} & \sqrt{3}yz \\ \mathbb{M}_{2,0}^{(1,-1;a)}(T_2) & \begin{bmatrix} \frac{\sqrt{2}i}{40} & 0 & \frac{\sqrt{6}i}{40} & 0 & 0 & \frac{\sqrt{2}i}{5} & 0 & \frac{i}{5} & 0 & 0 \\ 0 & -\frac{\sqrt{6}i}{40} & 0 & -\frac{\sqrt{2}i}{40} & 0 & 0 & \frac{i}{5} & 0 & \frac{\sqrt{2}i}{5} & 0 \\ 0 & -\frac{i}{10} & 0 & 0 & -\frac{\sqrt{15}i}{20} & 0 & -\frac{3\sqrt{6}i}{40} & 0 & 0 & 0 \\ \frac{i}{10} & 0 & 0 & 0 & 0 & \frac{i}{20} & 0 & -\frac{\sqrt{2}i}{8} & 0 & 0 \\ 0 & 0 & 0 & \frac{i}{10} & 0 & 0 & \frac{\sqrt{2}i}{8} & 0 & -\frac{i}{20} & 0 \\ 0 & 0 & -\frac{i}{10} & 0 & 0 & 0 & 0 & \frac{3\sqrt{6}i}{40} & 0 & \frac{\sqrt{15}i}{20} \end{bmatrix} \end{matrix}$ |
| 259 | symmetry                         | $\begin{matrix} & \sqrt{3}xz \\ \mathbb{M}_{2,1}^{(1,-1;a)}(T_2) & \begin{bmatrix} \frac{\sqrt{2}}{40} & 0 & -\frac{\sqrt{6}}{40} & 0 & 0 & \frac{\sqrt{2}}{5} & 0 & -\frac{1}{5} & 0 & 0 \\ 0 & -\frac{\sqrt{6}}{40} & 0 & \frac{\sqrt{2}}{40} & 0 & 0 & \frac{1}{5} & 0 & -\frac{\sqrt{2}}{5} & 0 \\ 0 & \frac{1}{10} & 0 & 0 & -\frac{\sqrt{15}}{20} & 0 & \frac{3\sqrt{6}}{40} & 0 & 0 & 0 \\ \frac{1}{10} & 0 & 0 & 0 & 0 & \frac{1}{20} & 0 & \frac{\sqrt{2}}{8} & 0 & 0 \\ 0 & 0 & 0 & -\frac{1}{10} & 0 & 0 & \frac{\sqrt{2}}{8} & 0 & \frac{1}{20} & 0 \\ 0 & 0 & -\frac{1}{10} & 0 & 0 & 0 & 0 & \frac{3\sqrt{6}}{40} & 0 & -\frac{\sqrt{15}}{20} \end{bmatrix} \end{matrix}$             |
| 260 | symmetry                         | $\begin{matrix} & \sqrt{3}xy \\ \mathbb{M}_{2,2}^{(1,-1;a)}(T_2) & \begin{bmatrix} 0 & 0 & 0 & \frac{\sqrt{2}i}{20} & -\frac{\sqrt{10}i}{10} & 0 & 0 & 0 & \frac{\sqrt{2}i}{10} & 0 \\ \frac{\sqrt{2}i}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{10} & 0 & 0 & 0 & \frac{\sqrt{10}i}{10} \\ 0 & 0 & -\frac{i}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{20} & 0 & 0 \\ 0 & 0 & 0 & -\frac{i}{10} & -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 & -\frac{i}{5} & 0 \\ \frac{i}{10} & 0 & 0 & 0 & 0 & -\frac{i}{5} & 0 & 0 & 0 & -\frac{\sqrt{5}i}{10} \\ 0 & \frac{i}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{20} & 0 & 0 & 0 \end{bmatrix} \end{matrix}$   |
| 261 | symmetry                         | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$  |

continued ...

Table 6

| No. | multipole                      | matrix  |
|-----|--------------------------------|---|
|     | $\mathbb{M}_4^{(1,-1;a)}(A_1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{12} & 0 & 0 & 0 & -\frac{\sqrt{15}}{12} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{12} & 0 & 0 & 0 & \frac{\sqrt{3}}{12} & 0 & 0 \end{bmatrix}$   |
| 262 | symmetry                       | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ $\mathbb{M}_{4,0}^{(1,-1;a)}(E)$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{105}}{84} & 0 & 0 & 0 & \frac{\sqrt{21}}{12} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{70}}{28} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}}{28} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{12} & 0 & 0 & 0 & \frac{\sqrt{105}}{84} & 0 & 0 \end{bmatrix}$   |
| 263 | symmetry                       | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ $\mathbb{M}_{4,1}^{(1,-1;a)}(E)$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{70}}{28} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{28} & 0 & 0 & 0 & -\frac{\sqrt{105}}{28} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105}}{28} & 0 & 0 & 0 & \frac{\sqrt{21}}{28} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}}{28} & 0 & 0 & 0 & 0 \end{bmatrix}$   |
| 264 | symmetry                       | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$ $\mathbb{M}_{4,0}^{(1,-1;a)}(T_1)$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{i}{16} & 0 & -\frac{\sqrt{10}i}{16} & 0 & -\frac{\sqrt{5}i}{16} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{16} & 0 & \frac{\sqrt{30}i}{16} & 0 & \frac{\sqrt{3}i}{16} & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{16} & 0 & -\frac{\sqrt{30}i}{16} & 0 & -\frac{\sqrt{15}i}{16} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{16} & 0 & \frac{\sqrt{10}i}{16} & 0 & \frac{i}{16} & 0 \end{bmatrix}$ |
| 265 | symmetry                       | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$  |

continued ...

Table 6

| No. | multipole                          | matrix   |
|-----|------------------------------------|--|
|     | $\mathbb{M}_{4,1}^{(1,-1;a)}(T_1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{1}{16} & 0 & -\frac{\sqrt{10}}{16} & 0 & \frac{\sqrt{5}}{16} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{16} & 0 & \frac{\sqrt{30}}{16} & 0 & -\frac{\sqrt{3}}{16} & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{16} & 0 & \frac{\sqrt{30}}{16} & 0 & -\frac{\sqrt{15}}{16} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{16} & 0 & -\frac{\sqrt{10}}{16} & 0 & \frac{1}{16} & 0 \end{bmatrix}$   |
| 266 | symmetry                           | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$ $\mathbb{M}_{4,2}^{(1,-1;a)}(T_1) = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{i}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{i}{2} & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$  |
| 267 | symmetry                           | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$ $\mathbb{M}_{4,0}^{(1,-1;a)}(T_2) = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{7}i}{112} & 0 & -\frac{\sqrt{70}i}{112} & 0 & \frac{\sqrt{35}i}{16} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105}i}{112} & 0 & \frac{\sqrt{210}i}{112} & 0 & -\frac{\sqrt{21}i}{16} & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{21}i}{16} & 0 & -\frac{\sqrt{210}i}{112} & 0 & -\frac{\sqrt{105}i}{112} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}i}{16} & 0 & \frac{\sqrt{70}i}{112} & 0 & \frac{\sqrt{7}i}{112} & 0 \end{bmatrix}$ |
| 268 | symmetry                           | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ $\mathbb{M}_{4,1}^{(1,-1;a)}(T_2) = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{112} & 0 & \frac{\sqrt{70}}{112} & 0 & \frac{\sqrt{35}}{16} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105}}{112} & 0 & -\frac{\sqrt{210}}{112} & 0 & -\frac{\sqrt{21}}{16} & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{16} & 0 & -\frac{\sqrt{210}}{112} & 0 & \frac{\sqrt{105}}{112} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{35}}{16} & 0 & \frac{\sqrt{70}}{112} & 0 & -\frac{\sqrt{7}}{112} & 0 \end{bmatrix}$            |
| 269 | symmetry                           | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$  |

continued ...

Table 6

| No. | multipole | matrix   |
|-----|-----------|--|
|     |           | $ \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{70}i}{28} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{21}i}{28} & 0 & 0 & 0 & -\frac{\sqrt{105}i}{28} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{105}i}{28} & 0 & 0 & 0 & 0 & \frac{\sqrt{21}i}{28} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{70}i}{28} & 0 & 0 & 0 & 0 \end{bmatrix} $   |
| 270 | symmetry  | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$   |
|     |           | $ \begin{bmatrix} 0 & -\frac{\sqrt{30}}{60} & 0 & 0 & 0 & 0 & \frac{2\sqrt{5}}{15} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{30}}{60} & 0 & 0 & 0 & 0 & \frac{2\sqrt{5}}{15} & 0 & 0 & 0 \\ \frac{\sqrt{15}}{15} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{30} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{15}}{15} & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{60} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{15}}{15} & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{60} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{15}}{15} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{30} & 0 & 0 \end{bmatrix} $  |
| 271 | symmetry  | $\frac{\sqrt{3}(x-y)(x+y)}{2}$   |
|     |           | $ \begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{30}}{60} & \frac{\sqrt{6}}{9} & 0 & 0 & 0 & \frac{\sqrt{30}}{45} & 0 & 0 \\ \frac{\sqrt{30}}{60} & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{45} & 0 & 0 & 0 & \frac{\sqrt{6}}{9} & 0 \\ 0 & 0 & \frac{\sqrt{15}}{15} & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{60} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{15}}{15} & -\frac{\sqrt{3}}{18} & 0 & 0 & 0 & \frac{\sqrt{15}}{45} & 0 & 0 \\ \frac{\sqrt{15}}{15} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{45} & 0 & 0 & 0 & \frac{\sqrt{3}}{18} & 0 \\ 0 & \frac{\sqrt{15}}{15} & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{60} & 0 & 0 & 0 & 0 \end{bmatrix} $   |
| 272 | symmetry  | $\sqrt{3}yz$   |
|     |           | $ \begin{bmatrix} \frac{\sqrt{30}i}{120} & 0 & \frac{\sqrt{10}i}{40} & 0 & 0 & -\frac{2\sqrt{30}i}{45} & 0 & -\frac{2\sqrt{15}i}{45} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{10}i}{40} & 0 & -\frac{\sqrt{30}i}{120} & 0 & 0 & -\frac{2\sqrt{15}i}{45} & 0 & -\frac{2\sqrt{30}i}{45} & 0 & 0 \\ 0 & -\frac{\sqrt{15}i}{15} & 0 & 0 & -\frac{i}{12} & 0 & -\frac{\sqrt{10}i}{40} & 0 & 0 & 0 & 0 \\ \frac{\sqrt{15}i}{15} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{180} & 0 & -\frac{\sqrt{30}i}{72} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{15}i}{15} & 0 & 0 & \frac{\sqrt{30}i}{72} & 0 & -\frac{\sqrt{15}i}{180} & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{15}i}{15} & 0 & 0 & 0 & 0 & \frac{\sqrt{10}i}{40} & 0 & \frac{i}{12} & 0 \end{bmatrix} $ |
| 273 | symmetry  | $\sqrt{3}xz$   |

continued ...

Table 6

| No. | multipole                         | matrix   |
|-----|-----------------------------------|--|
|     | $\mathbb{M}_{2,1}^{(1,0;a)}(T_2)$ | $\begin{bmatrix} \frac{\sqrt{30}}{120} & 0 & -\frac{\sqrt{10}}{40} & 0 & 0 & -\frac{2\sqrt{30}}{45} & 0 & \frac{2\sqrt{15}}{45} & 0 & 0 \\ 0 & -\frac{\sqrt{10}}{40} & 0 & \frac{\sqrt{30}}{120} & 0 & 0 & -\frac{2\sqrt{15}}{45} & 0 & \frac{2\sqrt{30}}{45} & 0 \\ 0 & \frac{\sqrt{15}}{15} & 0 & 0 & -\frac{1}{12} & 0 & \frac{\sqrt{10}}{40} & 0 & 0 & 0 \\ \frac{\sqrt{15}}{15} & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{180} & 0 & \frac{\sqrt{30}}{72} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{15}}{15} & 0 & 0 & \frac{\sqrt{30}}{72} & 0 & \frac{\sqrt{15}}{180} & 0 \\ 0 & 0 & -\frac{\sqrt{15}}{15} & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{40} & 0 & -\frac{1}{12} \end{bmatrix}$                     |
| 274 | symmetry                          | $\begin{matrix} \sqrt{3}xy \\ \mathbb{M}_{2,2}^{(1,0;a)}(T_2) \end{matrix}$ $\begin{bmatrix} 0 & 0 & 0 & \frac{\sqrt{30}i}{60} & \frac{\sqrt{6}i}{9} & 0 & 0 & 0 & -\frac{\sqrt{30}i}{45} & 0 \\ \frac{\sqrt{30}i}{60} & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{45} & 0 & 0 & 0 & -\frac{\sqrt{6}i}{9} \\ 0 & 0 & -\frac{\sqrt{15}i}{15} & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}i}{60} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{15}i}{15} & -\frac{\sqrt{3}i}{18} & 0 & 0 & 0 & -\frac{\sqrt{15}i}{45} & 0 \\ \frac{\sqrt{15}i}{15} & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{45} & 0 & 0 & 0 & -\frac{\sqrt{3}i}{18} \\ 0 & \frac{\sqrt{15}i}{15} & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}i}{60} & 0 & 0 & 0 \end{bmatrix}$ |
| 275 | symmetry                          | $\begin{matrix} 1 \\ \mathbb{M}_0^{(1,1;a)}(A_1) \end{matrix}$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$  |
| 276 | symmetry                          | $\begin{matrix} -\frac{x^2}{2} - \frac{y^2}{2} + z^2 \\ \mathbb{M}_{2,0}^{(1,1;a)}(E) \end{matrix}$ $\begin{bmatrix} 0 & \frac{\sqrt{42}}{15} & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{30} & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{42}}{15} & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{30} & 0 & 0 \\ \frac{\sqrt{21}}{30} & 0 & 0 & 0 & 0 & -\frac{2\sqrt{21}}{105} & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{21}}{30} & 0 & 0 & 0 & 0 & -\frac{\sqrt{14}}{105} & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{21}}{30} & 0 & 0 & 0 & 0 & \frac{\sqrt{14}}{105} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{21}}{30} & 0 & 0 & 0 & 0 & \frac{2\sqrt{21}}{105} & 0 \end{bmatrix}$  |
| 277 | symmetry                          | $\frac{\sqrt{3}(x-y)(x+y)}{2}$   |

continued ...

Table 6

| No. | multipole                         | matrix                   |                          |                          |                          |                            |                           |                           |                          |                           |                            |
|-----|-----------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|----------------------------|---------------------------|---------------------------|--------------------------|---------------------------|----------------------------|
|     | $\mathbb{M}_{2,1}^{(1,1;a)}(E)$   | 0                        | 0                        | 0                        | $\frac{\sqrt{42}}{15}$   | $-\frac{\sqrt{210}}{180}$  | 0                         | 0                         | 0                        | $-\frac{\sqrt{42}}{180}$  | 0                          |
|     |                                   | $-\frac{\sqrt{42}}{15}$  | 0                        | 0                        | 0                        | 0                          | $-\frac{\sqrt{42}}{180}$  | 0                         | 0                        | 0                         | $-\frac{\sqrt{210}}{180}$  |
|     |                                   | 0                        | 0                        | $\frac{\sqrt{21}}{30}$   | 0                        | 0                          | 0                         | 0                         | $-\frac{\sqrt{14}}{105}$ | 0                         | 0                          |
|     |                                   | 0                        | 0                        | 0                        | $\frac{\sqrt{21}}{30}$   | $\frac{2\sqrt{105}}{315}$  | 0                         | 0                         | 0                        | $-\frac{4\sqrt{21}}{315}$ | 0                          |
|     |                                   | $\frac{\sqrt{21}}{30}$   | 0                        | 0                        | 0                        | 0                          | $\frac{4\sqrt{21}}{315}$  | 0                         | 0                        | 0                         | $-\frac{2\sqrt{105}}{315}$ |
|     |                                   | 0                        | $\frac{\sqrt{21}}{30}$   | 0                        | 0                        | 0                          | 0                         | $\frac{\sqrt{14}}{105}$   | 0                        | 0                         | 0                          |
| 278 | symmetry                          | $\sqrt{3}yz$             |                          |                          |                          |                            |                           |                           |                          |                           |                            |
|     | $\mathbb{M}_{2,0}^{(1,1;a)}(T_2)$ | $-\frac{\sqrt{42}i}{30}$ | 0                        | $-\frac{\sqrt{14}i}{10}$ | 0                        | 0                          | $\frac{\sqrt{42}i}{90}$   | 0                         | $\frac{\sqrt{21}i}{90}$  | 0                         | 0                          |
|     |                                   | 0                        | $\frac{\sqrt{14}i}{10}$  | 0                        | $\frac{\sqrt{42}i}{30}$  | 0                          | 0                         | $\frac{\sqrt{21}i}{90}$   | 0                        | $\frac{\sqrt{42}i}{90}$   | 0                          |
|     |                                   | 0                        | $-\frac{\sqrt{21}i}{30}$ | 0                        | 0                        | $\frac{\sqrt{35}i}{105}$   | 0                         | $\frac{\sqrt{14}i}{70}$   | 0                        | 0                         | 0                          |
|     |                                   | $\frac{\sqrt{21}i}{30}$  | 0                        | 0                        | 0                        | 0                          | $-\frac{\sqrt{21}i}{315}$ | 0                         | $\frac{\sqrt{42}i}{126}$ | 0                         | 0                          |
|     |                                   | 0                        | 0                        | 0                        | $\frac{\sqrt{21}i}{30}$  | 0                          | 0                         | $-\frac{\sqrt{42}i}{126}$ | 0                        | $\frac{\sqrt{21}i}{315}$  | 0                          |
|     |                                   | 0                        | 0                        | $-\frac{\sqrt{21}i}{30}$ | 0                        | 0                          | 0                         | 0                         | $-\frac{\sqrt{14}i}{70}$ | 0                         | $-\frac{\sqrt{35}i}{105}$  |
| 279 | symmetry                          | $\sqrt{3}xz$             |                          |                          |                          |                            |                           |                           |                          |                           |                            |
|     | $\mathbb{M}_{2,1}^{(1,1;a)}(T_2)$ | $-\frac{\sqrt{42}}{30}$  | 0                        | $\frac{\sqrt{14}}{10}$   | 0                        | 0                          | $\frac{\sqrt{42}}{90}$    | 0                         | $-\frac{\sqrt{21}}{90}$  | 0                         | 0                          |
|     |                                   | 0                        | $\frac{\sqrt{14}}{10}$   | 0                        | $-\frac{\sqrt{42}}{30}$  | 0                          | 0                         | $\frac{\sqrt{21}}{90}$    | 0                        | $-\frac{\sqrt{42}}{90}$   | 0                          |
|     |                                   | 0                        | $\frac{\sqrt{21}}{30}$   | 0                        | 0                        | $\frac{\sqrt{35}}{105}$    | 0                         | $-\frac{\sqrt{14}}{70}$   | 0                        | 0                         | 0                          |
|     |                                   | $\frac{\sqrt{21}}{30}$   | 0                        | 0                        | 0                        | 0                          | $-\frac{\sqrt{21}}{315}$  | 0                         | $-\frac{\sqrt{42}}{126}$ | 0                         | 0                          |
|     |                                   | 0                        | 0                        | 0                        | $-\frac{\sqrt{21}}{30}$  | 0                          | 0                         | $-\frac{\sqrt{42}}{126}$  | 0                        | $-\frac{\sqrt{21}}{315}$  | 0                          |
|     |                                   | 0                        | 0                        | $-\frac{\sqrt{21}}{30}$  | 0                        | 0                          | 0                         | 0                         | $-\frac{\sqrt{14}}{70}$  | 0                         | $\frac{\sqrt{35}}{105}$    |
| 280 | symmetry                          | $\sqrt{3}xy$             |                          |                          |                          |                            |                           |                           |                          |                           |                            |
|     | $\mathbb{M}_{2,2}^{(1,1;a)}(T_2)$ | 0                        | 0                        | 0                        | $-\frac{\sqrt{42}i}{15}$ | $-\frac{\sqrt{210}i}{180}$ | 0                         | 0                         | 0                        | $\frac{\sqrt{42}i}{180}$  | 0                          |
|     |                                   | $-\frac{\sqrt{42}i}{15}$ | 0                        | 0                        | 0                        | 0                          | $-\frac{\sqrt{42}i}{180}$ | 0                         | 0                        | 0                         | $\frac{\sqrt{210}i}{180}$  |
|     |                                   | 0                        | 0                        | $-\frac{\sqrt{21}i}{30}$ | 0                        | 0                          | 0                         | 0                         | $\frac{\sqrt{14}i}{105}$ | 0                         | 0                          |
|     |                                   | 0                        | 0                        | 0                        | $-\frac{\sqrt{21}i}{30}$ | $\frac{2\sqrt{105}i}{315}$ | 0                         | 0                         | 0                        | $\frac{4\sqrt{21}i}{315}$ | 0                          |
|     |                                   | $\frac{\sqrt{21}i}{30}$  | 0                        | 0                        | 0                        | 0                          | $\frac{4\sqrt{21}i}{315}$ | 0                         | 0                        | 0                         | $\frac{2\sqrt{105}i}{315}$ |
|     |                                   | 0                        | $\frac{\sqrt{21}i}{30}$  | 0                        | 0                        | 0                          | 0                         | $\frac{\sqrt{14}i}{105}$  | 0                        | 0                         | 0                          |

$$\begin{aligned}\text{bra:} &= \langle \frac{1}{2}, \frac{1}{2}; p |, \langle \frac{1}{2}, -\frac{1}{2}; p |, \langle \frac{3}{2}, \frac{3}{2}; p |, \langle \frac{3}{2}, \frac{1}{2}; p |, \langle \frac{3}{2}, -\frac{1}{2}; p |, \langle \frac{3}{2}, -\frac{3}{2}; p | \\ \text{ket:} &= | \frac{5}{2}, \frac{5}{2}; f \rangle, | \frac{5}{2}, \frac{3}{2}; f \rangle, | \frac{5}{2}, \frac{1}{2}; f \rangle, | \frac{5}{2}, -\frac{1}{2}; f \rangle, | \frac{5}{2}, -\frac{3}{2}; f \rangle, | \frac{5}{2}, -\frac{5}{2}; f \rangle, | \frac{7}{2}, \frac{7}{2}; f \rangle, | \frac{7}{2}, \frac{5}{2}; f \rangle, | \frac{7}{2}, \frac{3}{2}; f \rangle, | \frac{7}{2}, \frac{1}{2}; f \rangle, | \frac{7}{2}, -\frac{1}{2}; f \rangle, | \frac{7}{2}, -\frac{3}{2}; f \rangle, | \frac{7}{2}, -\frac{5}{2}; f \rangle, | \frac{7}{2}, -\frac{7}{2}; f \rangle\end{aligned}$$

Table 7: (p,f) block.

| No. | multipole | matrix  |
|-----|-----------|---|
| 281 | symmetry  | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ $\mathbb{Q}_{2,0}^{(a)}(E)$ $\begin{bmatrix} 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{1}{7} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{14} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{6}}{42} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{3\sqrt{2}}{14} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{6}}{42} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{3\sqrt{2}}{14} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{1}{7} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{14} & 0 & 0 \end{bmatrix}$   |
| 282 | symmetry  | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ $\mathbb{Q}_{2,1}^{(a)}(E)$ $\begin{bmatrix} \frac{\sqrt{10}}{12} & 0 & 0 & 0 & \frac{\sqrt{2}}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}}{12} & 0 & 0 & 0 & \frac{\sqrt{10}}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{6}}{42} & 0 & 0 & \frac{\sqrt{70}}{28} & 0 & 0 & 0 & \frac{\sqrt{2}}{28} & 0 & 0 & 0 \\ \frac{\sqrt{5}}{21} & 0 & 0 & 0 & -\frac{2}{21} & 0 & 0 & \frac{\sqrt{30}}{28} & 0 & 0 & 0 & \frac{\sqrt{10}}{28} & 0 & 0 \\ 0 & \frac{2}{21} & 0 & 0 & 0 & -\frac{\sqrt{5}}{21} & 0 & 0 & \frac{\sqrt{10}}{28} & 0 & 0 & 0 & \frac{\sqrt{30}}{28} & 0 \\ 0 & 0 & \frac{\sqrt{6}}{42} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{28} & 0 & 0 & 0 & \frac{\sqrt{70}}{28} \end{bmatrix}$                                |
| 283 | symmetry  | $\sqrt{3}yz$ $\mathbb{Q}_{2,0}^{(a)}(T_2)$ $\begin{bmatrix} 0 & -\frac{\sqrt{2}i}{6} & 0 & -\frac{i}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{i}{6} & 0 & -\frac{\sqrt{2}i}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{15}i}{42} & 0 & \frac{\sqrt{6}i}{28} & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}i}{14} & 0 & -\frac{\sqrt{2}i}{14} & 0 & 0 & 0 & 0 \\ 0 & -\frac{i}{42} & 0 & \frac{5\sqrt{2}i}{84} & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}i}{14} & 0 & -\frac{\sqrt{6}i}{14} & 0 & 0 & 0 \\ 0 & 0 & -\frac{5\sqrt{2}i}{84} & 0 & \frac{i}{42} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{14} & 0 & -\frac{\sqrt{10}i}{14} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{6}i}{28} & 0 & -\frac{\sqrt{15}i}{42} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{14} & 0 & -\frac{\sqrt{10}i}{14} & 0 \end{bmatrix}$ |
| 284 | symmetry  | $\sqrt{3}xz$  |

*continued ...*

Table 7

| No. | multipole                     | matrix   |
|-----|-------------------------------|--|
|     | $\mathbb{Q}_{2,1}^{(a)}(T_2)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{2}}{6} & 0 & \frac{1}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{1}{6} & 0 & \frac{\sqrt{2}}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{15}}{42} & 0 & -\frac{\sqrt{6}}{28} & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{14} & 0 & \frac{\sqrt{2}}{14} & 0 & 0 & 0 & 0 \\ 0 & -\frac{1}{42} & 0 & -\frac{5\sqrt{2}}{84} & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{14} & 0 & \frac{\sqrt{6}}{14} & 0 & 0 & 0 \\ 0 & 0 & -\frac{5\sqrt{2}}{84} & 0 & -\frac{1}{42} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{14} & 0 & \frac{\sqrt{10}}{14} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{6}}{28} & 0 & \frac{\sqrt{15}}{42} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{14} & 0 & \frac{\sqrt{10}}{14} & 0 \end{bmatrix}$   |
| 285 | symmetry                      | $\begin{array}{c} \sqrt{3}xy \\ \mathbb{Q}_{2,2}^{(a)}(T_2) \end{array} \begin{bmatrix} \frac{\sqrt{10}i}{12} & 0 & 0 & 0 & -\frac{\sqrt{2}i}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}i}{12} & 0 & 0 & 0 & -\frac{\sqrt{10}i}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{6}i}{42} & 0 & 0 & \frac{\sqrt{70}i}{28} & 0 & 0 & 0 & -\frac{\sqrt{2}i}{28} & 0 & 0 & 0 \\ \frac{\sqrt{5}i}{21} & 0 & 0 & 0 & \frac{2i}{21} & 0 & 0 & \frac{\sqrt{30}i}{28} & 0 & 0 & 0 & -\frac{\sqrt{10}i}{28} & 0 & 0 \\ 0 & \frac{2i}{21} & 0 & 0 & 0 & \frac{\sqrt{5}i}{21} & 0 & 0 & \frac{\sqrt{10}i}{28} & 0 & 0 & 0 & -\frac{\sqrt{30}i}{28} & 0 \\ 0 & 0 & \frac{\sqrt{6}i}{42} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{28} & 0 & 0 & 0 & -\frac{\sqrt{70}i}{28} \end{bmatrix}$  |
| 286 | symmetry                      | $\begin{array}{c} \frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6} \\ \mathbb{Q}_4^{(a)}(A_1) \end{array} \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{12} & 0 & 0 & 0 & -\frac{\sqrt{5}}{12} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{12} & 0 & 0 & 0 & \frac{\sqrt{7}}{12} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{7}}{28} & 0 & 0 & 0 & \frac{\sqrt{35}}{28} & 0 & 0 & -\frac{\sqrt{70}}{56} & 0 & 0 & 0 & -\frac{\sqrt{210}}{168} & 0 \\ 0 & 0 & -\frac{\sqrt{42}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{5\sqrt{14}}{168} & 0 & 0 & 0 & -\frac{\sqrt{10}}{24} \\ 0 & 0 & 0 & \frac{\sqrt{42}}{28} & 0 & 0 & -\frac{\sqrt{10}}{24} & 0 & 0 & 0 & \frac{5\sqrt{14}}{168} & 0 & 0 & 0 \\ -\frac{\sqrt{35}}{28} & 0 & 0 & 0 & -\frac{\sqrt{7}}{28} & 0 & 0 & -\frac{\sqrt{210}}{168} & 0 & 0 & 0 & -\frac{\sqrt{70}}{56} & 0 & 0 \end{bmatrix}$ |
| 287 | symmetry                      | $\begin{array}{c} -\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12} \\ \mathbb{Q}_{4,0}^{(a)}(E) \end{array} \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{12} & 0 & 0 & 0 & \frac{\sqrt{7}}{12} \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{12} & 0 & 0 & 0 & \frac{\sqrt{5}}{12} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{5}}{28} & 0 & 0 & 0 & -\frac{1}{4} & 0 & 0 & -\frac{5\sqrt{2}}{56} & 0 & 0 & 0 & \frac{\sqrt{6}}{24} & 0 \\ 0 & 0 & -\frac{\sqrt{30}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{5\sqrt{10}}{168} & 0 & 0 & 0 & \frac{\sqrt{14}}{24} \\ 0 & 0 & 0 & \frac{\sqrt{30}}{28} & 0 & 0 & \frac{\sqrt{14}}{24} & 0 & 0 & 0 & \frac{5\sqrt{10}}{168} & 0 & 0 & 0 \\ \frac{1}{4} & 0 & 0 & 0 & -\frac{\sqrt{5}}{28} & 0 & 0 & \frac{\sqrt{6}}{24} & 0 & 0 & 0 & -\frac{5\sqrt{2}}{56} & 0 & 0 \end{bmatrix}$                       |
| 288 | symmetry                      | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$   |

continued ...



Table 7

| No. | multipole                     | matrix                               |                            |                           |                            |                           |                           |                         |                            |                           |                           |                           |                           |                            |                        |  |
|-----|-------------------------------|--------------------------------------|----------------------------|---------------------------|----------------------------|---------------------------|---------------------------|-------------------------|----------------------------|---------------------------|---------------------------|---------------------------|---------------------------|----------------------------|------------------------|--|
|     |                               | 0                                    | 0                          | 0                         | 0                          | 0                         | 0                         | 0                       | $\frac{\sqrt{3}}{12}$      | 0                         | 0                         | 0                         | $\frac{1}{4}$             | 0                          | 0                      |  |
|     |                               | 0                                    | 0                          | 0                         | 0                          | 0                         | 0                         | 0                       | 0                          | $-\frac{1}{4}$            | 0                         | 0                         | 0                         | $-\frac{\sqrt{3}}{12}$     | 0                      |  |
|     | $\mathbb{Q}_{4,1}^{(a)}(E)$   | 0                                    | 0                          | 0                         | $-\frac{\sqrt{30}}{28}$    | 0                         | 0                         | $\frac{\sqrt{14}}{56}$  | 0                          | 0                         | 0                         | $\frac{3\sqrt{10}}{56}$   | 0                         | 0                          | 0                      |  |
|     |                               | $\frac{3}{28}$                       | 0                          | 0                         | 0                          | $\frac{3\sqrt{5}}{28}$    | 0                         | 0                       | $-\frac{11\sqrt{6}}{168}$  | 0                         | 0                         | 0                         | $\frac{\sqrt{2}}{56}$     | 0                          | 0                      |  |
|     |                               | 0                                    | $-\frac{3\sqrt{5}}{28}$    | 0                         | 0                          | 0                         | $-\frac{3}{28}$           | 0                       | 0                          | $\frac{\sqrt{2}}{56}$     | 0                         | 0                         | 0                         | $-\frac{11\sqrt{6}}{168}$  | 0                      |  |
|     |                               | 0                                    | 0                          | $\frac{\sqrt{30}}{28}$    | 0                          | 0                         | 0                         | 0                       | 0                          | 0                         | $\frac{3\sqrt{10}}{56}$   | 0                         | 0                         | 0                          | $\frac{\sqrt{14}}{56}$ |  |
| 289 | symmetry                      | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$    |                            |                           |                            |                           |                           |                         |                            |                           |                           |                           |                           |                            |                        |  |
|     | $\mathbb{Q}_{4,0}^{(a)}(T_1)$ | 0                                    | 0                          | 0                         | 0                          | 0                         | 0                         | $-\frac{\sqrt{3}i}{48}$ | 0                          | $-\frac{\sqrt{7}i}{16}$   | 0                         | $-\frac{\sqrt{105}i}{48}$ | 0                         | $-\frac{\sqrt{21}i}{48}$   | 0                      |  |
|     |                               | 0                                    | 0                          | 0                         | 0                          | 0                         | 0                         | 0                       | $\frac{\sqrt{21}i}{48}$    | 0                         | $\frac{\sqrt{105}i}{48}$  | 0                         | $\frac{\sqrt{7}i}{16}$    | 0                          | $\frac{\sqrt{3}i}{48}$ |  |
|     |                               | $\frac{\sqrt{21}i}{112}$             | 0                          | $\frac{\sqrt{210}i}{112}$ | 0                          | $\frac{\sqrt{105}i}{112}$ | 0                         | 0                       | $-\frac{3\sqrt{14}i}{112}$ | 0                         | $-\frac{\sqrt{70}i}{56}$  | 0                         | $-\frac{\sqrt{42}i}{112}$ | 0                          | 0                      |  |
|     |                               | 0                                    | $-\frac{3\sqrt{35}i}{112}$ | 0                         | $-\frac{3\sqrt{70}i}{112}$ | 0                         | $-\frac{3\sqrt{7}i}{112}$ | $\frac{\sqrt{6}i}{48}$  | 0                          | $\frac{\sqrt{14}i}{28}$   | 0                         | $\frac{\sqrt{210}i}{336}$ | 0                         | $-\frac{\sqrt{42}i}{168}$  | 0                      |  |
|     |                               | $\frac{3\sqrt{7}i}{112}$             | 0                          | $\frac{3\sqrt{70}i}{112}$ | 0                          | $\frac{3\sqrt{35}i}{112}$ | 0                         | 0                       | $-\frac{\sqrt{42}i}{168}$  | 0                         | $\frac{\sqrt{210}i}{336}$ | 0                         | $\frac{\sqrt{14}i}{28}$   | 0                          | $\frac{\sqrt{6}i}{48}$ |  |
|     |                               | 0                                    | $-\frac{\sqrt{105}i}{112}$ | 0                         | $-\frac{\sqrt{210}i}{112}$ | 0                         | $-\frac{\sqrt{21}i}{112}$ | 0                       | 0                          | $-\frac{\sqrt{42}i}{112}$ | 0                         | $-\frac{\sqrt{70}i}{56}$  | 0                         | $-\frac{3\sqrt{14}i}{112}$ | 0                      |  |
| 290 | symmetry                      | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$   |                            |                           |                            |                           |                           |                         |                            |                           |                           |                           |                           |                            |                        |  |
|     | $\mathbb{Q}_{4,1}^{(a)}(T_1)$ | 0                                    | 0                          | 0                         | 0                          | 0                         | 0                         | $-\frac{\sqrt{3}}{48}$  | 0                          | $\frac{\sqrt{7}}{16}$     | 0                         | $-\frac{\sqrt{105}}{48}$  | 0                         | $\frac{\sqrt{21}}{48}$     | 0                      |  |
|     |                               | 0                                    | 0                          | 0                         | 0                          | 0                         | 0                         | 0                       | $\frac{\sqrt{21}}{48}$     | 0                         | $-\frac{\sqrt{105}}{48}$  | 0                         | $\frac{\sqrt{7}}{16}$     | 0                          | $-\frac{\sqrt{3}}{48}$ |  |
|     |                               | $-\frac{\sqrt{21}}{112}$             | 0                          | $\frac{\sqrt{210}}{112}$  | 0                          | $-\frac{\sqrt{105}}{112}$ | 0                         | 0                       | $\frac{3\sqrt{14}}{112}$   | 0                         | $-\frac{\sqrt{70}}{56}$   | 0                         | $\frac{\sqrt{42}}{112}$   | 0                          | 0                      |  |
|     |                               | 0                                    | $\frac{3\sqrt{35}}{112}$   | 0                         | $-\frac{3\sqrt{70}}{112}$  | 0                         | $\frac{3\sqrt{7}}{112}$   | $\frac{\sqrt{6}}{48}$   | 0                          | $-\frac{\sqrt{14}}{28}$   | 0                         | $\frac{\sqrt{210}}{336}$  | 0                         | $\frac{\sqrt{42}}{168}$    | 0                      |  |
|     |                               | $\frac{3\sqrt{7}}{112}$              | 0                          | $-\frac{3\sqrt{70}}{112}$ | 0                          | $\frac{3\sqrt{35}}{112}$  | 0                         | 0                       | $-\frac{\sqrt{42}}{168}$   | 0                         | $-\frac{\sqrt{210}}{336}$ | 0                         | $\frac{\sqrt{14}}{28}$    | 0                          | $-\frac{\sqrt{6}}{48}$ |  |
|     |                               | 0                                    | $-\frac{\sqrt{105}}{112}$  | 0                         | $\frac{\sqrt{210}}{112}$   | 0                         | $-\frac{\sqrt{21}}{112}$  | 0                       | 0                          | $-\frac{\sqrt{42}}{112}$  | 0                         | $\frac{\sqrt{70}}{56}$    | 0                         | $-\frac{3\sqrt{14}}{112}$  | 0                      |  |
| 291 | symmetry                      | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$    |                            |                           |                            |                           |                           |                         |                            |                           |                           |                           |                           |                            |                        |  |
|     | $\mathbb{Q}_{4,2}^{(a)}(T_1)$ | 0                                    | 0                          | 0                         | 0                          | 0                         | 0                         | 0                       | 0                          | 0                         | 0                         | 0                         | 0                         | $\frac{\sqrt{3}i}{6}$      |                        |  |
|     |                               | 0                                    | 0                          | 0                         | 0                          | 0                         | 0                         | $\frac{\sqrt{3}i}{6}$   | 0                          | 0                         | 0                         | 0                         | 0                         | 0                          | 0                      |  |
|     |                               | 0                                    | 0                          | 0                         | 0                          | 0                         | $-\frac{\sqrt{21}i}{14}$  | 0                       | 0                          | 0                         | 0                         | 0                         | $\frac{\sqrt{14}i}{28}$   | 0                          |                        |  |
|     |                               | 0                                    | 0                          | 0                         | 0                          | 0                         | 0                         | 0                       | 0                          | 0                         | 0                         | 0                         | 0                         | $\frac{\sqrt{6}i}{12}$     |                        |  |
|     |                               | 0                                    | 0                          | 0                         | 0                          | 0                         | 0                         | $-\frac{\sqrt{6}i}{12}$ | 0                          | 0                         | 0                         | 0                         | 0                         | 0                          | 0                      |  |
|     |                               | $-\frac{\sqrt{21}i}{14}$             | 0                          | 0                         | 0                          | 0                         | 0                         | 0                       | $-\frac{\sqrt{14}i}{28}$   | 0                         | 0                         | 0                         | 0                         | 0                          | 0                      |  |
| 292 | symmetry                      | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$ |                            |                           |                            |                           |                           |                         |                            |                           |                           |                           |                           |                            |                        |  |

continued ...

Table 7

| No. | multipole                      | matrix   |                           |                           |                            |                          |                          |                           |                           |                           |                          |                           |                         |                            |                          |
|-----|--------------------------------|--|---------------------------|---------------------------|----------------------------|--------------------------|--------------------------|---------------------------|---------------------------|---------------------------|--------------------------|---------------------------|-------------------------|----------------------------|--------------------------|
|     | $\mathbb{Q}_{4,0}^{(a)}(T_2)$  | 0  | 0                         | 0                         | 0                          | 0                        | 0                        | $\frac{\sqrt{21}i}{48}$   | 0                         | $-\frac{i}{16}$           | 0                        | $-\frac{\sqrt{15}i}{48}$  | 0                       | $\frac{7\sqrt{3}i}{48}$    | 0                        |
|     |                                | 0  | 0                         | 0                         | 0                          | 0                        | 0                        | $-\frac{7\sqrt{3}i}{48}$  | 0                         | $\frac{\sqrt{15}i}{48}$   | 0                        | $\frac{i}{16}$            | 0                       | $-\frac{\sqrt{21}i}{48}$   |                          |
|     |                                | $\frac{\sqrt{3}i}{112}$  | 0                         | $\frac{\sqrt{30}i}{112}$  | 0                          | $-\frac{\sqrt{15}i}{16}$ | 0                        | $-\frac{3\sqrt{2}i}{112}$ | 0                         | $-\frac{\sqrt{10}i}{56}$  | 0                        | $\frac{\sqrt{6}i}{16}$    | 0                       | 0                          |                          |
|     |                                | 0  | $-\frac{3\sqrt{5}i}{112}$ | 0                         | $-\frac{3\sqrt{10}i}{112}$ | 0                        | $\frac{3i}{16}$          | $-\frac{\sqrt{42}i}{48}$  | 0                         | $\frac{\sqrt{2}i}{28}$    | 0                        | $\frac{\sqrt{30}i}{336}$  | 0                       | $\frac{\sqrt{6}i}{24}$     | 0                        |
|     |                                | $-\frac{3i}{16}$   | 0                         | $\frac{3\sqrt{10}i}{112}$ | 0                          | $\frac{3\sqrt{5}i}{112}$ | 0                        | 0                         | $\frac{\sqrt{6}i}{24}$    | 0                         | $\frac{\sqrt{30}i}{336}$ | 0                         | $\frac{\sqrt{2}i}{28}$  | 0                          | $-\frac{\sqrt{42}i}{48}$ |
|     |                                | 0  | $\frac{\sqrt{15}i}{16}$   | 0                         | $-\frac{\sqrt{30}i}{112}$  | 0                        | $-\frac{\sqrt{3}i}{112}$ | 0                         | 0                         | $\frac{\sqrt{6}i}{16}$    | 0                        | $-\frac{\sqrt{10}i}{56}$  | 0                       | $-\frac{3\sqrt{2}i}{112}$  | 0                        |
| 293 | symmetry                       | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$                          |                           |                           |                            |                          |                          |                           |                           |                           |                          |                           |                         |                            |                          |
|     | $\mathbb{Q}_{4,1}^{(a)}(T_2)$  | 0  | 0                         | 0                         | 0                          | 0                        | 0                        | $-\frac{\sqrt{21}}{48}$   | 0                         | $-\frac{1}{16}$           | 0                        | $\frac{\sqrt{15}}{48}$    | 0                       | $\frac{7\sqrt{3}}{48}$     | 0                        |
|     |                                | 0  | 0                         | 0                         | 0                          | 0                        | 0                        | $\frac{7\sqrt{3}}{48}$    | 0                         | $\frac{\sqrt{15}}{48}$    | 0                        | $-\frac{1}{16}$           | 0                       | $-\frac{\sqrt{21}}{48}$    |                          |
|     |                                | $\frac{\sqrt{3}}{112}$   | 0                         | $-\frac{\sqrt{30}}{112}$  | 0                          | $-\frac{\sqrt{15}}{16}$  | 0                        | $-\frac{3\sqrt{2}}{112}$  | 0                         | $\frac{\sqrt{10}}{56}$    | 0                        | $\frac{\sqrt{6}}{16}$     | 0                       | 0                          |                          |
|     |                                | 0  | $-\frac{3\sqrt{5}}{112}$  | 0                         | $\frac{3\sqrt{10}}{112}$   | 0                        | $\frac{3}{16}$           | $\frac{\sqrt{42}}{48}$    | 0                         | $\frac{\sqrt{2}}{28}$     | 0                        | $-\frac{\sqrt{30}}{336}$  | 0                       | $\frac{\sqrt{6}}{24}$      | 0                        |
|     |                                | $\frac{3}{16}$   | 0                         | $\frac{3\sqrt{10}}{112}$  | 0                          | $-\frac{3\sqrt{5}}{112}$ | 0                        | 0                         | $-\frac{\sqrt{6}}{24}$    | 0                         | $\frac{\sqrt{30}}{336}$  | 0                         | $-\frac{\sqrt{2}}{28}$  | 0                          | $-\frac{\sqrt{42}}{48}$  |
|     |                                | 0  | $-\frac{\sqrt{15}}{16}$   | 0                         | $-\frac{\sqrt{30}}{112}$   | 0                        | $\frac{\sqrt{3}}{112}$   | 0                         | 0                         | $-\frac{\sqrt{6}}{16}$    | 0                        | $-\frac{\sqrt{10}}{56}$   | 0                       | $\frac{3\sqrt{2}}{112}$    | 0                        |
| 294 | symmetry                       | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$                          |                           |                           |                            |                          |                          |                           |                           |                           |                          |                           |                         |                            |                          |
|     | $\mathbb{Q}_{4,2}^{(a)}(T_2)$  | 0  | 0                         | 0                         | 0                          | 0                        | 0                        | $-\frac{\sqrt{3}i}{12}$   | 0                         | 0                         | 0                        | $\frac{i}{4}$             | 0                       | 0                          |                          |
|     |                                | 0  | 0                         | 0                         | 0                          | 0                        | 0                        | 0                         | $\frac{i}{4}$             | 0                         | 0                        | 0                         | $-\frac{\sqrt{3}i}{12}$ | 0                          |                          |
|     |                                | 0  | 0                         | 0                         | $-\frac{\sqrt{30}i}{28}$   | 0                        | 0                        | $-\frac{\sqrt{14}i}{56}$  | 0                         | 0                         | 0                        | $\frac{3\sqrt{10}i}{56}$  | 0                       | 0                          | 0                        |
|     |                                | $-\frac{3i}{28}$   | 0                         | 0                         | 0                          | $\frac{3\sqrt{5}i}{28}$  | 0                        | 0                         | $\frac{11\sqrt{6}i}{168}$ | 0                         | 0                        | 0                         | $\frac{\sqrt{2}i}{56}$  | 0                          | 0                        |
|     |                                | 0  | $\frac{3\sqrt{5}i}{28}$   | 0                         | 0                          | 0                        | $-\frac{3i}{28}$         | 0                         | 0                         | $-\frac{\sqrt{2}i}{56}$   | 0                        | 0                         | 0                       | $-\frac{11\sqrt{6}i}{168}$ | 0                        |
|     |                                | 0  | 0                         | $-\frac{\sqrt{30}i}{28}$  | 0                          | 0                        | 0                        | 0                         | 0                         | $-\frac{3\sqrt{10}i}{56}$ | 0                        | 0                         | 0                       | 0                          | $\frac{\sqrt{14}i}{56}$  |
| 295 | symmetry                       | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$     |                           |                           |                            |                          |                          |                           |                           |                           |                          |                           |                         |                            |                          |
|     | $\mathbb{Q}_4^{(1,-1;a)}(A_1)$ | 0  | 0                         | 0                         | 0                          | 0                        | 0                        | 0                         | 0                         | $-\frac{\sqrt{21}}{24}$   | 0                        | 0                         | 0                       | $-\frac{\sqrt{15}}{24}$    |                          |
|     |                                | 0  | 0                         | 0                         | 0                          | 0                        | 0                        | $\frac{\sqrt{15}}{24}$    | 0                         | 0                         | 0                        | $\frac{\sqrt{21}}{24}$    | 0                       | 0                          | 0                        |
|     |                                | 0  | $\frac{\sqrt{21}}{168}$   | 0                         | 0                          | 0                        | $\frac{\sqrt{105}}{168}$ | 0                         | 0                         | $\frac{\sqrt{210}}{56}$   | 0                        | 0                         | 0                       | $\frac{\sqrt{70}}{56}$     | 0                        |
|     |                                | 0  | 0                         | $-\frac{\sqrt{14}}{56}$   | 0                          | 0                        | 0                        | 0                         | 0                         | $-\frac{5\sqrt{42}}{168}$ | 0                        | 0                         | 0                       | 0                          | $\frac{\sqrt{30}}{24}$   |
|     |                                | 0  | 0                         | 0                         | $\frac{\sqrt{14}}{56}$     | 0                        | 0                        | $\frac{\sqrt{30}}{24}$    | 0                         | 0                         | 0                        | $-\frac{5\sqrt{42}}{168}$ | 0                       | 0                          | 0                        |
|     |                                | $-\frac{\sqrt{105}}{168}$                                      | 0                         | 0                         | 0                          | $-\frac{\sqrt{21}}{168}$ | 0                        | 0                         | $\frac{\sqrt{70}}{56}$    | 0                         | 0                        | 0                         | $\frac{\sqrt{210}}{56}$ | 0                          | 0                        |
| 296 | symmetry                       | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ |                           |                           |                            |                          |                          |                           |                           |                           |                          |                           |                         |                            |                          |

continued ...

Table 7

| No. | multipole                          | matrix                                       |                            |                           |                            |                           |                           |                         |                           |                           |                           |                           |                           |                           |                         |
|-----|------------------------------------|--|----------------------------|---------------------------|----------------------------|---------------------------|---------------------------|-------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|-------------------------|
|     | $\mathbb{Q}_{4,0}^{(1,-1;a)}(E)$   | 0  | 0                          | 0                         | 0                          | 0                         | 0                         | 0                       | 0                         | 0                         | $-\frac{\sqrt{15}}{24}$   | 0                         | 0                         | 0                         | $\frac{\sqrt{21}}{24}$  |
|     |                                    | 0  | 0                          | 0                         | 0                          | 0                         | 0                         | $-\frac{\sqrt{21}}{24}$ | 0                         | 0                         | 0                         | $\frac{\sqrt{15}}{24}$    | 0                         | 0                         | 0                       |
|     |                                    | 0  | $\frac{\sqrt{15}}{168}$    | 0                         | 0                          | 0                         | $-\frac{\sqrt{3}}{24}$    | 0                       | 0                         | $\frac{5\sqrt{6}}{56}$    | 0                         | 0                         | 0                         | $-\frac{\sqrt{2}}{8}$     | 0                       |
|     |                                    | 0  | 0                          | $-\frac{\sqrt{10}}{56}$   | 0                          | 0                         | 0                         | 0                       | 0                         | 0                         | $-\frac{5\sqrt{30}}{168}$ | 0                         | 0                         | 0                         | $-\frac{\sqrt{42}}{24}$ |
|     |                                    | 0  | 0                          | 0                         | $\frac{\sqrt{10}}{56}$     | 0                         | 0                         | $-\frac{\sqrt{42}}{24}$ | 0                         | 0                         | 0                         | $-\frac{5\sqrt{30}}{168}$ | 0                         | 0                         | 0                       |
|     |                                    | $\frac{\sqrt{3}}{24}$                        | 0                          | 0                         | 0                          | $-\frac{\sqrt{15}}{168}$  | 0                         | 0                       | $-\frac{\sqrt{2}}{8}$     | 0                         | 0                         | 0                         | $\frac{5\sqrt{6}}{56}$    | 0                         | 0                       |
| 297 | symmetry                           | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ |                            |                           |                            |                           |                           |                         |                           |                           |                           |                           |                           |                           |                         |
|     | $\mathbb{Q}_{4,1}^{(1,-1;a)}(E)$   | 0  | 0                          | 0                         | 0                          | 0                         | 0                         | $\frac{1}{8}$           | 0                         | 0                         | 0                         | $\frac{\sqrt{3}}{8}$      | 0                         | 0                         | 0                       |
|     |                                    | 0  | 0                          | 0                         | 0                          | 0                         | 0                         | 0                       | $-\frac{\sqrt{3}}{8}$     | 0                         | 0                         | 0                         | 0                         | $-\frac{1}{8}$            | 0                       |
|     |                                    | 0  | 0                          | 0                         | $-\frac{\sqrt{10}}{56}$    | 0                         | 0                         | $-\frac{\sqrt{42}}{56}$ | 0                         | 0                         | 0                         | $-\frac{3\sqrt{30}}{56}$  | 0                         | 0                         | 0                       |
|     |                                    | $\frac{\sqrt{3}}{56}$                        | 0                          | 0                         | 0                          | $\frac{\sqrt{15}}{56}$    | 0                         | 0                       | $\frac{11\sqrt{2}}{56}$   | 0                         | 0                         | 0                         | $-\frac{\sqrt{6}}{56}$    | 0                         | 0                       |
|     |                                    | 0  | $-\frac{\sqrt{15}}{56}$    | 0                         | 0                          | 0                         | $-\frac{\sqrt{3}}{56}$    | 0                       | 0                         | $-\frac{\sqrt{6}}{56}$    | 0                         | 0                         | 0                         | $\frac{11\sqrt{2}}{56}$   | 0                       |
|     |                                    | 0  | 0                          | $\frac{\sqrt{10}}{56}$    | 0                          | 0                         | 0                         | 0                       | 0                         | $-\frac{3\sqrt{30}}{56}$  | 0                         | 0                         | 0                         | 0                         | $-\frac{\sqrt{42}}{56}$ |
| 298 | symmetry                           | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$            |                            |                           |                            |                           |                           |                         |                           |                           |                           |                           |                           |                           |                         |
|     | $\mathbb{Q}_{4,0}^{(1,-1;a)}(T_1)$ | 0  | 0                          | 0                         | 0                          | 0                         | 0                         | $-\frac{i}{32}$         | 0                         | $-\frac{\sqrt{21}i}{32}$  | 0                         | $-\frac{\sqrt{35}i}{32}$  | 0                         | $-\frac{\sqrt{7}i}{32}$   | 0                       |
|     |                                    | 0  | 0                          | 0                         | 0                          | 0                         | 0                         | 0                       | $\frac{\sqrt{7}i}{32}$    | 0                         | $\frac{\sqrt{35}i}{32}$   | 0                         | $\frac{\sqrt{21}i}{32}$   | 0                         | $\frac{i}{32}$          |
|     |                                    | $\frac{\sqrt{7}i}{224}$                      | 0                          | $\frac{\sqrt{70}i}{224}$  | 0                          | $\frac{\sqrt{35}i}{224}$  | 0                         | 0                       | $\frac{3\sqrt{42}i}{112}$ | 0                         | $\frac{\sqrt{210}i}{56}$  | 0                         | $\frac{3\sqrt{14}i}{112}$ | 0                         | 0                       |
|     |                                    | 0  | $-\frac{\sqrt{105}i}{224}$ | 0                         | $-\frac{\sqrt{210}i}{224}$ | 0                         | $-\frac{\sqrt{21}i}{224}$ | $-\frac{\sqrt{2}i}{16}$ | 0                         | $-\frac{\sqrt{42}i}{28}$  | 0                         | $-\frac{\sqrt{70}i}{112}$ | 0                         | $\frac{\sqrt{14}i}{56}$   | 0                       |
|     |                                    | $\frac{\sqrt{21}i}{224}$                     | 0                          | $\frac{\sqrt{210}i}{224}$ | 0                          | $\frac{\sqrt{105}i}{224}$ | 0                         | 0                       | $\frac{\sqrt{14}i}{56}$   | 0                         | $-\frac{\sqrt{70}i}{112}$ | 0                         | $-\frac{\sqrt{42}i}{28}$  | 0                         | $-\frac{\sqrt{2}i}{16}$ |
|     |                                    | 0  | $-\frac{\sqrt{35}i}{224}$  | 0                         | $-\frac{\sqrt{70}i}{224}$  | 0                         | $-\frac{\sqrt{7}i}{224}$  | 0                       | 0                         | $\frac{3\sqrt{14}i}{112}$ | 0                         | $\frac{\sqrt{210}i}{56}$  | 0                         | $\frac{3\sqrt{42}i}{112}$ | 0                       |
| 299 | symmetry                           | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$           |                            |                           |                            |                           |                           |                         |                           |                           |                           |                           |                           |                           |                         |
|     | $\mathbb{Q}_{4,1}^{(1,-1;a)}(T_1)$ | 0  | 0                          | 0                         | 0                          | 0                         | 0                         | $-\frac{1}{32}$         | 0                         | $\frac{\sqrt{21}}{32}$    | 0                         | $-\frac{\sqrt{35}}{32}$   | 0                         | $\frac{\sqrt{7}}{32}$     | 0                       |
|     |                                    | 0  | 0                          | 0                         | 0                          | 0                         | 0                         | 0                       | $\frac{\sqrt{7}}{32}$     | 0                         | $-\frac{\sqrt{35}}{32}$   | 0                         | $\frac{\sqrt{21}}{32}$    | 0                         | $-\frac{1}{32}$         |
|     |                                    | $-\frac{\sqrt{7}}{224}$                      | 0                          | $\frac{\sqrt{70}}{224}$   | 0                          | $-\frac{\sqrt{35}}{224}$  | 0                         | 0                       | $-\frac{3\sqrt{42}}{112}$ | 0                         | $\frac{\sqrt{210}}{56}$   | 0                         | $-\frac{3\sqrt{14}}{112}$ | 0                         | 0                       |
|     |                                    | 0  | $\frac{\sqrt{105}}{224}$   | 0                         | $-\frac{\sqrt{210}}{224}$  | 0                         | $\frac{\sqrt{21}}{224}$   | $-\frac{\sqrt{2}}{16}$  | 0                         | $\frac{\sqrt{42}}{28}$    | 0                         | $-\frac{\sqrt{70}}{112}$  | 0                         | $-\frac{\sqrt{14}}{56}$   | 0                       |
|     |                                    | $\frac{\sqrt{21}}{224}$                      | 0                          | $-\frac{\sqrt{210}}{224}$ | 0                          | $\frac{\sqrt{105}}{224}$  | 0                         | 0                       | $\frac{\sqrt{14}}{56}$    | 0                         | $\frac{\sqrt{70}}{112}$   | 0                         | $-\frac{\sqrt{42}}{28}$   | 0                         | $\frac{\sqrt{2}}{16}$   |
|     |                                    | 0  | $-\frac{\sqrt{35}}{224}$   | 0                         | $\frac{\sqrt{70}}{224}$    | 0                         | $-\frac{\sqrt{7}}{224}$   | 0                       | 0                         | $\frac{3\sqrt{14}}{112}$  | 0                         | $-\frac{\sqrt{210}}{56}$  | 0                         | $\frac{3\sqrt{42}}{112}$  | 0                       |
| 300 | symmetry                           | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$            |                            |                           |                            |                           |                           |                         |                           |                           |                           |                           |                           |                           |                         |

continued ...

Table 7

| No. | multipole                          | matrix   |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----|------------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
|     |                                    | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{i}{4} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{i}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}i}{28} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{42}i}{28} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{7}i}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{42}i}{28} & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$   |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 301 | symmetry                           | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$   |  |  |  |  |  |  |  |  |  |  |  |  |  |
|     | $\mathbb{Q}_{4,0}^{(1,-1;a)}(T_2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}i}{32} & 0 & -\frac{\sqrt{3}i}{32} & 0 & -\frac{\sqrt{5}i}{32} & 0 & \frac{7i}{32} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{7i}{32} & 0 & \frac{\sqrt{5}i}{32} & 0 & \frac{\sqrt{3}i}{32} & 0 & -\frac{\sqrt{7}i}{32} \\ \frac{i}{224} & 0 & \frac{\sqrt{10}i}{224} & 0 & -\frac{\sqrt{5}i}{32} & 0 & 0 & \frac{3\sqrt{6}i}{112} & 0 & \frac{\sqrt{30}i}{56} & 0 & -\frac{3\sqrt{2}i}{16} & 0 & 0 \\ 0 & -\frac{\sqrt{15}i}{224} & 0 & -\frac{\sqrt{30}i}{224} & 0 & \frac{\sqrt{3}i}{32} & \frac{\sqrt{14}i}{16} & 0 & -\frac{\sqrt{6}i}{28} & 0 & -\frac{\sqrt{10}i}{112} & 0 & -\frac{\sqrt{2}i}{8} & 0 \\ -\frac{\sqrt{3}i}{32} & 0 & \frac{\sqrt{30}i}{224} & 0 & \frac{\sqrt{15}i}{224} & 0 & 0 & -\frac{\sqrt{2}i}{8} & 0 & -\frac{\sqrt{10}i}{112} & 0 & -\frac{\sqrt{6}i}{28} & 0 & \frac{\sqrt{14}i}{16} \\ 0 & \frac{\sqrt{5}i}{32} & 0 & -\frac{\sqrt{10}i}{224} & 0 & -\frac{i}{224} & 0 & 0 & -\frac{3\sqrt{2}i}{16} & 0 & \frac{\sqrt{30}i}{56} & 0 & \frac{3\sqrt{6}i}{112} & 0 \end{bmatrix}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 302 | symmetry                           | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|     | $\mathbb{Q}_{4,1}^{(1,-1;a)}(T_2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{32} & 0 & -\frac{\sqrt{3}}{32} & 0 & \frac{\sqrt{5}}{32} & 0 & \frac{7}{32} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{7}{32} & 0 & \frac{\sqrt{5}}{32} & 0 & -\frac{\sqrt{3}}{32} & 0 & -\frac{\sqrt{7}}{32} \\ \frac{1}{224} & 0 & -\frac{\sqrt{10}}{224} & 0 & -\frac{\sqrt{5}}{32} & 0 & 0 & \frac{3\sqrt{6}}{112} & 0 & -\frac{\sqrt{30}}{56} & 0 & -\frac{3\sqrt{2}}{16} & 0 & 0 \\ 0 & -\frac{\sqrt{15}}{224} & 0 & \frac{\sqrt{30}}{224} & 0 & \frac{\sqrt{3}}{32} & -\frac{\sqrt{14}}{16} & 0 & -\frac{\sqrt{6}}{28} & 0 & \frac{\sqrt{10}}{112} & 0 & -\frac{\sqrt{2}}{8} & 0 \\ \frac{\sqrt{3}}{32} & 0 & \frac{\sqrt{30}}{224} & 0 & -\frac{\sqrt{15}}{224} & 0 & 0 & \frac{\sqrt{2}}{8} & 0 & -\frac{\sqrt{10}}{112} & 0 & \frac{\sqrt{6}}{28} & 0 & \frac{\sqrt{14}}{16} \\ 0 & -\frac{\sqrt{5}}{32} & 0 & -\frac{\sqrt{10}}{224} & 0 & \frac{1}{224} & 0 & 0 & \frac{3\sqrt{2}}{16} & 0 & \frac{\sqrt{30}}{56} & 0 & -\frac{3\sqrt{6}}{112} & 0 \end{bmatrix}$                                  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 303 | symmetry                           | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|     | $\mathbb{Q}_{4,2}^{(1,-1;a)}(T_2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{i}{8} & 0 & 0 & 0 & \frac{\sqrt{3}i}{8} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{8} & 0 & 0 & 0 & -\frac{i}{8} & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{10}i}{56} & 0 & 0 & \frac{\sqrt{42}i}{56} & 0 & 0 & 0 & -\frac{3\sqrt{30}i}{56} & 0 & 0 & 0 \\ -\frac{\sqrt{3}i}{56} & 0 & 0 & 0 & \frac{\sqrt{15}i}{56} & 0 & 0 & -\frac{11\sqrt{2}i}{56} & 0 & 0 & 0 & -\frac{\sqrt{6}i}{56} & 0 & 0 \\ 0 & \frac{\sqrt{15}i}{56} & 0 & 0 & 0 & -\frac{\sqrt{3}i}{56} & 0 & 0 & \frac{\sqrt{6}i}{56} & 0 & 0 & 0 & \frac{11\sqrt{2}i}{56} & 0 \\ 0 & 0 & -\frac{\sqrt{10}i}{56} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{3\sqrt{30}i}{56} & 0 & 0 & 0 & -\frac{\sqrt{42}i}{56} \end{bmatrix}$   |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 304 | symmetry                           | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$   |  |  |  |  |  |  |  |  |  |  |  |  |  |

continued ...

Table 7

| No. | multipole                         | matrix                         |                          |                           |                            |                           |                          |                          |                        |                          |                      |                         |                          |                          |   |
|-----|-----------------------------------|--------------------------------|--------------------------|---------------------------|----------------------------|---------------------------|--------------------------|--------------------------|------------------------|--------------------------|----------------------|-------------------------|--------------------------|--------------------------|---|
|     | $\mathbb{Q}_{2,0}^{(1,0;a)}(E)$   | 0                              | 0                        | $-\frac{\sqrt{2}}{6}$     | 0                          | 0                         | 0                        | 0                        | 0                      | 0                        | 0                    | 0                       | 0                        | 0                        | 0 |
|     |                                   | 0                              | 0                        | 0                         | $-\frac{\sqrt{2}}{6}$      | 0                         | 0                        | 0                        | 0                      | 0                        | 0                    | 0                       | 0                        | 0                        | 0 |
|     |                                   | 0                              | $\frac{5\sqrt{6}}{42}$   | 0                         | 0                          | 0                         | 0                        | 0                        | $\frac{\sqrt{15}}{21}$ | 0                        | 0                    | 0                       | 0                        | 0                        | 0 |
|     |                                   | 0                              | 0                        | $\frac{5}{42}$            | 0                          | 0                         | 0                        | 0                        | 0                      | $\frac{\sqrt{3}}{7}$     | 0                    | 0                       | 0                        | 0                        | 0 |
|     |                                   | 0                              | 0                        | 0                         | $-\frac{5}{42}$            | 0                         | 0                        | 0                        | 0                      | 0                        | $\frac{\sqrt{3}}{7}$ | 0                       | 0                        | 0                        | 0 |
|     |                                   | 0                              | 0                        | 0                         | 0                          | $-\frac{5\sqrt{6}}{42}$   | 0                        | 0                        | 0                      | 0                        | 0                    | 0                       | $\frac{\sqrt{15}}{21}$   | 0                        | 0 |
| 305 | symmetry                          | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ |                          |                           |                            |                           |                          |                          |                        |                          |                      |                         |                          |                          |   |
|     | $\mathbb{Q}_{2,1}^{(1,0;a)}(E)$   | $-\frac{\sqrt{15}}{18}$        | 0                        | 0                         | 0                          | $-\frac{\sqrt{3}}{18}$    | 0                        | 0                        | 0                      | 0                        | 0                    | 0                       | 0                        | 0                        | 0 |
|     |                                   | 0                              | $-\frac{\sqrt{3}}{18}$   | 0                         | 0                          | 0                         | $-\frac{\sqrt{15}}{18}$  | 0                        | 0                      | 0                        | 0                    | 0                       | 0                        | 0                        | 0 |
|     |                                   | 0                              | 0                        | 0                         | $\frac{5}{42}$             | 0                         | 0                        | $\frac{\sqrt{105}}{42}$  | 0                      | 0                        | 0                    | $\frac{\sqrt{3}}{42}$   | 0                        | 0                        | 0 |
|     |                                   | $-\frac{5\sqrt{30}}{126}$      | 0                        | 0                         | 0                          | $\frac{5\sqrt{6}}{63}$    | 0                        | 0                        | $\frac{\sqrt{5}}{14}$  | 0                        | 0                    | 0                       | $\frac{\sqrt{15}}{42}$   | 0                        | 0 |
|     |                                   | 0                              | $-\frac{5\sqrt{6}}{63}$  | 0                         | 0                          | 0                         | $\frac{5\sqrt{30}}{126}$ | 0                        | 0                      | $\frac{\sqrt{15}}{42}$   | 0                    | 0                       | 0                        | $\frac{\sqrt{5}}{14}$    | 0 |
|     |                                   | 0                              | 0                        | $-\frac{5}{42}$           | 0                          | 0                         | 0                        | 0                        | 0                      | $\frac{\sqrt{3}}{42}$    | 0                    | 0                       | 0                        | $\frac{\sqrt{105}}{42}$  | 0 |
| 306 | symmetry                          | $\sqrt{3}yz$                   |                          |                           |                            |                           |                          |                          |                        |                          |                      |                         |                          |                          |   |
|     | $\mathbb{Q}_{2,0}^{(1,0;a)}(T_2)$ | 0                              | $\frac{\sqrt{3}i}{9}$    | 0                         | $\frac{\sqrt{6}i}{18}$     | 0                         | 0                        | 0                        | 0                      | 0                        | 0                    | 0                       | 0                        | 0                        | 0 |
|     |                                   | 0                              | 0                        | $\frac{\sqrt{6}i}{18}$    | 0                          | $\frac{\sqrt{3}i}{9}$     | 0                        | 0                        | 0                      | 0                        | 0                    | 0                       | 0                        | 0                        | 0 |
|     |                                   | $-\frac{5\sqrt{10}i}{84}$      | 0                        | $-\frac{5i}{28}$          | 0                          | 0                         | 0                        | $-\frac{\sqrt{15}i}{21}$ | 0                      | $-\frac{\sqrt{3}i}{21}$  | 0                    | 0                       | 0                        | 0                        | 0 |
|     |                                   | 0                              | $\frac{5\sqrt{6}i}{252}$ | 0                         | $-\frac{25\sqrt{3}i}{252}$ | 0                         | 0                        | 0                        | 0                      | $-\frac{\sqrt{15}i}{21}$ | 0                    | $-\frac{i}{7}$          | 0                        | 0                        | 0 |
|     |                                   | 0                              | 0                        | $\frac{25\sqrt{3}i}{252}$ | 0                          | $-\frac{5\sqrt{6}i}{252}$ | 0                        | 0                        | 0                      | 0                        | $-\frac{i}{7}$       | 0                       | $-\frac{\sqrt{15}i}{21}$ | 0                        | 0 |
|     |                                   | 0                              | 0                        | 0                         | $\frac{5i}{28}$            | 0                         | $\frac{5\sqrt{10}i}{84}$ | 0                        | 0                      | 0                        | 0                    | $-\frac{\sqrt{3}i}{21}$ | 0                        | $-\frac{\sqrt{15}i}{21}$ | 0 |
| 307 | symmetry                          | $\sqrt{3}xz$                   |                          |                           |                            |                           |                          |                          |                        |                          |                      |                         |                          |                          |   |
|     | $\mathbb{Q}_{2,1}^{(1,0;a)}(T_2)$ | 0                              | $\frac{\sqrt{3}}{9}$     | 0                         | $-\frac{\sqrt{6}}{18}$     | 0                         | 0                        | 0                        | 0                      | 0                        | 0                    | 0                       | 0                        | 0                        | 0 |
|     |                                   | 0                              | 0                        | $\frac{\sqrt{6}}{18}$     | 0                          | $-\frac{\sqrt{3}}{9}$     | 0                        | 0                        | 0                      | 0                        | 0                    | 0                       | 0                        | 0                        | 0 |
|     |                                   | $-\frac{5\sqrt{10}}{84}$       | 0                        | $\frac{5}{28}$            | 0                          | 0                         | 0                        | $-\frac{\sqrt{15}}{21}$  | 0                      | $\frac{\sqrt{3}}{21}$    | 0                    | 0                       | 0                        | 0                        | 0 |
|     |                                   | 0                              | $\frac{5\sqrt{6}}{252}$  | 0                         | $\frac{25\sqrt{3}}{252}$   | 0                         | 0                        | 0                        | 0                      | $-\frac{\sqrt{15}}{21}$  | 0                    | $\frac{1}{7}$           | 0                        | 0                        | 0 |
|     |                                   | 0                              | 0                        | $\frac{25\sqrt{3}}{252}$  | 0                          | $\frac{5\sqrt{6}}{252}$   | 0                        | 0                        | 0                      | 0                        | $-\frac{1}{7}$       | 0                       | $\frac{\sqrt{15}}{21}$   | 0                        | 0 |
|     |                                   | 0                              | 0                        | 0                         | $\frac{5}{28}$             | 0                         | $-\frac{5\sqrt{10}}{84}$ | 0                        | 0                      | 0                        | 0                    | $-\frac{\sqrt{3}}{21}$  | 0                        | $\frac{\sqrt{15}}{21}$   | 0 |
| 308 | symmetry                          | $\sqrt{3}xy$                   |                          |                           |                            |                           |                          |                          |                        |                          |                      |                         |                          |                          |   |

continued ...

Table 7

| No. | multipole                         | matrix   |                          |                         |                          |                          |                            |                          |                            |                         |                         |                         |                          |                            |                           |
|-----|-----------------------------------|--|--------------------------|-------------------------|--------------------------|--------------------------|----------------------------|--------------------------|----------------------------|-------------------------|-------------------------|-------------------------|--------------------------|----------------------------|---------------------------|
|     | $\mathbb{Q}_{2,2}^{(1,0;a)}(T_2)$ | $-\frac{\sqrt{15}i}{18}$                                       | 0                        | 0                       | 0                        | $\frac{\sqrt{3}i}{18}$   | 0                          | 0                        | 0                          | 0                       | 0                       | 0                       | 0                        | 0                          | 0                         |
|     |                                   | 0  | $-\frac{\sqrt{3}i}{18}$  | 0                       | 0                        | 0                        | $\frac{\sqrt{15}i}{18}$    | 0                        | 0                          | 0                       | 0                       | 0                       | 0                        | 0                          | 0                         |
|     |                                   | 0  | 0                        | 0                       | $-\frac{5i}{42}$         | 0                        | 0                          | $\frac{\sqrt{105}i}{42}$ | 0                          | 0                       | 0                       | $-\frac{\sqrt{3}i}{42}$ | 0                        | 0                          | 0                         |
|     |                                   | $-\frac{5\sqrt{30}i}{126}$                                     | 0                        | 0                       | 0                        | $-\frac{5\sqrt{6}i}{63}$ | 0                          | 0                        | $\frac{\sqrt{5}i}{14}$     | 0                       | 0                       | 0                       | $-\frac{\sqrt{15}i}{42}$ | 0                          | 0                         |
|     |                                   | 0  | $-\frac{5\sqrt{6}i}{63}$ | 0                       | 0                        | 0                        | $-\frac{5\sqrt{30}i}{126}$ | 0                        | 0                          | $\frac{\sqrt{15}i}{42}$ | 0                       | 0                       | 0                        | $-\frac{\sqrt{5}i}{14}$    | 0                         |
|     |                                   | 0  | 0                        | $-\frac{5i}{42}$        | 0                        | 0                        | 0                          | 0                        | 0                          | 0                       | $\frac{\sqrt{3}i}{42}$  | 0                       | 0                        | 0                          | $-\frac{\sqrt{105}i}{42}$ |
| 309 | symmetry                          | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$     |                          |                         |                          |                          |                            |                          |                            |                         |                         |                         |                          |                            |                           |
|     | $\mathbb{Q}_4^{(1,0;a)}(A_1)$     | 0  | 0                        | 0                       | 0                        | 0                        | 0                          | 0                        | 0                          | 0                       | $-\frac{\sqrt{35}}{24}$ | 0                       | 0                        | 0                          | $-\frac{5}{24}$           |
|     |                                   | 0  | 0                        | 0                       | 0                        | 0                        | 0                          | $\frac{5}{24}$           | 0                          | 0                       | 0                       | $\frac{\sqrt{35}}{24}$  | 0                        | 0                          | 0                         |
|     |                                   | 0  | $-\frac{\sqrt{35}}{56}$  | 0                       | 0                        | 0                        | $-\frac{5\sqrt{7}}{56}$    | 0                        | 0                          | $-\frac{\sqrt{14}}{56}$ | 0                       | 0                       | 0                        | $-\frac{\sqrt{42}}{168}$   | 0                         |
|     |                                   | 0  | 0                        | $\frac{\sqrt{210}}{56}$ | 0                        | 0                        | 0                          | 0                        | 0                          | 0                       | $\frac{\sqrt{70}}{168}$ | 0                       | 0                        | 0                          | $-\frac{\sqrt{2}}{24}$    |
|     |                                   | 0  | 0                        | 0                       | $-\frac{\sqrt{210}}{56}$ | 0                        | 0                          | $-\frac{\sqrt{2}}{24}$   | 0                          | 0                       | 0                       | $\frac{\sqrt{70}}{168}$ | 0                        | 0                          | 0                         |
|     |                                   | $\frac{5\sqrt{7}}{56}$   | 0                        | 0                       | 0                        | $\frac{\sqrt{35}}{56}$   | 0                          | 0                        | $-\frac{\sqrt{42}}{168}$   | 0                       | 0                       | 0                       | $-\frac{\sqrt{14}}{56}$  | 0                          | 0                         |
| 310 | symmetry                          | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ |                          |                         |                          |                          |                            |                          |                            |                         |                         |                         |                          |                            |                           |
|     | $\mathbb{Q}_{4,0}^{(1,0;a)}(E)$   | 0  | 0                        | 0                       | 0                        | 0                        | 0                          | 0                        | 0                          | 0                       | $-\frac{5}{24}$         | 0                       | 0                        | 0                          | $\frac{\sqrt{35}}{24}$    |
|     |                                   | 0  | 0                        | 0                       | 0                        | 0                        | 0                          | $-\frac{\sqrt{35}}{24}$  | 0                          | 0                       | 0                       | $\frac{5}{24}$          | 0                        | 0                          | 0                         |
|     |                                   | 0  | $-\frac{5}{56}$          | 0                       | 0                        | 0                        | $\frac{\sqrt{5}}{8}$       | 0                        | 0                          | $-\frac{\sqrt{10}}{56}$ | 0                       | 0                       | 0                        | $\frac{\sqrt{30}}{120}$    | 0                         |
|     |                                   | 0  | 0                        | $\frac{5\sqrt{6}}{56}$  | 0                        | 0                        | 0                          | 0                        | 0                          | 0                       | $\frac{5\sqrt{2}}{168}$ | 0                       | 0                        | 0                          | $\frac{\sqrt{70}}{120}$   |
|     |                                   | 0  | 0                        | 0                       | $-\frac{5\sqrt{6}}{56}$  | 0                        | 0                          | $\frac{\sqrt{70}}{120}$  | 0                          | 0                       | 0                       | $\frac{5\sqrt{2}}{168}$ | 0                        | 0                          | 0                         |
|     |                                   | $-\frac{\sqrt{5}}{8}$  | 0                        | 0                       | 0                        | $\frac{5}{56}$           | 0                          | 0                        | $\frac{\sqrt{30}}{120}$    | 0                       | 0                       | 0                       | $-\frac{\sqrt{10}}{56}$  | 0                          | 0                         |
| 311 | symmetry                          | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$                   |                          |                         |                          |                          |                            |                          |                            |                         |                         |                         |                          |                            |                           |
|     | $\mathbb{Q}_{4,1}^{(1,0;a)}(E)$   | 0  | 0                        | 0                       | 0                        | 0                        | 0                          | $\frac{\sqrt{15}}{24}$   | 0                          | 0                       | 0                       | $\frac{\sqrt{5}}{8}$    | 0                        | 0                          | 0                         |
|     |                                   | 0  | 0                        | 0                       | 0                        | 0                        | 0                          | 0                        | $-\frac{\sqrt{5}}{8}$      | 0                       | 0                       | 0                       | $-\frac{\sqrt{15}}{24}$  | 0                          | 0                         |
|     |                                   | 0  | 0                        | 0                       | $\frac{5\sqrt{6}}{56}$   | 0                        | 0                          | $\frac{\sqrt{70}}{280}$  | 0                          | 0                       | 0                       | $\frac{3\sqrt{2}}{56}$  | 0                        | 0                          | 0                         |
|     |                                   | $-\frac{3\sqrt{5}}{56}$  | 0                        | 0                       | 0                        | $-\frac{15}{56}$         | 0                          | 0                        | $-\frac{11\sqrt{30}}{840}$ | 0                       | 0                       | 0                       | $\frac{\sqrt{10}}{280}$  | 0                          | 0                         |
|     |                                   | 0  | $\frac{15}{56}$          | 0                       | 0                        | 0                        | $\frac{3\sqrt{5}}{56}$     | 0                        | 0                          | $\frac{\sqrt{10}}{280}$ | 0                       | 0                       | 0                        | $-\frac{11\sqrt{30}}{840}$ | 0                         |
|     |                                   | 0  | 0                        | $-\frac{5\sqrt{6}}{56}$ | 0                        | 0                        | 0                          | 0                        | 0                          | 0                       | $\frac{3\sqrt{2}}{56}$  | 0                       | 0                        | 0                          | $\frac{\sqrt{70}}{280}$   |
| 312 | symmetry                          | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$                              |                          |                         |                          |                          |                            |                          |                            |                         |                         |                         |                          |                            |                           |

continued ...

Table 7

| No. | multipole                         | matrix                                |                           |                             |                            |                            |                           |                            |                            |                            |                          |                           |                            |                            |                            |
|-----|-----------------------------------|---------------------------------------|---------------------------|-----------------------------|----------------------------|----------------------------|---------------------------|----------------------------|----------------------------|----------------------------|--------------------------|---------------------------|----------------------------|----------------------------|----------------------------|
|     | $\mathbb{Q}_{4,0}^{(1,0;a)}(T_1)$ | 0                                     | 0                         | 0                           | 0                          | 0                          | 0                         | $-\frac{\sqrt{15}i}{96}$   | 0                          | $-\frac{\sqrt{35}i}{32}$   | 0                        | $-\frac{5\sqrt{21}i}{96}$ | 0                          | $-\frac{\sqrt{105}i}{96}$  | 0                          |
|     |                                   | 0                                     | 0                         | 0                           | 0                          | 0                          | 0                         | $\frac{\sqrt{105}i}{96}$   | 0                          | $\frac{5\sqrt{21}i}{96}$   | 0                        | $\frac{\sqrt{35}i}{32}$   | 0                          | $\frac{\sqrt{15}i}{96}$    |                            |
|     |                                   | $-\frac{\sqrt{105}i}{224}$            | 0                         | $-\frac{5\sqrt{42}i}{224}$  | 0                          | $-\frac{5\sqrt{21}i}{224}$ | 0                         | 0                          | $-\frac{3\sqrt{70}i}{560}$ | 0                          | $-\frac{\sqrt{14}i}{56}$ | 0                         | $-\frac{\sqrt{210}i}{560}$ | 0                          | 0                          |
|     |                                   | 0                                     | $\frac{15\sqrt{7}i}{224}$ | 0                           | $\frac{15\sqrt{14}i}{224}$ | 0                          | $\frac{3\sqrt{35}i}{224}$ | $\frac{\sqrt{30}i}{240}$   | 0                          | $\frac{\sqrt{70}i}{140}$   | 0                        | $\frac{\sqrt{42}i}{336}$  | 0                          | $-\frac{\sqrt{210}i}{840}$ | 0                          |
|     |                                   | $-\frac{3\sqrt{35}i}{224}$            | 0                         | $-\frac{15\sqrt{14}i}{224}$ | 0                          | $-\frac{15\sqrt{7}i}{224}$ | 0                         | 0                          | $-\frac{\sqrt{210}i}{840}$ | 0                          | $\frac{\sqrt{42}i}{336}$ | 0                         | $\frac{\sqrt{70}i}{140}$   | 0                          | $\frac{\sqrt{30}i}{240}$   |
|     |                                   | 0                                     | $\frac{5\sqrt{21}i}{224}$ | 0                           | $\frac{5\sqrt{42}i}{224}$  | 0                          | $\frac{\sqrt{105}i}{224}$ | 0                          | 0                          | $-\frac{\sqrt{210}i}{560}$ | 0                        | $-\frac{\sqrt{14}i}{56}$  | 0                          | $-\frac{3\sqrt{70}i}{560}$ | 0                          |
| 313 | symmetry                          | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$    |                           |                             |                            |                            |                           |                            |                            |                            |                          |                           |                            |                            |                            |
|     | $\mathbb{Q}_{4,1}^{(1,0;a)}(T_1)$ | 0                                     | 0                         | 0                           | 0                          | 0                          | 0                         | $-\frac{\sqrt{15}}{96}$    | 0                          | $\frac{\sqrt{35}}{32}$     | 0                        | $-\frac{5\sqrt{21}}{96}$  | 0                          | $\frac{\sqrt{105}}{96}$    | 0                          |
|     |                                   | 0                                     | 0                         | 0                           | 0                          | 0                          | 0                         | $\frac{\sqrt{105}}{96}$    | 0                          | $-\frac{5\sqrt{21}}{96}$   | 0                        | $\frac{\sqrt{35}}{32}$    | 0                          | $-\frac{\sqrt{15}}{96}$    |                            |
|     |                                   | $\frac{\sqrt{105}}{224}$              | 0                         | $-\frac{5\sqrt{42}}{224}$   | 0                          | $\frac{5\sqrt{21}}{224}$   | 0                         | 0                          | $\frac{3\sqrt{70}}{560}$   | 0                          | $-\frac{\sqrt{14}}{56}$  | 0                         | $\frac{\sqrt{210}}{560}$   | 0                          | 0                          |
|     |                                   | 0                                     | $-\frac{15\sqrt{7}}{224}$ | 0                           | $\frac{15\sqrt{14}}{224}$  | 0                          | $-\frac{3\sqrt{35}}{224}$ | $\frac{\sqrt{30}}{240}$    | 0                          | $-\frac{\sqrt{70}}{140}$   | 0                        | $\frac{\sqrt{42}}{336}$   | 0                          | $\frac{\sqrt{210}}{840}$   | 0                          |
|     |                                   | $-\frac{3\sqrt{35}}{224}$             | 0                         | $\frac{15\sqrt{14}}{224}$   | 0                          | $-\frac{15\sqrt{7}}{224}$  | 0                         | 0                          | $-\frac{\sqrt{210}}{840}$  | 0                          | $-\frac{\sqrt{42}}{336}$ | 0                         | $\frac{\sqrt{70}}{140}$    | 0                          | $-\frac{\sqrt{30}}{240}$   |
|     |                                   | 0                                     | $\frac{5\sqrt{21}}{224}$  | 0                           | $-\frac{5\sqrt{42}}{224}$  | 0                          | $\frac{\sqrt{105}}{224}$  | 0                          | 0                          | $-\frac{\sqrt{210}}{560}$  | 0                        | $\frac{\sqrt{14}}{56}$    | 0                          | $-\frac{3\sqrt{70}}{560}$  | 0                          |
| 314 | symmetry                          | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$     |                           |                             |                            |                            |                           |                            |                            |                            |                          |                           |                            |                            |                            |
|     | $\mathbb{Q}_{4,2}^{(1,0;a)}(T_1)$ | 0                                     | 0                         | 0                           | 0                          | 0                          | 0                         | 0                          | 0                          | 0                          | 0                        | 0                         | 0                          | $\frac{\sqrt{15}i}{12}$    |                            |
|     |                                   | 0                                     | 0                         | 0                           | 0                          | 0                          | 0                         | $\frac{\sqrt{15}i}{12}$    | 0                          | 0                          | 0                        | 0                         | 0                          | 0                          |                            |
|     |                                   | 0                                     | 0                         | 0                           | 0                          | 0                          | $\frac{\sqrt{105}i}{28}$  | 0                          | 0                          | 0                          | 0                        | 0                         | $\frac{\sqrt{70}i}{140}$   | 0                          |                            |
|     |                                   | 0                                     | 0                         | 0                           | 0                          | 0                          | 0                         | 0                          | 0                          | 0                          | 0                        | 0                         | 0                          | $\frac{\sqrt{30}i}{60}$    |                            |
|     |                                   | 0                                     | 0                         | 0                           | 0                          | 0                          | 0                         | $-\frac{\sqrt{30}i}{60}$   | 0                          | 0                          | 0                        | 0                         | 0                          | 0                          |                            |
|     |                                   | $\frac{\sqrt{105}i}{28}$              | 0                         | 0                           | 0                          | 0                          | 0                         | 0                          | $-\frac{\sqrt{70}i}{140}$  | 0                          | 0                        | 0                         | 0                          | 0                          |                            |
| 315 | symmetry                          | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$  |                           |                             |                            |                            |                           |                            |                            |                            |                          |                           |                            |                            |                            |
|     | $\mathbb{Q}_{4,0}^{(1,0;a)}(T_2)$ | 0                                     | 0                         | 0                           | 0                          | 0                          | 0                         | $\frac{\sqrt{105}i}{96}$   | 0                          | $-\frac{\sqrt{5}i}{32}$    | 0                        | $-\frac{5\sqrt{3}i}{96}$  | 0                          | $\frac{7\sqrt{15}i}{96}$   | 0                          |
|     |                                   | 0                                     | 0                         | 0                           | 0                          | 0                          | 0                         | 0                          | $-\frac{7\sqrt{15}i}{96}$  | 0                          | $\frac{5\sqrt{3}i}{96}$  | 0                         | $\frac{\sqrt{5}i}{32}$     | 0                          | $-\frac{\sqrt{105}i}{96}$  |
|     |                                   | $-\frac{\sqrt{15}i}{224}$             | 0                         | $-\frac{5\sqrt{6}i}{224}$   | 0                          | $\frac{5\sqrt{3}i}{32}$    | 0                         | 0                          | $-\frac{3\sqrt{10}i}{560}$ | 0                          | $-\frac{\sqrt{2}i}{56}$  | 0                         | $\frac{\sqrt{30}i}{80}$    | 0                          | 0                          |
|     |                                   | 0                                     | $\frac{15i}{224}$         | 0                           | $\frac{15\sqrt{2}i}{224}$  | 0                          | $-\frac{3\sqrt{5}i}{32}$  | $-\frac{\sqrt{210}i}{240}$ | 0                          | $\frac{\sqrt{10}i}{140}$   | 0                        | $\frac{\sqrt{6}i}{336}$   | 0                          | $\frac{\sqrt{30}i}{120}$   | 0                          |
|     |                                   | $\frac{3\sqrt{5}i}{32}$               | 0                         | $-\frac{15\sqrt{2}i}{224}$  | 0                          | $-\frac{15i}{224}$         | 0                         | 0                          | $\frac{\sqrt{30}i}{120}$   | 0                          | $\frac{\sqrt{6}i}{336}$  | 0                         | $\frac{\sqrt{10}i}{140}$   | 0                          | $-\frac{\sqrt{210}i}{240}$ |
|     |                                   | 0                                     | $-\frac{5\sqrt{3}i}{32}$  | 0                           | $\frac{5\sqrt{6}i}{224}$   | 0                          | $\frac{\sqrt{15}i}{224}$  | 0                          | 0                          | $\frac{\sqrt{30}i}{80}$    | 0                        | $-\frac{\sqrt{2}i}{56}$   | 0                          | $-\frac{3\sqrt{10}i}{560}$ | 0                          |
| 316 | symmetry                          | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ |                           |                             |                            |                            |                           |                            |                            |                            |                          |                           |                            |                            |                            |

continued ...

Table 7

| No. | multipole                         | matrix                                 |                         |                           |                           |                         |                          |                           |                            |                           |                        |                         |                          |                             |                           |
|-----|-----------------------------------|--|-------------------------|---------------------------|---------------------------|-------------------------|--------------------------|---------------------------|----------------------------|---------------------------|------------------------|-------------------------|--------------------------|-----------------------------|---------------------------|
|     | $\mathbb{Q}_{4,1}^{(1,0;a)}(T_2)$ | 0                                      | 0                       | 0                         | 0                         | 0                       | 0                        | $-\frac{\sqrt{105}}{96}$  | 0                          | $-\frac{\sqrt{5}}{32}$    | 0                      | $\frac{5\sqrt{3}}{96}$  | 0                        | $\frac{7\sqrt{15}}{96}$     | 0                         |
|     |                                   | 0                                      | 0                       | 0                         | 0                         | 0                       | 0                        | 0                         | $\frac{7\sqrt{15}}{96}$    | 0                         | $\frac{5\sqrt{3}}{96}$ | 0                       | $-\frac{\sqrt{5}}{32}$   | 0                           | $-\frac{\sqrt{105}}{96}$  |
|     |                                   | $-\frac{\sqrt{15}}{224}$               | 0                       | $\frac{5\sqrt{6}}{224}$   | 0                         | $\frac{5\sqrt{3}}{32}$  | 0                        | 0                         | $-\frac{3\sqrt{10}}{560}$  | 0                         | $\frac{\sqrt{2}}{56}$  | 0                       | $\frac{\sqrt{30}}{80}$   | 0                           | 0                         |
|     |                                   | 0                                      | $\frac{15}{224}$        | 0                         | $-\frac{15\sqrt{2}}{224}$ | 0                       | $-\frac{3\sqrt{5}}{32}$  | $\frac{\sqrt{210}}{240}$  | 0                          | $\frac{\sqrt{10}}{140}$   | 0                      | $-\frac{\sqrt{6}}{336}$ | 0                        | $\frac{\sqrt{30}}{120}$     | 0                         |
|     |                                   | $-\frac{3\sqrt{5}}{32}$                | 0                       | $-\frac{15\sqrt{2}}{224}$ | 0                         | $\frac{15}{224}$        | 0                        | 0                         | $-\frac{\sqrt{30}}{120}$   | 0                         | $\frac{\sqrt{6}}{336}$ | 0                       | $-\frac{\sqrt{10}}{140}$ | 0                           | $-\frac{\sqrt{210}}{240}$ |
|     |                                   | 0                                      | $\frac{5\sqrt{3}}{32}$  | 0                         | $\frac{5\sqrt{6}}{224}$   | 0                       | $-\frac{\sqrt{15}}{224}$ | 0                         | 0                          | $-\frac{\sqrt{30}}{80}$   | 0                      | $-\frac{\sqrt{2}}{56}$  | 0                        | $\frac{3\sqrt{10}}{560}$    | 0                         |
| 317 | symmetry                          | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$  |                         |                           |                           |                         |                          |                           |                            |                           |                        |                         |                          |                             |                           |
|     | $\mathbb{Q}_{4,2}^{(1,0;a)}(T_2)$ | 0                                      | 0                       | 0                         | 0                         | 0                       | 0                        | $-\frac{\sqrt{15}i}{24}$  | 0                          | 0                         | 0                      | $\frac{\sqrt{5}i}{8}$   | 0                        | 0                           |                           |
|     |                                   | 0                                      | 0                       | 0                         | 0                         | 0                       | 0                        | 0                         | $\frac{\sqrt{5}i}{8}$      | 0                         | 0                      | 0                       | $-\frac{\sqrt{15}i}{24}$ | 0                           |                           |
|     |                                   | 0                                      | 0                       | 0                         | $\frac{5\sqrt{6}i}{56}$   | 0                       | 0                        | $-\frac{\sqrt{70}i}{280}$ | 0                          | 0                         | 0                      | $\frac{3\sqrt{2}i}{56}$ | 0                        | 0                           | 0                         |
|     |                                   | $\frac{3\sqrt{5}i}{56}$                | 0                       | 0                         | 0                         | $-\frac{15i}{56}$       | 0                        | 0                         | $\frac{11\sqrt{30}i}{840}$ | 0                         | 0                      | 0                       | $\frac{\sqrt{10}i}{280}$ | 0                           | 0                         |
|     |                                   | 0                                      | $-\frac{15i}{56}$       | 0                         | 0                         | 0                       | $\frac{3\sqrt{5}i}{56}$  | 0                         | 0                          | $-\frac{\sqrt{10}i}{280}$ | 0                      | 0                       | 0                        | $-\frac{11\sqrt{30}i}{840}$ | 0                         |
|     |                                   | 0                                      | 0                       | $\frac{5\sqrt{6}i}{56}$   | 0                         | 0                       | 0                        | 0                         | 0                          | $-\frac{3\sqrt{2}i}{56}$  | 0                      | 0                       | 0                        | 0                           | $\frac{\sqrt{70}i}{280}$  |
| 318 | symmetry                          | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |                         |                           |                           |                         |                          |                           |                            |                           |                        |                         |                          |                             |                           |
|     | $\mathbb{Q}_{2,0}^{(1,1;a)}(E)$   | 0                                      | 0                       | $-\frac{1}{3}$            | 0                         | 0                       | 0                        | 0                         | 0                          | 0                         | 0                      | 0                       | 0                        | 0                           | 0                         |
|     |                                   | 0                                      | 0                       | 0                         | $-\frac{1}{3}$            | 0                       | 0                        | 0                         | 0                          | 0                         | 0                      | 0                       | 0                        | 0                           | 0                         |
|     |                                   | 0                                      | $-\frac{4\sqrt{3}}{21}$ | 0                         | 0                         | 0                       | 0                        | 0                         | 0                          | $\frac{\sqrt{30}}{84}$    | 0                      | 0                       | 0                        | 0                           | 0                         |
|     |                                   | 0                                      | 0                       | $-\frac{2\sqrt{2}}{21}$   | 0                         | 0                       | 0                        | 0                         | 0                          | 0                         | $\frac{\sqrt{6}}{28}$  | 0                       | 0                        | 0                           | 0                         |
|     |                                   | 0                                      | 0                       | 0                         | $\frac{2\sqrt{2}}{21}$    | 0                       | 0                        | 0                         | 0                          | 0                         | 0                      | $\frac{\sqrt{6}}{28}$   | 0                        | 0                           | 0                         |
|     |                                   | 0                                      | 0                       | 0                         | 0                         | $\frac{4\sqrt{3}}{21}$  | 0                        | 0                         | 0                          | 0                         | 0                      | 0                       | $\frac{\sqrt{30}}{84}$   | 0                           | 0                         |
| 319 | symmetry                          | $\frac{\sqrt{3}(x-y)(x+y)}{2}$         |                         |                           |                           |                         |                          |                           |                            |                           |                        |                         |                          |                             |                           |
|     | $\mathbb{Q}_{2,1}^{(1,1;a)}(E)$   | $-\frac{\sqrt{30}}{18}$                | 0                       | 0                         | 0                         | $-\frac{\sqrt{6}}{18}$  | 0                        | 0                         | 0                          | 0                         | 0                      | 0                       | 0                        | 0                           | 0                         |
|     |                                   | 0                                      | $-\frac{\sqrt{6}}{18}$  | 0                         | 0                         | 0                       | $-\frac{\sqrt{30}}{18}$  | 0                         | 0                          | 0                         | 0                      | 0                       | 0                        | 0                           | 0                         |
|     |                                   | 0                                      | 0                       | 0                         | $-\frac{2\sqrt{2}}{21}$   | 0                       | 0                        | $\frac{\sqrt{210}}{168}$  | 0                          | 0                         | 0                      | $\frac{\sqrt{6}}{168}$  | 0                        | 0                           | 0                         |
|     |                                   | $\frac{4\sqrt{15}}{63}$                | 0                       | 0                         | 0                         | $-\frac{8\sqrt{3}}{63}$ | 0                        | 0                         | $\frac{\sqrt{10}}{56}$     | 0                         | 0                      | 0                       | $\frac{\sqrt{30}}{168}$  | 0                           | 0                         |
|     |                                   | 0                                      | $\frac{8\sqrt{3}}{63}$  | 0                         | 0                         | 0                       | $-\frac{4\sqrt{15}}{63}$ | 0                         | 0                          | $\frac{\sqrt{30}}{168}$   | 0                      | 0                       | 0                        | $\frac{\sqrt{10}}{56}$      | 0                         |
|     |                                   | 0                                      | 0                       | $\frac{2\sqrt{2}}{21}$    | 0                         | 0                       | 0                        | 0                         | 0                          | 0                         | $\frac{\sqrt{6}}{168}$ | 0                       | 0                        | 0                           | $\frac{\sqrt{210}}{168}$  |
| 320 | symmetry                          | $\sqrt{3}yz$                           |                         |                           |                           |                         |                          |                           |                            |                           |                        |                         |                          |                             |                           |

continued ...



Table 7

| No. | multipole                         | matrix                        |                          |                          |                          |                         |                          |                           |                          |                          |                          |                           |                         |                          |                            |
|-----|-----------------------------------|-------------------------------|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|---------------------------|--------------------------|--------------------------|--------------------------|---------------------------|-------------------------|--------------------------|----------------------------|
|     | $\mathbb{Q}_{2,0}^{(1,1;a)}(T_2)$ | 0                             | $\frac{\sqrt{6}i}{9}$    | 0                        | $\frac{\sqrt{3}i}{9}$    | 0                       | 0                        | 0                         | 0                        | 0                        | 0                        | 0                         | 0                       | 0                        | 0                          |
|     |                                   | 0                             | 0                        | $\frac{\sqrt{3}i}{9}$    | 0                        | $\frac{\sqrt{6}i}{9}$   | 0                        | 0                         | 0                        | 0                        | 0                        | 0                         | 0                       | 0                        | 0                          |
|     |                                   | $\frac{2\sqrt{5}i}{21}$       | 0                        | $\frac{\sqrt{2}i}{7}$    | 0                        | 0                       | 0                        | $-\frac{\sqrt{30}i}{84}$  | 0                        | $-\frac{\sqrt{6}i}{84}$  | 0                        | 0                         | 0                       | 0                        | 0                          |
|     |                                   | 0                             | $-\frac{2\sqrt{3}i}{63}$ | 0                        | $\frac{5\sqrt{6}i}{63}$  | 0                       | 0                        | 0                         | $-\frac{\sqrt{30}i}{84}$ | 0                        | $-\frac{\sqrt{2}i}{28}$  | 0                         | 0                       | 0                        | 0                          |
|     |                                   | 0                             | 0                        | $-\frac{5\sqrt{6}i}{63}$ | 0                        | $\frac{2\sqrt{3}i}{63}$ | 0                        | 0                         | 0                        | $-\frac{\sqrt{2}i}{28}$  | 0                        | $-\frac{\sqrt{30}i}{84}$  | 0                       | 0                        | 0                          |
|     |                                   | 0                             | 0                        | 0                        | $-\frac{\sqrt{2}i}{7}$   | 0                       | $-\frac{2\sqrt{5}i}{21}$ | 0                         | 0                        | 0                        | 0                        | $-\frac{\sqrt{6}i}{84}$   | 0                       | $-\frac{\sqrt{30}i}{84}$ | 0                          |
| 321 | symmetry                          | $\sqrt{3}xz$                  |                          |                          |                          |                         |                          |                           |                          |                          |                          |                           |                         |                          |                            |
|     | $\mathbb{Q}_{2,1}^{(1,1;a)}(T_2)$ | 0                             | $\frac{\sqrt{6}}{9}$     | 0                        | $-\frac{\sqrt{3}}{9}$    | 0                       | 0                        | 0                         | 0                        | 0                        | 0                        | 0                         | 0                       | 0                        | 0                          |
|     |                                   | 0                             | 0                        | $\frac{\sqrt{3}}{9}$     | 0                        | $-\frac{\sqrt{6}}{9}$   | 0                        | 0                         | 0                        | 0                        | 0                        | 0                         | 0                       | 0                        | 0                          |
|     |                                   | $\frac{2\sqrt{5}}{21}$        | 0                        | $-\frac{\sqrt{2}}{7}$    | 0                        | 0                       | 0                        | $-\frac{\sqrt{30}}{84}$   | 0                        | $\frac{\sqrt{6}}{84}$    | 0                        | 0                         | 0                       | 0                        | 0                          |
|     |                                   | 0                             | $-\frac{2\sqrt{3}}{63}$  | 0                        | $-\frac{5\sqrt{6}}{63}$  | 0                       | 0                        | 0                         | $-\frac{\sqrt{30}}{84}$  | 0                        | $\frac{\sqrt{2}}{28}$    | 0                         | 0                       | 0                        | 0                          |
|     |                                   | 0                             | 0                        | $-\frac{5\sqrt{6}}{63}$  | 0                        | $-\frac{2\sqrt{3}}{63}$ | 0                        | 0                         | 0                        | $-\frac{\sqrt{2}}{28}$   | 0                        | $\frac{\sqrt{30}}{84}$    | 0                       | 0                        | 0                          |
|     |                                   | 0                             | 0                        | 0                        | $-\frac{\sqrt{2}}{7}$    | 0                       | $\frac{2\sqrt{5}}{21}$   | 0                         | 0                        | 0                        | 0                        | $-\frac{\sqrt{6}}{84}$    | 0                       | $\frac{\sqrt{30}}{84}$   | 0                          |
| 322 | symmetry                          | $\sqrt{3}xy$                  |                          |                          |                          |                         |                          |                           |                          |                          |                          |                           |                         |                          |                            |
|     | $\mathbb{Q}_{2,2}^{(1,1;a)}(T_2)$ | $-\frac{\sqrt{30}i}{18}$      | 0                        | 0                        | 0                        | $\frac{\sqrt{6}i}{18}$  | 0                        | 0                         | 0                        | 0                        | 0                        | 0                         | 0                       | 0                        | 0                          |
|     |                                   | 0                             | $-\frac{\sqrt{6}i}{18}$  | 0                        | 0                        | 0                       | $\frac{\sqrt{30}i}{18}$  | 0                         | 0                        | 0                        | 0                        | 0                         | 0                       | 0                        | 0                          |
|     |                                   | 0                             | 0                        | 0                        | $\frac{2\sqrt{2}i}{21}$  | 0                       | 0                        | $\frac{\sqrt{210}i}{168}$ | 0                        | 0                        | $-\frac{\sqrt{6}i}{168}$ | 0                         | 0                       | 0                        | 0                          |
|     |                                   | $\frac{4\sqrt{15}i}{63}$      | 0                        | 0                        | 0                        | $\frac{8\sqrt{3}i}{63}$ | 0                        | 0                         | $\frac{\sqrt{10}i}{56}$  | 0                        | 0                        | $-\frac{\sqrt{30}i}{168}$ | 0                       | 0                        | 0                          |
|     |                                   | 0                             | $\frac{8\sqrt{3}i}{63}$  | 0                        | 0                        | 0                       | $\frac{4\sqrt{15}i}{63}$ | 0                         | 0                        | $\frac{\sqrt{30}i}{168}$ | 0                        | 0                         | 0                       | $-\frac{\sqrt{10}i}{56}$ | 0                          |
|     |                                   | 0                             | 0                        | $\frac{2\sqrt{2}i}{21}$  | 0                        | 0                       | 0                        | 0                         | 0                        | $\frac{\sqrt{6}i}{168}$  | 0                        | 0                         | 0                       | 0                        | $-\frac{\sqrt{210}i}{168}$ |
| 323 | symmetry                          | $\sqrt{15}xyz$                |                          |                          |                          |                         |                          |                           |                          |                          |                          |                           |                         |                          |                            |
|     | $\mathbb{G}_3^{(a)}(A_2)$         | $-\frac{\sqrt{14}}{42}$       | 0                        | 0                        | 0                        | $\frac{\sqrt{70}}{42}$  | 0                        | 0                         | $-\frac{\sqrt{21}}{28}$  | 0                        | 0                        | 0                         | $\frac{\sqrt{7}}{28}$   | 0                        | 0                          |
|     |                                   | 0                             | $\frac{\sqrt{70}}{42}$   | 0                        | 0                        | 0                       | $-\frac{\sqrt{14}}{42}$  | 0                         | 0                        | $-\frac{\sqrt{7}}{28}$   | 0                        | 0                         | 0                       | $\frac{\sqrt{21}}{28}$   | 0                          |
|     |                                   | 0                             | 0                        | 0                        | $-\frac{\sqrt{210}}{84}$ | 0                       | 0                        | $-\frac{\sqrt{2}}{8}$     | 0                        | 0                        | 0                        | $\frac{\sqrt{70}}{56}$    | 0                       | 0                        | 0                          |
|     |                                   | $-\frac{5\sqrt{7}}{84}$       | 0                        | 0                        | 0                        | $-\frac{\sqrt{35}}{84}$ | 0                        | 0                         | $\frac{\sqrt{42}}{56}$   | 0                        | 0                        | 0                         | $\frac{3\sqrt{14}}{56}$ | 0                        | 0                          |
|     |                                   | 0                             | $\frac{\sqrt{35}}{84}$   | 0                        | 0                        | 0                       | $\frac{5\sqrt{7}}{84}$   | 0                         | 0                        | $\frac{3\sqrt{14}}{56}$  | 0                        | 0                         | 0                       | $\frac{\sqrt{42}}{56}$   | 0                          |
|     |                                   | 0                             | 0                        | $\frac{\sqrt{210}}{84}$  | 0                        | 0                       | 0                        | 0                         | 0                        | $\frac{\sqrt{70}}{56}$   | 0                        | 0                         | 0                       | 0                        | $-\frac{\sqrt{2}}{8}$      |
| 324 | symmetry                          | $\frac{x(2x^2-3y^2-3z^2)}{2}$ |                          |                          |                          |                         |                          |                           |                          |                          |                          |                           |                         |                          |                            |

continued ...

Table 7

| No. | multipole                     | matrix                            |                            |                           |                            |                           |                             |                         |                           |                           |                            |                            |                            |                           |                         |
|-----|-------------------------------|-----------------------------------|----------------------------|---------------------------|----------------------------|---------------------------|-----------------------------|-------------------------|---------------------------|---------------------------|----------------------------|----------------------------|----------------------------|---------------------------|-------------------------|
|     | $\mathbb{G}_{3,0}^{(a)}(T_1)$ | 0                                 | $\frac{\sqrt{42}i}{84}$    | 0                         | $-\frac{\sqrt{21}i}{42}$   | 0                         | $\frac{\sqrt{210}i}{84}$    | $-\frac{\sqrt{5}i}{16}$ | 0                         | $\frac{\sqrt{105}i}{112}$ | 0                          | $-\frac{3\sqrt{7}i}{112}$  | 0                          | $\frac{\sqrt{35}i}{112}$  | 0                       |
|     |                               | $\frac{\sqrt{210}i}{84}$          | 0                          | $-\frac{\sqrt{21}i}{42}$  | 0                          | $\frac{\sqrt{42}i}{84}$   | 0                           | 0                       | $-\frac{\sqrt{35}i}{112}$ | 0                         | $\frac{3\sqrt{7}i}{112}$   | 0                          | $-\frac{\sqrt{105}i}{112}$ | 0                         | $\frac{\sqrt{5}i}{16}$  |
|     |                               | $-\frac{\sqrt{35}i}{112}$         | 0                          | $\frac{3\sqrt{14}i}{112}$ | 0                          | $-\frac{5\sqrt{7}i}{112}$ | 0                           | 0                       | $\frac{\sqrt{210}i}{112}$ | 0                         | $-\frac{\sqrt{42}i}{56}$   | 0                          | $\frac{\sqrt{70}i}{112}$   | 0                         | 0                       |
|     |                               | 0                                 | $\frac{\sqrt{21}i}{48}$    | 0                         | $-\frac{\sqrt{42}i}{336}$  | 0                         | $-\frac{5\sqrt{105}i}{336}$ | $\frac{\sqrt{10}i}{16}$ | 0                         | 0                         | 0                          | $-\frac{3\sqrt{14}i}{112}$ | 0                          | $\frac{\sqrt{70}i}{56}$   | 0                       |
|     |                               | $\frac{5\sqrt{105}i}{336}$        | 0                          | $\frac{\sqrt{42}i}{336}$  | 0                          | $-\frac{\sqrt{21}i}{48}$  | 0                           | 0                       | $\frac{\sqrt{70}i}{56}$   | 0                         | $-\frac{3\sqrt{14}i}{112}$ | 0                          | 0                          | 0                         | $\frac{\sqrt{10}i}{16}$ |
|     |                               | 0                                 | $\frac{5\sqrt{7}i}{112}$   | 0                         | $-\frac{3\sqrt{14}i}{112}$ | 0                         | $\frac{\sqrt{35}i}{112}$    | 0                       | 0                         | $\frac{\sqrt{70}i}{112}$  | 0                          | $-\frac{\sqrt{42}i}{56}$   | 0                          | $\frac{\sqrt{210}i}{112}$ | 0                       |
| 325 | symmetry                      | $-\frac{y(3x^2-2y^2+3z^2)}{2}$    |                            |                           |                            |                           |                             |                         |                           |                           |                            |                            |                            |                           |                         |
|     | $\mathbb{G}_{3,1}^{(a)}(T_1)$ | 0                                 | $-\frac{\sqrt{42}}{84}$    | 0                         | $-\frac{\sqrt{21}}{42}$    | 0                         | $-\frac{\sqrt{210}}{84}$    | $-\frac{\sqrt{5}}{16}$  | 0                         | $-\frac{\sqrt{105}}{112}$ | 0                          | $-\frac{3\sqrt{7}}{112}$   | 0                          | $-\frac{\sqrt{35}}{112}$  | 0                       |
|     |                               | $\frac{\sqrt{210}}{84}$           | 0                          | $\frac{\sqrt{21}}{42}$    | 0                          | $\frac{\sqrt{42}}{84}$    | 0                           | 0                       | $-\frac{\sqrt{35}}{112}$  | 0                         | $-\frac{3\sqrt{7}}{112}$   | 0                          | $-\frac{\sqrt{105}}{112}$  | 0                         | $-\frac{\sqrt{5}}{16}$  |
|     |                               | $\frac{\sqrt{35}}{112}$           | 0                          | $\frac{3\sqrt{14}}{112}$  | 0                          | $\frac{5\sqrt{7}}{112}$   | 0                           | 0                       | $-\frac{\sqrt{210}}{112}$ | 0                         | $-\frac{\sqrt{42}}{56}$    | 0                          | $-\frac{\sqrt{70}}{112}$   | 0                         | 0                       |
|     |                               | 0                                 | $-\frac{\sqrt{21}}{48}$    | 0                         | $-\frac{\sqrt{42}}{336}$   | 0                         | $\frac{5\sqrt{105}}{336}$   | $\frac{\sqrt{10}}{16}$  | 0                         | 0                         | 0                          | $-\frac{3\sqrt{14}}{112}$  | 0                          | $-\frac{\sqrt{70}}{56}$   | 0                       |
|     |                               | $\frac{5\sqrt{105}}{336}$         | 0                          | $-\frac{\sqrt{42}}{336}$  | 0                          | $-\frac{\sqrt{21}}{48}$   | 0                           | 0                       | $\frac{\sqrt{70}}{56}$    | 0                         | $\frac{3\sqrt{14}}{112}$   | 0                          | 0                          | 0                         | $-\frac{\sqrt{10}}{16}$ |
|     |                               | 0                                 | $\frac{5\sqrt{7}}{112}$    | 0                         | $\frac{3\sqrt{14}}{112}$   | 0                         | $\frac{\sqrt{35}}{112}$     | 0                       | 0                         | $\frac{\sqrt{70}}{112}$   | 0                          | $\frac{\sqrt{42}}{56}$     | 0                          | $\frac{\sqrt{210}}{112}$  | 0                       |
| 326 | symmetry                      | $-\frac{z(3x^2+3y^2-2z^2)}{2}$    |                            |                           |                            |                           |                             |                         |                           |                           |                            |                            |                            |                           |                         |
|     | $\mathbb{G}_{3,2}^{(a)}(T_1)$ | 0                                 | 0                          | $\frac{\sqrt{21}i}{21}$   | 0                          | 0                         | 0                           | 0                       | 0                         | $\frac{\sqrt{7}i}{14}$    | 0                          | 0                          | 0                          | 0                         | 0                       |
|     |                               | 0                                 | 0                          | 0                         | $-\frac{\sqrt{21}i}{21}$   | 0                         | 0                           | 0                       | 0                         | 0                         | $\frac{\sqrt{7}i}{14}$     | 0                          | 0                          | 0                         | 0                       |
|     |                               | 0                                 | $-\frac{\sqrt{7}i}{14}$    | 0                         | 0                          | 0                         | 0                           | 0                       | $\frac{\sqrt{70}i}{28}$   | 0                         | 0                          | 0                          | 0                          | 0                         | 0                       |
|     |                               | 0                                 | 0                          | $\frac{\sqrt{42}i}{42}$   | 0                          | 0                         | 0                           | 0                       | 0                         | $\frac{\sqrt{14}i}{28}$   | 0                          | 0                          | 0                          | 0                         | 0                       |
|     |                               | 0                                 | 0                          | 0                         | $\frac{\sqrt{42}i}{42}$    | 0                         | 0                           | 0                       | 0                         | 0                         | $-\frac{\sqrt{14}i}{28}$   | 0                          | 0                          | 0                         | 0                       |
|     |                               | 0                                 | 0                          | 0                         | 0                          | $-\frac{\sqrt{7}i}{14}$   | 0                           | 0                       | 0                         | 0                         | 0                          | $-\frac{\sqrt{70}i}{28}$   | 0                          | 0                         | 0                       |
| 327 | symmetry                      | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$  |                            |                           |                            |                           |                             |                         |                           |                           |                            |                            |                            |                           |                         |
|     | $\mathbb{G}_{3,0}^{(a)}(T_2)$ | 0                                 | $\frac{\sqrt{70}i}{84}$    | 0                         | $-\frac{\sqrt{35}i}{42}$   | 0                         | $-\frac{\sqrt{14}i}{28}$    | $\frac{\sqrt{3}i}{16}$  | 0                         | $\frac{5\sqrt{7}i}{112}$  | 0                          | $-\frac{\sqrt{105}i}{112}$ | 0                          | $-\frac{\sqrt{21}i}{112}$ | 0                       |
|     |                               | $-\frac{\sqrt{14}i}{28}$          | 0                          | $-\frac{\sqrt{35}i}{42}$  | 0                          | $\frac{\sqrt{70}i}{84}$   | 0                           | 0                       | $\frac{\sqrt{21}i}{112}$  | 0                         | $\frac{\sqrt{105}i}{112}$  | 0                          | $-\frac{5\sqrt{7}i}{112}$  | 0                         | $-\frac{\sqrt{3}i}{16}$ |
|     |                               | $-\frac{5\sqrt{21}i}{336}$        | 0                          | $\frac{\sqrt{210}i}{112}$ | 0                          | $\frac{\sqrt{105}i}{112}$ | 0                           | 0                       | $\frac{5\sqrt{14}i}{112}$ | 0                         | $-\frac{\sqrt{70}i}{56}$   | 0                          | $-\frac{\sqrt{42}i}{112}$  | 0                         | 0                       |
|     |                               | 0                                 | $\frac{\sqrt{35}i}{48}$    | 0                         | $-\frac{\sqrt{70}i}{336}$  | 0                         | $\frac{5\sqrt{7}i}{112}$    | $-\frac{\sqrt{6}i}{16}$ | 0                         | 0                         | 0                          | $-\frac{\sqrt{210}i}{112}$ | 0                          | $-\frac{\sqrt{42}i}{56}$  | 0                       |
|     |                               | $-\frac{5\sqrt{7}i}{112}$         | 0                          | $\frac{\sqrt{70}i}{336}$  | 0                          | $-\frac{\sqrt{35}i}{48}$  | 0                           | 0                       | $-\frac{\sqrt{42}i}{56}$  | 0                         | $-\frac{\sqrt{210}i}{112}$ | 0                          | 0                          | 0                         | $-\frac{\sqrt{6}i}{16}$ |
|     |                               | 0                                 | $-\frac{\sqrt{105}i}{112}$ | 0                         | $-\frac{\sqrt{210}i}{112}$ | 0                         | $\frac{5\sqrt{21}i}{336}$   | 0                       | 0                         | $-\frac{\sqrt{42}i}{112}$ | 0                          | $-\frac{\sqrt{70}i}{56}$   | 0                          | $\frac{5\sqrt{14}i}{112}$ | 0                       |
| 328 | symmetry                      | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |                            |                           |                            |                           |                             |                         |                           |                           |                            |                            |                            |                           |                         |

continued ...

Table 7

| No. | multipole                          | matrix                           |                           |                           |                           |                           |                           |                           |                          |                           |                           |                          |                          |                           |                           |
|-----|------------------------------------|----------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|--------------------------|---------------------------|---------------------------|--------------------------|--------------------------|---------------------------|---------------------------|
|     | $\mathbb{G}_{3,1}^{(a)}(T_2)$      | 0                                | $\frac{\sqrt{70}}{84}$    | 0                         | $\frac{\sqrt{35}}{42}$    | 0                         | $-\frac{\sqrt{14}}{28}$   | $-\frac{\sqrt{3}}{16}$    | 0                        | $\frac{5\sqrt{7}}{112}$   | 0                         | $\frac{\sqrt{105}}{112}$ | 0                        | $-\frac{\sqrt{21}}{112}$  | 0                         |
|     |                                    | $\frac{\sqrt{14}}{28}$           | 0                         | $-\frac{\sqrt{35}}{42}$   | 0                         | $-\frac{\sqrt{70}}{84}$   | 0                         | 0                         | $-\frac{\sqrt{21}}{112}$ | 0                         | $\frac{\sqrt{105}}{112}$  | 0                        | $\frac{5\sqrt{7}}{112}$  | 0                         | $-\frac{\sqrt{3}}{16}$    |
|     |                                    | $-\frac{5\sqrt{21}}{336}$        | 0                         | $-\frac{\sqrt{210}}{112}$ | 0                         | $\frac{\sqrt{105}}{112}$  | 0                         | 0                         | $\frac{5\sqrt{14}}{112}$ | 0                         | $\frac{\sqrt{70}}{56}$    | 0                        | $-\frac{\sqrt{42}}{112}$ | 0                         | 0                         |
|     |                                    | 0                                | $\frac{\sqrt{35}}{48}$    | 0                         | $\frac{\sqrt{70}}{336}$   | 0                         | $\frac{5\sqrt{7}}{112}$   | $\frac{\sqrt{6}}{16}$     | 0                        | 0                         | 0                         | $\frac{\sqrt{210}}{112}$ | 0                        | $-\frac{\sqrt{42}}{56}$   | 0                         |
|     |                                    | $\frac{5\sqrt{7}}{112}$          | 0                         | $\frac{\sqrt{70}}{336}$   | 0                         | $\frac{\sqrt{35}}{48}$    | 0                         | 0                         | $\frac{\sqrt{42}}{56}$   | 0                         | $-\frac{\sqrt{210}}{112}$ | 0                        | 0                        | 0                         | $-\frac{\sqrt{6}}{16}$    |
|     |                                    | 0                                | $\frac{\sqrt{105}}{112}$  | 0                         | $-\frac{\sqrt{210}}{112}$ | 0                         | $-\frac{5\sqrt{21}}{336}$ | 0                         | 0                        | $\frac{\sqrt{42}}{112}$   | 0                         | $-\frac{\sqrt{70}}{56}$  | 0                        | $-\frac{5\sqrt{14}}{112}$ | 0                         |
| 329 | symmetry                           | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ |                           |                           |                           |                           |                           |                           |                          |                           |                           |                          |                          |                           |                           |
|     | $\mathbb{G}_{3,2}^{(a)}(T_2)$      | $\frac{\sqrt{14}i}{42}$          | 0                         | 0                         | 0                         | $\frac{\sqrt{70}i}{42}$   | 0                         | 0                         | $\frac{\sqrt{21}i}{28}$  | 0                         | 0                         | 0                        | $\frac{\sqrt{7}i}{28}$   | 0                         | 0                         |
|     |                                    | 0                                | $-\frac{\sqrt{70}i}{42}$  | 0                         | 0                         | 0                         | $-\frac{\sqrt{14}i}{42}$  | 0                         | 0                        | $\frac{\sqrt{7}i}{28}$    | 0                         | 0                        | 0                        | $\frac{\sqrt{21}i}{28}$   | 0                         |
|     |                                    | 0                                | 0                         | 0                         | $-\frac{\sqrt{210}i}{84}$ | 0                         | 0                         | $\frac{\sqrt{2}i}{8}$     | 0                        | 0                         | 0                         | $\frac{\sqrt{70}i}{56}$  | 0                        | 0                         | 0                         |
|     |                                    | $\frac{5\sqrt{7}i}{84}$          | 0                         | 0                         | 0                         | $-\frac{\sqrt{35}i}{84}$  | 0                         | 0                         | $-\frac{\sqrt{42}i}{56}$ | 0                         | 0                         | 0                        | $\frac{3\sqrt{14}i}{56}$ | 0                         | 0                         |
|     |                                    | 0                                | $-\frac{\sqrt{35}i}{84}$  | 0                         | 0                         | 0                         | $\frac{5\sqrt{7}i}{84}$   | 0                         | 0                        | $-\frac{3\sqrt{14}i}{56}$ | 0                         | 0                        | 0                        | $\frac{\sqrt{42}i}{56}$   | 0                         |
|     |                                    | 0                                | 0                         | $-\frac{\sqrt{210}i}{84}$ | 0                         | 0                         | 0                         | 0                         | 0                        | $-\frac{\sqrt{70}i}{56}$  | 0                         | 0                        | 0                        | 0                         | $-\frac{\sqrt{2}i}{8}$    |
| 330 | symmetry                           | $\sqrt{15}xyz$                   |                           |                           |                           |                           |                           |                           |                          |                           |                           |                          |                          |                           |                           |
|     | $\mathbb{G}_3^{(1,-1;a)}(A_2)$     | $\frac{\sqrt{30}}{252}$          | 0                         | 0                         | 0                         | $-\frac{5\sqrt{6}}{252}$  | 0                         | 0                         | $\frac{\sqrt{5}}{7}$     | 0                         | 0                         | 0                        | $-\frac{\sqrt{15}}{21}$  | 0                         | 0                         |
|     |                                    | 0                                | $-\frac{5\sqrt{6}}{252}$  | 0                         | 0                         | 0                         | $\frac{\sqrt{30}}{252}$   | 0                         | 0                        | $\frac{\sqrt{15}}{21}$    | 0                         | 0                        | 0                        | $-\frac{\sqrt{5}}{7}$     | 0                         |
|     |                                    | 0                                | 0                         | 0                         | $\frac{\sqrt{2}}{21}$     | 0                         | 0                         | $-\frac{\sqrt{210}}{84}$  | 0                        | 0                         | 0                         | $\frac{5\sqrt{6}}{84}$   | 0                        | 0                         | 0                         |
|     |                                    | $\frac{\sqrt{15}}{63}$           | 0                         | 0                         | 0                         | $\frac{\sqrt{3}}{63}$     | 0                         | 0                         | $\frac{\sqrt{10}}{28}$   | 0                         | 0                         | 0                        | $\frac{\sqrt{30}}{28}$   | 0                         | 0                         |
|     |                                    | 0                                | $-\frac{\sqrt{3}}{63}$    | 0                         | 0                         | 0                         | $-\frac{\sqrt{15}}{63}$   | 0                         | 0                        | $\frac{\sqrt{30}}{28}$    | 0                         | 0                        | 0                        | $\frac{\sqrt{10}}{28}$    | 0                         |
|     |                                    | 0                                | 0                         | $-\frac{\sqrt{2}}{21}$    | 0                         | 0                         | 0                         | 0                         | 0                        | 0                         | $\frac{5\sqrt{6}}{84}$    | 0                        | 0                        | 0                         | $-\frac{\sqrt{210}}{84}$  |
| 331 | symmetry                           | $\frac{x(2x^2-3y^2-3z^2)}{2}$    |                           |                           |                           |                           |                           |                           |                          |                           |                           |                          |                          |                           |                           |
|     | $\mathbb{G}_{3,0}^{(1,-1;a)}(T_1)$ | 0                                | $-\frac{\sqrt{10}i}{168}$ | 0                         | $\frac{\sqrt{5}i}{84}$    | 0                         | $-\frac{5\sqrt{2}i}{168}$ | $\frac{5\sqrt{21}i}{84}$  | 0                        | $-\frac{5i}{28}$          | 0                         | $\frac{\sqrt{15}i}{28}$  | 0                        | $-\frac{5\sqrt{3}i}{84}$  | 0                         |
|     |                                    | $-\frac{5\sqrt{2}i}{168}$        | 0                         | $\frac{\sqrt{5}i}{84}$    | 0                         | $-\frac{\sqrt{10}i}{168}$ | 0                         | 0                         | $\frac{5\sqrt{3}i}{84}$  | 0                         | $-\frac{\sqrt{15}i}{28}$  | 0                        | $\frac{5i}{28}$          | 0                         | $-\frac{5\sqrt{21}i}{84}$ |
|     |                                    | $\frac{\sqrt{3}i}{84}$           | 0                         | $-\frac{\sqrt{30}i}{140}$ | 0                         | $\frac{\sqrt{15}i}{84}$   | 0                         | 0                         | $\frac{5\sqrt{2}i}{56}$  | 0                         | $-\frac{\sqrt{10}i}{28}$  | 0                        | $\frac{5\sqrt{6}i}{168}$ | 0                         | 0                         |
|     |                                    | 0                                | $-\frac{\sqrt{5}i}{60}$   | 0                         | $\frac{\sqrt{10}i}{420}$  | 0                         | $\frac{5i}{84}$           | $\frac{5\sqrt{42}i}{168}$ | 0                        | 0                         | 0                         | $-\frac{\sqrt{30}i}{56}$ | 0                        | $\frac{5\sqrt{6}i}{84}$   | 0                         |
|     |                                    | $-\frac{5i}{84}$                 | 0                         | $-\frac{\sqrt{10}i}{420}$ | 0                         | $\frac{\sqrt{5}i}{60}$    | 0                         | 0                         | $\frac{5\sqrt{6}i}{84}$  | 0                         | $-\frac{\sqrt{30}i}{56}$  | 0                        | 0                        | 0                         | $\frac{5\sqrt{42}i}{168}$ |
|     |                                    | 0                                | $-\frac{\sqrt{15}i}{84}$  | 0                         | $\frac{\sqrt{30}i}{140}$  | 0                         | $-\frac{\sqrt{3}i}{84}$   | 0                         | 0                        | $\frac{5\sqrt{6}i}{168}$  | 0                         | $-\frac{\sqrt{10}i}{28}$ | 0                        | $\frac{5\sqrt{2}i}{56}$   | 0                         |
| 332 | symmetry                           | $-\frac{y(3x^2-2y^2+3z^2)}{2}$   |                           |                           |                           |                           |                           |                           |                          |                           |                           |                          |                          |                           |                           |

continued ...

Table 7

| No. | multipole                          | matrix   |                         |                          |                          |                          |                         |                          |                         |                         |                         |                         |                          |                         |                           |
|-----|------------------------------------|--|-------------------------|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|-------------------------|-------------------------|-------------------------|-------------------------|--------------------------|-------------------------|---------------------------|
|     | $\mathbb{G}_{3,1}^{(1,-1;a)}(T_1)$ | 0  | $\frac{\sqrt{10}}{168}$ | 0                        | $\frac{\sqrt{5}}{84}$    | 0                        | $\frac{5\sqrt{2}}{168}$ | $\frac{5\sqrt{21}}{84}$  | 0                       | $\frac{5}{28}$          | 0                       | $\frac{\sqrt{15}}{28}$  | 0                        | $\frac{5\sqrt{3}}{84}$  | 0                         |
|     |                                    | $-\frac{5\sqrt{2}}{168}$   | 0                       | $-\frac{\sqrt{5}}{84}$   | 0                        | $-\frac{\sqrt{10}}{168}$ | 0                       | 0                        | $\frac{5\sqrt{3}}{84}$  | 0                       | $\frac{\sqrt{15}}{28}$  | 0                       | $\frac{5}{28}$           | 0                       | $\frac{5\sqrt{21}}{84}$   |
|     |                                    | $-\frac{\sqrt{3}}{84}$   | 0                       | $-\frac{\sqrt{30}}{140}$ | 0                        | $-\frac{\sqrt{15}}{84}$  | 0                       | 0                        | $-\frac{5\sqrt{2}}{56}$ | 0                       | $-\frac{\sqrt{10}}{28}$ | 0                       | $-\frac{5\sqrt{6}}{168}$ | 0                       | 0                         |
|     |                                    | 0  | $\frac{\sqrt{5}}{60}$   | 0                        | $\frac{\sqrt{10}}{420}$  | 0                        | $-\frac{5}{84}$         | $\frac{5\sqrt{42}}{168}$ | 0                       | 0                       | 0                       | $-\frac{\sqrt{30}}{56}$ | 0                        | $-\frac{5\sqrt{6}}{84}$ | 0                         |
|     |                                    | $-\frac{5}{84}$  | 0                       | $\frac{\sqrt{10}}{420}$  | 0                        | $\frac{\sqrt{5}}{60}$    | 0                       | 0                        | $\frac{5\sqrt{6}}{84}$  | 0                       | $\frac{\sqrt{30}}{56}$  | 0                       | 0                        | 0                       | $-\frac{5\sqrt{42}}{168}$ |
|     |                                    | 0  | $-\frac{\sqrt{15}}{84}$ | 0                        | $-\frac{\sqrt{30}}{140}$ | 0                        | $-\frac{\sqrt{3}}{84}$  | 0                        | 0                       | $\frac{5\sqrt{6}}{168}$ | 0                       | $\frac{\sqrt{10}}{28}$  | 0                        | $\frac{5\sqrt{2}}{56}$  | 0                         |
| 333 | symmetry                           | $-\frac{z(3x^2+3y^2-2z^2)}{2}$   |                         |                          |                          |                          |                         |                          |                         |                         |                         |                         |                          |                         |                           |
|     | $\mathbb{G}_{3,2}^{(1,-1;a)}(T_1)$ | $\begin{bmatrix} 0 & 0 & -\frac{\sqrt{5}i}{42} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{2\sqrt{15}i}{21} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{5}i}{42} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{2\sqrt{15}i}{21} & 0 & 0 & 0 \\ 0 & \frac{2\sqrt{15}i}{105} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{5\sqrt{6}i}{42} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{2\sqrt{10}i}{105} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{42} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{2\sqrt{10}i}{105} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{42} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{2\sqrt{15}i}{105} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{5\sqrt{6}i}{42} & 0 & 0 \end{bmatrix}$  |                         |                          |                          |                          |                         |                          |                         |                         |                         |                         |                          |                         |                           |
| 334 | symmetry                           | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$   |                         |                          |                          |                          |                         |                          |                         |                         |                         |                         |                          |                         |                           |
|     | $\mathbb{G}_{3,0}^{(1,-1;a)}(T_2)$ | $\begin{bmatrix} 0 & -\frac{5\sqrt{6}i}{504} & 0 & \frac{5\sqrt{3}i}{252} & 0 & \frac{\sqrt{30}i}{168} & -\frac{\sqrt{35}i}{28} & 0 & -\frac{5\sqrt{15}i}{84} & 0 & \frac{5i}{28} & 0 & \frac{\sqrt{5}i}{28} & 0 \\ \frac{\sqrt{30}i}{168} & 0 & \frac{5\sqrt{3}i}{252} & 0 & -\frac{5\sqrt{6}i}{504} & 0 & 0 & -\frac{\sqrt{5}i}{28} & 0 & -\frac{5i}{28} & 0 & \frac{5\sqrt{15}i}{84} & 0 & \frac{\sqrt{35}i}{28} \\ \frac{\sqrt{5}i}{84} & 0 & -\frac{\sqrt{2}i}{28} & 0 & -\frac{i}{28} & 0 & 0 & \frac{5\sqrt{30}i}{168} & 0 & -\frac{5\sqrt{6}i}{84} & 0 & -\frac{\sqrt{10}i}{56} & 0 & 0 \\ 0 & -\frac{\sqrt{3}i}{36} & 0 & \frac{\sqrt{6}i}{252} & 0 & -\frac{\sqrt{15}i}{84} & -\frac{\sqrt{70}i}{56} & 0 & 0 & 0 & -\frac{5\sqrt{2}i}{56} & 0 & -\frac{\sqrt{10}i}{28} & 0 \\ \frac{\sqrt{15}i}{84} & 0 & -\frac{\sqrt{6}i}{252} & 0 & \frac{\sqrt{3}i}{36} & 0 & 0 & -\frac{\sqrt{10}i}{28} & 0 & -\frac{5\sqrt{2}i}{56} & 0 & 0 & 0 & -\frac{\sqrt{70}i}{56} \\ 0 & \frac{i}{28} & 0 & \frac{\sqrt{2}i}{28} & 0 & -\frac{\sqrt{5}i}{84} & 0 & 0 & -\frac{\sqrt{10}i}{56} & 0 & -\frac{5\sqrt{6}i}{84} & 0 & \frac{5\sqrt{30}i}{168} & 0 \end{bmatrix}$ |                         |                          |                          |                          |                         |                          |                         |                         |                         |                         |                          |                         |                           |
| 335 | symmetry                           | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$  |                         |                          |                          |                          |                         |                          |                         |                         |                         |                         |                          |                         |                           |
|     | $\mathbb{G}_{3,1}^{(1,-1;a)}(T_2)$ | $\begin{bmatrix} 0 & -\frac{5\sqrt{6}}{504} & 0 & -\frac{5\sqrt{3}}{252} & 0 & \frac{\sqrt{30}}{168} & \frac{\sqrt{35}}{28} & 0 & -\frac{5\sqrt{15}}{84} & 0 & -\frac{5}{28} & 0 & \frac{\sqrt{5}}{28} & 0 \\ -\frac{\sqrt{30}}{168} & 0 & \frac{5\sqrt{3}}{252} & 0 & \frac{5\sqrt{6}}{504} & 0 & 0 & \frac{\sqrt{5}}{28} & 0 & -\frac{5}{28} & 0 & -\frac{5\sqrt{15}}{84} & 0 & \frac{\sqrt{35}}{28} \\ \frac{\sqrt{5}}{84} & 0 & \frac{\sqrt{2}}{28} & 0 & -\frac{1}{28} & 0 & 0 & \frac{5\sqrt{30}}{168} & 0 & \frac{5\sqrt{6}}{84} & 0 & -\frac{\sqrt{10}}{56} & 0 & 0 \\ 0 & -\frac{\sqrt{3}}{36} & 0 & -\frac{\sqrt{6}}{252} & 0 & -\frac{\sqrt{15}}{84} & \frac{\sqrt{70}}{56} & 0 & 0 & 0 & \frac{5\sqrt{2}}{56} & 0 & -\frac{\sqrt{10}}{28} & 0 \\ -\frac{\sqrt{15}}{84} & 0 & -\frac{\sqrt{6}}{252} & 0 & -\frac{\sqrt{3}}{36} & 0 & 0 & \frac{\sqrt{10}}{28} & 0 & -\frac{5\sqrt{2}}{56} & 0 & 0 & 0 & -\frac{\sqrt{70}}{56} \\ 0 & -\frac{1}{28} & 0 & \frac{\sqrt{2}}{28} & 0 & \frac{\sqrt{5}}{84} & 0 & 0 & \frac{\sqrt{10}}{56} & 0 & -\frac{5\sqrt{6}}{84} & 0 & -\frac{5\sqrt{30}}{168} & 0 \end{bmatrix}$                                      |                         |                          |                          |                          |                         |                          |                         |                         |                         |                         |                          |                         |                           |
| 336 | symmetry                           | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$   |                         |                          |                          |                          |                         |                          |                         |                         |                         |                         |                          |                         |                           |

continued ...

Table 7

| No. | multipole                            | matrix   |                          |                        |                        |                           |                          |                          |                          |                          |                          |                         |                          |                         |                           |
|-----|--------------------------------------|--|--------------------------|------------------------|------------------------|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|-------------------------|---------------------------|
|     | $\mathbb{G}_{3,2}^{(1,-1;a)}(T_2)$   | $-\frac{\sqrt{30}i}{252}$  | 0                        | 0                      | 0                      | $-\frac{5\sqrt{6}i}{252}$ | 0                        | 0                        | $-\frac{\sqrt{5}i}{7}$   | 0                        | 0                        | 0                       | $-\frac{\sqrt{15}i}{21}$ | 0                       | 0                         |
|     |                                      | 0  | $\frac{5\sqrt{6}i}{252}$ | 0                      | 0                      | 0                         | $\frac{\sqrt{30}i}{252}$ | 0                        | 0                        | $-\frac{\sqrt{15}i}{21}$ | 0                        | 0                       | 0                        | $-\frac{\sqrt{5}i}{7}$  | 0                         |
|     |                                      | 0  | 0                        | 0                      | $\frac{\sqrt{2}i}{21}$ | 0                         | 0                        | $\frac{\sqrt{210}i}{84}$ | 0                        | 0                        | 0                        | $\frac{5\sqrt{6}i}{84}$ | 0                        | 0                       | 0                         |
|     |                                      | $-\frac{\sqrt{15}i}{63}$   | 0                        | 0                      | 0                      | $\frac{\sqrt{3}i}{63}$    | 0                        | 0                        | $-\frac{\sqrt{10}i}{28}$ | 0                        | 0                        | 0                       | $\frac{\sqrt{30}i}{28}$  | 0                       | 0                         |
|     |                                      | 0  | $\frac{\sqrt{3}i}{63}$   | 0                      | 0                      | 0                         | $-\frac{\sqrt{15}i}{63}$ | 0                        | 0                        | $-\frac{\sqrt{30}i}{28}$ | 0                        | 0                       | 0                        | $\frac{\sqrt{10}i}{28}$ | 0                         |
|     |                                      | 0  | 0                        | $\frac{\sqrt{2}i}{21}$ | 0                      | 0                         | 0                        | 0                        | 0                        | 0                        | $-\frac{5\sqrt{6}i}{84}$ | 0                       | 0                        | 0                       | $-\frac{\sqrt{210}i}{84}$ |
| 337 | symmetry                             | $\frac{3\sqrt{35}xyz(x-y)(x+y)}{2}$  |                          |                        |                        |                           |                          |                          |                          |                          |                          |                         |                          |                         |                           |
|     | $\mathbb{G}_{5,0}^{(1,-1;a)}(E)$     | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}}{20} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{20} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$   |                          |                        |                        |                           |                          |                          |                          |                          |                          |                         |                          |                         |                           |
| 338 | symmetry                             | $\frac{\sqrt{105}xyz(x^2+y^2-2z^2)}{2}$  |                          |                        |                        |                           |                          |                          |                          |                          |                          |                         |                          |                         |                           |
|     | $\mathbb{G}_{5,1}^{(1,-1;a)}(E)$     | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{120} & 0 & 0 & 0 & \frac{\sqrt{42}}{24} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{70}}{40} & 0 & 0 & 0 & -\frac{\sqrt{210}}{40} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}}{40} & 0 & 0 & 0 & \frac{\sqrt{70}}{40} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{42}}{24} & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{120} \end{bmatrix}$   |                          |                        |                        |                           |                          |                          |                          |                          |                          |                         |                          |                         |                           |
| 339 | symmetry                             | $\frac{x(8x^4-40x^2y^2-40x^2z^2+15y^4+30y^2z^2+15z^4)}{8}$   |                          |                        |                        |                           |                          |                          |                          |                          |                          |                         |                          |                         |                           |
|     | $\mathbb{G}_{5,0}^{(1,-1;a)}(T_1,1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{32} & 0 & -\frac{\sqrt{10}i}{32} & 0 & \frac{7\sqrt{6}i}{96} & 0 & -\frac{3\sqrt{14}i}{32} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{42}i}{96} & 0 & -\frac{3\sqrt{2}i}{32} & 0 & \frac{\sqrt{30}i}{32} & 0 & -\frac{7\sqrt{6}i}{96} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{7\sqrt{6}i}{96} & 0 & \frac{\sqrt{30}i}{32} & 0 & -\frac{3\sqrt{2}i}{32} & 0 & \frac{\sqrt{42}i}{96} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{14}i}{32} & 0 & \frac{7\sqrt{6}i}{96} & 0 & -\frac{\sqrt{10}i}{32} & 0 & \frac{\sqrt{2}i}{32} & 0 & 0 \end{bmatrix}$ |                          |                        |                        |                           |                          |                          |                          |                          |                          |                         |                          |                         |                           |
| 340 | symmetry                             | $\frac{y(15x^4-40x^2y^2+30x^2z^2+8y^4-40y^2z^2+15z^4)}{8}$   |                          |                        |                        |                           |                          |                          |                          |                          |                          |                         |                          |                         |                           |

continued ...

Table 7

| No. | multipole                             | matrix   |
|-----|---------------------------------------|--|
|     |                                       | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{32} & 0 & -\frac{\sqrt{10}}{32} & 0 & -\frac{7\sqrt{6}}{96} & 0 & -\frac{3\sqrt{14}}{32} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{42}}{96} & 0 & \frac{3\sqrt{2}}{32} & 0 & \frac{\sqrt{30}}{32} & 0 & \frac{7\sqrt{6}}{96} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{7\sqrt{6}}{96} & 0 & -\frac{\sqrt{30}}{32} & 0 & -\frac{3\sqrt{2}}{32} & 0 & -\frac{\sqrt{42}}{96} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{3\sqrt{14}}{32} & 0 & \frac{7\sqrt{6}}{96} & 0 & \frac{\sqrt{10}}{32} & 0 & \frac{\sqrt{2}}{32} & 0 & 0 \end{bmatrix}$   |
| 341 | symmetry                              | $\frac{z(15x^4+30x^2y^2-40x^2z^2+15y^4-40y^2z^2+8z^4)}{8}$   |
|     | $\mathbb{G}_{5,2}^{(1,-1;a)}(T_1, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{12} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{12} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{12} & 0 & 0 & 0 \end{bmatrix}$   |
| 342 | symmetry                              | $\frac{3\sqrt{35}x(y^2-2yz-z^2)(y^2+2yz-z^2)}{8}$  |
|     | $\mathbb{G}_{5,0}^{(1,-1;a)}(T_1, 2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{70}i}{160} & 0 & -\frac{\sqrt{14}i}{32} & 0 & -\frac{3\sqrt{210}i}{160} & 0 & -\frac{\sqrt{10}i}{32} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{30}i}{160} & 0 & -\frac{3\sqrt{70}i}{160} & 0 & \frac{\sqrt{42}i}{32} & 0 & \frac{3\sqrt{210}i}{160} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{3\sqrt{210}i}{160} & 0 & \frac{\sqrt{42}i}{32} & 0 & -\frac{3\sqrt{70}i}{160} & 0 & -\frac{3\sqrt{30}i}{160} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}i}{32} & 0 & -\frac{3\sqrt{210}i}{160} & 0 & -\frac{\sqrt{14}i}{32} & 0 & \frac{\sqrt{70}i}{160} & 0 & 0 \end{bmatrix}$ |
| 343 | symmetry                              | $\frac{3\sqrt{35}y(x^2-2xz-z^2)(x^2+2xz-z^2)}{8}$  |
|     | $\mathbb{G}_{5,1}^{(1,-1;a)}(T_1, 2)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}}{160} & 0 & -\frac{\sqrt{14}}{32} & 0 & \frac{3\sqrt{210}}{160} & 0 & -\frac{\sqrt{10}}{32} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{30}}{160} & 0 & \frac{3\sqrt{70}}{160} & 0 & \frac{\sqrt{42}}{32} & 0 & -\frac{3\sqrt{210}}{160} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{3\sqrt{210}}{160} & 0 & -\frac{\sqrt{42}}{32} & 0 & -\frac{3\sqrt{70}}{160} & 0 & \frac{3\sqrt{30}}{160} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{32} & 0 & -\frac{3\sqrt{210}}{160} & 0 & \frac{\sqrt{14}}{32} & 0 & \frac{\sqrt{70}}{160} & 0 & 0 \end{bmatrix}$                   |
| 344 | symmetry                              | $\frac{3\sqrt{35}z(x^2-2xy-y^2)(x^2+2xy-y^2)}{8}$  |

continued ...

Table 7

| No. | multipole | matrix   |
|-----|-----------|--|
|     |           | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}i}{20} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{20} \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{70}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$   |
| 345 | symmetry  | $\frac{\sqrt{105}x(y-z)(y+z)(2x^2-y^2-z^2)}{4}$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{210}i}{240} & 0 & -\frac{\sqrt{42}i}{48} & 0 & \frac{\sqrt{70}i}{80} & 0 & \frac{\sqrt{30}i}{16} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}i}{80} & 0 & -\frac{\sqrt{210}i}{80} & 0 & \frac{\sqrt{14}i}{16} & 0 & -\frac{\sqrt{70}i}{80} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}i}{80} & 0 & \frac{\sqrt{14}i}{16} & 0 & -\frac{\sqrt{210}i}{80} & 0 & \frac{\sqrt{10}i}{80} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{16} & 0 & \frac{\sqrt{70}i}{80} & 0 & -\frac{\sqrt{42}i}{48} & 0 & \frac{\sqrt{210}i}{240} & 0 \end{bmatrix}$ |
| 346 | symmetry  | $\frac{\sqrt{105}y(x-z)(x+z)(x^2-2y^2+z^2)}{4}$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{210}}{240} & 0 & \frac{\sqrt{42}}{48} & 0 & \frac{\sqrt{70}}{80} & 0 & -\frac{\sqrt{30}}{16} \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{80} & 0 & -\frac{\sqrt{210}}{80} & 0 & -\frac{\sqrt{14}}{16} & 0 & -\frac{\sqrt{70}}{80} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{70}}{80} & 0 & \frac{\sqrt{14}}{16} & 0 & \frac{\sqrt{210}}{80} & 0 & \frac{\sqrt{10}}{80} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{16} & 0 & -\frac{\sqrt{70}}{80} & 0 & -\frac{\sqrt{42}}{48} & 0 & -\frac{\sqrt{210}}{240} & 0 \end{bmatrix}$               |
| 347 | symmetry  | $-\frac{\sqrt{105}z(x-y)(x+y)(x^2+y^2-2z^2)}{4}$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{120} & 0 & 0 & 0 & -\frac{\sqrt{42}i}{24} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{70}i}{40} & 0 & 0 & 0 & \frac{\sqrt{210}i}{40} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}i}{40} & 0 & 0 & 0 & -\frac{\sqrt{70}i}{40} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{42}i}{24} & 0 & 0 & 0 & \frac{\sqrt{30}i}{120} \end{bmatrix}$  |
| 348 | symmetry  | $\sqrt{15}xyz$   |

continued ...

Table 7

| No. | multipole                         | matrix                           |                            |                           |                            |                             |                             |                          |                            |                            |                            |                           |                            |                             |                           |
|-----|-----------------------------------|----------------------------------|----------------------------|---------------------------|----------------------------|-----------------------------|-----------------------------|--------------------------|----------------------------|----------------------------|----------------------------|---------------------------|----------------------------|-----------------------------|---------------------------|
|     | $\mathbb{G}_3^{(1,0;a)}(A_2)$     | $-\frac{\sqrt{42}}{126}$         | 0                          | 0                         | 0                          | $\frac{\sqrt{210}}{126}$    | 0                           | 0                        | $\frac{5\sqrt{7}}{56}$     | 0                          | 0                          | 0                         | $-\frac{5\sqrt{21}}{168}$  | 0                           | 0                         |
|     |                                   | 0                                | $\frac{\sqrt{210}}{126}$   | 0                         | 0                          | 0                           | $-\frac{\sqrt{42}}{126}$    | 0                        | 0                          | $\frac{5\sqrt{21}}{168}$   | 0                          | 0                         | 0                          | $-\frac{5\sqrt{7}}{56}$     | 0                         |
|     |                                   | 0                                | 0                          | 0                         | $-\frac{5\sqrt{70}}{168}$  | 0                           | 0                           | $\frac{\sqrt{6}}{24}$    | 0                          | 0                          | 0                          | $-\frac{\sqrt{210}}{168}$ | 0                          | 0                           | 0                         |
|     |                                   | $-\frac{25\sqrt{21}}{504}$       | 0                          | 0                         | 0                          | $-\frac{5\sqrt{105}}{504}$  | 0                           | 0                        | $-\frac{\sqrt{14}}{56}$    | 0                          | 0                          | 0                         | $-\frac{\sqrt{42}}{56}$    | 0                           | 0                         |
|     |                                   | 0                                | $\frac{5\sqrt{105}}{504}$  | 0                         | 0                          | 0                           | $\frac{25\sqrt{21}}{504}$   | 0                        | 0                          | $-\frac{\sqrt{42}}{56}$    | 0                          | 0                         | 0                          | $-\frac{\sqrt{14}}{56}$     | 0                         |
|     |                                   | 0                                | 0                          | $\frac{5\sqrt{70}}{168}$  | 0                          | 0                           | 0                           | 0                        | 0                          | 0                          | $-\frac{\sqrt{210}}{168}$  | 0                         | 0                          | 0                           | $\frac{\sqrt{6}}{24}$     |
| 349 | symmetry                          | $\frac{x(2x^2-3y^2-3z^2)}{2}$    |                            |                           |                            |                             |                             |                          |                            |                            |                            |                           |                            |                             |                           |
|     | $\mathbb{G}_{3,0}^{(1,0;a)}(T_1)$ | 0                                | $\frac{\sqrt{14}i}{84}$    | 0                         | $-\frac{\sqrt{7}i}{42}$    | 0                           | $\frac{\sqrt{70}i}{84}$     | $\frac{5\sqrt{15}i}{96}$ | 0                          | $-\frac{5\sqrt{35}i}{224}$ | 0                          | $\frac{5\sqrt{21}i}{224}$ | 0                          | $-\frac{5\sqrt{105}i}{672}$ | 0                         |
|     |                                   | $\frac{\sqrt{70}i}{84}$          | 0                          | $-\frac{\sqrt{7}i}{42}$   | 0                          | $\frac{\sqrt{14}i}{84}$     | 0                           | 0                        | $\frac{5\sqrt{105}i}{672}$ | 0                          | $-\frac{5\sqrt{21}i}{224}$ | 0                         | $\frac{5\sqrt{35}i}{224}$  | 0                           | $-\frac{5\sqrt{15}i}{96}$ |
|     |                                   | $-\frac{5\sqrt{105}i}{672}$      | 0                          | $\frac{5\sqrt{42}i}{224}$ | 0                          | $-\frac{25\sqrt{21}i}{672}$ | 0                           | 0                        | $-\frac{\sqrt{70}i}{112}$  | 0                          | $\frac{\sqrt{14}i}{56}$    | 0                         | $-\frac{\sqrt{210}i}{336}$ | 0                           | 0                         |
|     |                                   | 0                                | $\frac{5\sqrt{7}i}{96}$    | 0                         | $-\frac{5\sqrt{14}i}{672}$ | 0                           | $-\frac{25\sqrt{35}i}{672}$ | $-\frac{\sqrt{30}i}{48}$ | 0                          | 0                          | 0                          | $\frac{\sqrt{42}i}{112}$  | 0                          | $-\frac{\sqrt{210}i}{168}$  | 0                         |
|     |                                   | $\frac{25\sqrt{35}i}{672}$       | 0                          | $\frac{5\sqrt{14}i}{672}$ | 0                          | $-\frac{5\sqrt{7}i}{96}$    | 0                           | 0                        | $-\frac{\sqrt{210}i}{168}$ | 0                          | $\frac{\sqrt{42}i}{112}$   | 0                         | 0                          | 0                           | $-\frac{\sqrt{30}i}{48}$  |
|     |                                   | 0                                | $\frac{25\sqrt{21}i}{672}$ | 0                         | $-\frac{5\sqrt{42}i}{224}$ | 0                           | $\frac{5\sqrt{105}i}{672}$  | 0                        | 0                          | $-\frac{\sqrt{210}i}{336}$ | 0                          | $\frac{\sqrt{14}i}{56}$   | 0                          | $-\frac{\sqrt{70}i}{112}$   | 0                         |
| 350 | symmetry                          | $\frac{y(3x^2-2y^2+3z^2)}{2}$    |                            |                           |                            |                             |                             |                          |                            |                            |                            |                           |                            |                             |                           |
|     | $\mathbb{G}_{3,1}^{(1,0;a)}(T_1)$ | 0                                | $-\frac{\sqrt{14}}{84}$    | 0                         | $-\frac{\sqrt{7}}{42}$     | 0                           | $-\frac{\sqrt{70}}{84}$     | $\frac{5\sqrt{15}}{96}$  | 0                          | $\frac{5\sqrt{35}}{224}$   | 0                          | $\frac{5\sqrt{21}}{224}$  | 0                          | $\frac{5\sqrt{105}}{672}$   | 0                         |
|     |                                   | $\frac{\sqrt{70}}{84}$           | 0                          | $\frac{\sqrt{7}}{42}$     | 0                          | $\frac{\sqrt{14}}{84}$      | 0                           | 0                        | $\frac{5\sqrt{105}}{672}$  | 0                          | $\frac{5\sqrt{21}}{224}$   | 0                         | $\frac{5\sqrt{35}}{224}$   | 0                           | $\frac{5\sqrt{15}}{96}$   |
|     |                                   | $\frac{5\sqrt{105}}{672}$        | 0                          | $\frac{5\sqrt{42}}{224}$  | 0                          | $\frac{25\sqrt{21}}{672}$   | 0                           | 0                        | $\frac{\sqrt{70}}{112}$    | 0                          | $\frac{\sqrt{14}}{56}$     | 0                         | $\frac{\sqrt{210}}{336}$   | 0                           | 0                         |
|     |                                   | 0                                | $-\frac{5\sqrt{7}}{96}$    | 0                         | $-\frac{5\sqrt{14}}{672}$  | 0                           | $\frac{25\sqrt{35}}{672}$   | $-\frac{\sqrt{30}}{48}$  | 0                          | 0                          | 0                          | $\frac{\sqrt{42}}{112}$   | 0                          | $\frac{\sqrt{210}}{168}$    | 0                         |
|     |                                   | $\frac{25\sqrt{35}}{672}$        | 0                          | $-\frac{5\sqrt{14}}{672}$ | 0                          | $-\frac{5\sqrt{7}}{96}$     | 0                           | 0                        | $-\frac{\sqrt{210}}{168}$  | 0                          | $-\frac{\sqrt{42}}{112}$   | 0                         | 0                          | 0                           | $\frac{\sqrt{30}}{48}$    |
|     |                                   | 0                                | $\frac{25\sqrt{21}}{672}$  | 0                         | $\frac{5\sqrt{42}}{224}$   | 0                           | $\frac{5\sqrt{105}}{672}$   | 0                        | 0                          | $-\frac{\sqrt{210}}{336}$  | 0                          | $-\frac{\sqrt{14}}{56}$   | 0                          | $-\frac{\sqrt{70}}{112}$    | 0                         |
| 351 | symmetry                          | $\frac{z(3x^2+3y^2-2z^2)}{2}$    |                            |                           |                            |                             |                             |                          |                            |                            |                            |                           |                            |                             |                           |
|     | $\mathbb{G}_{3,2}^{(1,0;a)}(T_1)$ | 0                                | 0                          | $\frac{\sqrt{7}i}{21}$    | 0                          | 0                           | 0                           | 0                        | 0                          | $-\frac{5\sqrt{21}i}{84}$  | 0                          | 0                         | 0                          | 0                           | 0                         |
|     |                                   | 0                                | 0                          | 0                         | $-\frac{\sqrt{7}i}{21}$    | 0                           | 0                           | 0                        | 0                          | 0                          | $-\frac{5\sqrt{21}i}{84}$  | 0                         | 0                          | 0                           | 0                         |
|     |                                   | 0                                | $-\frac{5\sqrt{21}i}{84}$  | 0                         | 0                          | 0                           | 0                           | 0                        | 0                          | $-\frac{\sqrt{210}i}{84}$  | 0                          | 0                         | 0                          | 0                           | 0                         |
|     |                                   | 0                                | 0                          | $\frac{5\sqrt{14}i}{84}$  | 0                          | 0                           | 0                           | 0                        | 0                          | 0                          | $-\frac{\sqrt{42}i}{84}$   | 0                         | 0                          | 0                           | 0                         |
|     |                                   | 0                                | 0                          | 0                         | $\frac{5\sqrt{14}i}{84}$   | 0                           | 0                           | 0                        | 0                          | 0                          | 0                          | $\frac{\sqrt{42}i}{84}$   | 0                          | 0                           | 0                         |
|     |                                   | 0                                | 0                          | 0                         | 0                          | $-\frac{5\sqrt{21}i}{84}$   | 0                           | 0                        | 0                          | 0                          | 0                          | 0                         | $\frac{\sqrt{210}i}{84}$   | 0                           | 0                         |
| 352 | symmetry                          | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ |                            |                           |                            |                             |                             |                          |                            |                            |                            |                           |                            |                             |                           |

continued ...



Table 7

| No. | multipole                         | matrix                            |                             |                             |                              |                             |                            |                         |                            |                             |                            |                            |                            |                            |                        |
|-----|-----------------------------------|-----------------------------------|-----------------------------|-----------------------------|------------------------------|-----------------------------|----------------------------|-------------------------|----------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|------------------------|
|     | $\mathbb{G}_{3,0}^{(1,0;a)}(T_2)$ | 0                                 | $\frac{\sqrt{210}i}{252}$   | 0                           | $-\frac{\sqrt{105}i}{126}$   | 0                           | $-\frac{\sqrt{42}i}{84}$   | $-\frac{5i}{32}$        | 0                          | $-\frac{25\sqrt{21}i}{672}$ | 0                          | $\frac{5\sqrt{35}i}{224}$  | 0                          | $\frac{5\sqrt{7}i}{224}$   | 0                      |
|     |                                   | $-\frac{\sqrt{42}i}{84}$          | 0                           | $-\frac{\sqrt{105}i}{126}$  | 0                            | $\frac{\sqrt{210}i}{252}$   | 0                          | 0                       | $-\frac{5\sqrt{7}i}{224}$  | 0                           | $-\frac{5\sqrt{35}i}{224}$ | 0                          | $\frac{25\sqrt{21}i}{672}$ | 0                          | $\frac{5i}{32}$        |
|     |                                   | $-\frac{25\sqrt{7}i}{672}$        | 0                           | $\frac{5\sqrt{70}i}{224}$   | 0                            | $\frac{5\sqrt{35}i}{224}$   | 0                          | 0                       | $-\frac{5\sqrt{42}i}{336}$ | 0                           | $\frac{\sqrt{210}i}{168}$  | 0                          | $\frac{\sqrt{14}i}{112}$   | 0                          | 0                      |
|     |                                   | 0                                 | $\frac{5\sqrt{105}i}{288}$  | 0                           | $-\frac{5\sqrt{210}i}{2016}$ | 0                           | $\frac{25\sqrt{21}i}{672}$ | $\frac{\sqrt{2}i}{16}$  | 0                          | 0                           | 0                          | $\frac{\sqrt{70}i}{112}$   | 0                          | $\frac{\sqrt{14}i}{56}$    | 0                      |
|     |                                   | $-\frac{25\sqrt{21}i}{672}$       | 0                           | $\frac{5\sqrt{210}i}{2016}$ | 0                            | $-\frac{5\sqrt{105}i}{288}$ | 0                          | 0                       | $\frac{\sqrt{14}i}{56}$    | 0                           | $\frac{\sqrt{70}i}{112}$   | 0                          | 0                          | 0                          | $\frac{\sqrt{2}i}{16}$ |
|     |                                   | 0                                 | $-\frac{5\sqrt{35}i}{224}$  | 0                           | $-\frac{5\sqrt{70}i}{224}$   | 0                           | $\frac{25\sqrt{7}i}{672}$  | 0                       | 0                          | $\frac{\sqrt{14}i}{112}$    | 0                          | $\frac{\sqrt{210}i}{168}$  | 0                          | $-\frac{5\sqrt{42}i}{336}$ | 0                      |
| 353 | symmetry                          | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |                             |                             |                              |                             |                            |                         |                            |                             |                            |                            |                            |                            |                        |
|     | $\mathbb{G}_{3,1}^{(1,0;a)}(T_2)$ | 0                                 | $\frac{\sqrt{210}}{252}$    | 0                           | $\frac{\sqrt{105}}{126}$     | 0                           | $-\frac{\sqrt{42}}{84}$    | $\frac{5}{32}$          | 0                          | $-\frac{25\sqrt{21}}{672}$  | 0                          | $-\frac{5\sqrt{35}}{224}$  | 0                          | $\frac{5\sqrt{7}}{224}$    | 0                      |
|     |                                   | $\frac{\sqrt{42}}{84}$            | 0                           | $-\frac{\sqrt{105}}{126}$   | 0                            | $-\frac{\sqrt{210}}{252}$   | 0                          | 0                       | $\frac{5\sqrt{7}}{224}$    | 0                           | $-\frac{5\sqrt{35}}{224}$  | 0                          | $-\frac{25\sqrt{21}}{672}$ | 0                          | $\frac{5}{32}$         |
|     |                                   | $-\frac{25\sqrt{7}}{672}$         | 0                           | $-\frac{5\sqrt{70}}{224}$   | 0                            | $\frac{5\sqrt{35}}{224}$    | 0                          | 0                       | $-\frac{5\sqrt{42}}{336}$  | 0                           | $-\frac{\sqrt{210}}{168}$  | 0                          | $\frac{\sqrt{14}}{112}$    | 0                          | 0                      |
|     |                                   | 0                                 | $\frac{5\sqrt{105}}{288}$   | 0                           | $\frac{5\sqrt{210}}{2016}$   | 0                           | $\frac{25\sqrt{21}}{672}$  | $-\frac{\sqrt{2}}{16}$  | 0                          | 0                           | 0                          | $-\frac{\sqrt{70}}{112}$   | 0                          | $\frac{\sqrt{14}}{56}$     | 0                      |
|     |                                   | $\frac{25\sqrt{21}}{672}$         | 0                           | $\frac{5\sqrt{210}}{2016}$  | 0                            | $\frac{5\sqrt{105}}{288}$   | 0                          | 0                       | $-\frac{\sqrt{14}}{56}$    | 0                           | $\frac{\sqrt{70}}{112}$    | 0                          | 0                          | 0                          | $\frac{\sqrt{2}}{16}$  |
|     |                                   | 0                                 | $\frac{5\sqrt{35}}{224}$    | 0                           | $-\frac{5\sqrt{70}}{224}$    | 0                           | $-\frac{25\sqrt{7}}{672}$  | 0                       | 0                          | $-\frac{\sqrt{14}}{112}$    | 0                          | $\frac{\sqrt{210}}{168}$   | 0                          | $\frac{5\sqrt{42}}{336}$   | 0                      |
| 354 | symmetry                          | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$  |                             |                             |                              |                             |                            |                         |                            |                             |                            |                            |                            |                            |                        |
|     | $\mathbb{G}_{3,2}^{(1,0;a)}(T_2)$ | $\frac{\sqrt{42}i}{126}$          | 0                           | 0                           | 0                            | $\frac{\sqrt{210}i}{126}$   | 0                          | 0                       | $-\frac{5\sqrt{7}i}{56}$   | 0                           | 0                          | 0                          | $-\frac{5\sqrt{21}i}{168}$ | 0                          | 0                      |
|     |                                   | 0                                 | $-\frac{\sqrt{210}i}{126}$  | 0                           | 0                            | 0                           | $-\frac{\sqrt{42}i}{126}$  | 0                       | 0                          | $-\frac{5\sqrt{21}i}{168}$  | 0                          | 0                          | 0                          | $-\frac{5\sqrt{7}i}{56}$   | 0                      |
|     |                                   | 0                                 | 0                           | 0                           | $-\frac{5\sqrt{70}i}{168}$   | 0                           | 0                          | $-\frac{\sqrt{6}i}{24}$ | 0                          | 0                           | 0                          | $-\frac{\sqrt{210}i}{168}$ | 0                          | 0                          | 0                      |
|     |                                   | $\frac{25\sqrt{21}i}{504}$        | 0                           | 0                           | 0                            | $-\frac{5\sqrt{105}i}{504}$ | 0                          | 0                       | $\frac{\sqrt{14}i}{56}$    | 0                           | 0                          | 0                          | $-\frac{\sqrt{42}i}{56}$   | 0                          | 0                      |
|     |                                   | 0                                 | $-\frac{5\sqrt{105}i}{504}$ | 0                           | 0                            | 0                           | $\frac{25\sqrt{21}i}{504}$ | 0                       | 0                          | $\frac{\sqrt{42}i}{56}$     | 0                          | 0                          | 0                          | $-\frac{\sqrt{14}i}{56}$   | 0                      |
|     |                                   | 0                                 | 0                           | $-\frac{5\sqrt{70}i}{168}$  | 0                            | 0                           | 0                          | 0                       | 0                          | 0                           | $\frac{\sqrt{210}i}{168}$  | 0                          | 0                          | 0                          | $\frac{\sqrt{6}i}{24}$ |
| 355 | symmetry                          | $x$                               |                             |                             |                              |                             |                            |                         |                            |                             |                            |                            |                            |                            |                        |
|     | $\mathbb{G}_{1,0}^{(1,1;a)}(T_1)$ | 0                                 | 0                           | 0                           | 0                            | 0                           | 0                          | 0                       | 0                          | 0                           | 0                          | 0                          | 0                          | 0                          | 0                      |
|     |                                   | 0                                 | 0                           | 0                           | 0                            | 0                           | 0                          | 0                       | 0                          | 0                           | 0                          | 0                          | 0                          | 0                          | 0                      |
|     |                                   | $\frac{\sqrt{2}i}{4}$             | 0                           | $-\frac{\sqrt{5}i}{20}$     | 0                            | 0                           | 0                          | 0                       | 0                          | 0                           | 0                          | 0                          | 0                          | 0                          | 0                      |
|     |                                   | 0                                 | $\frac{\sqrt{30}i}{20}$     | 0                           | $-\frac{\sqrt{15}i}{20}$     | 0                           | 0                          | 0                       | 0                          | 0                           | 0                          | 0                          | 0                          | 0                          | 0                      |
|     |                                   | 0                                 | 0                           | $\frac{\sqrt{15}i}{20}$     | 0                            | $-\frac{\sqrt{30}i}{20}$    | 0                          | 0                       | 0                          | 0                           | 0                          | 0                          | 0                          | 0                          | 0                      |
|     |                                   | 0                                 | 0                           | 0                           | $\frac{\sqrt{5}i}{20}$       | 0                           | $-\frac{\sqrt{2}i}{4}$     | 0                       | 0                          | 0                           | 0                          | 0                          | 0                          | 0                          | 0                      |
| 356 | symmetry                          | $y$                               |                             |                             |                              |                             |                            |                         |                            |                             |                            |                            |                            |                            |                        |

continued ...

Table 7

| No. | multipole                         | matrix                         |                            |                           |                          |                           |                            |                            |                           |                           |                           |                          |                           |                           |                            |
|-----|-----------------------------------|--------------------------------|----------------------------|---------------------------|--------------------------|---------------------------|----------------------------|----------------------------|---------------------------|---------------------------|---------------------------|--------------------------|---------------------------|---------------------------|----------------------------|
|     | $\mathbb{G}_{1,1}^{(1,1;a)}(T_1)$ | 0                              | 0                          | 0                         | 0                        | 0                         | 0                          | 0                          | 0                         | 0                         | 0                         | 0                        | 0                         | 0                         | 0                          |
|     |                                   | 0                              | 0                          | 0                         | 0                        | 0                         | 0                          | 0                          | 0                         | 0                         | 0                         | 0                        | 0                         | 0                         | 0                          |
|     |                                   | $-\frac{\sqrt{2}}{4}$          | 0                          | $-\frac{\sqrt{5}}{20}$    | 0                        | 0                         | 0                          | 0                          | 0                         | 0                         | 0                         | 0                        | 0                         | 0                         | 0                          |
|     |                                   | 0                              | $-\frac{\sqrt{30}}{20}$    | 0                         | $-\frac{\sqrt{15}}{20}$  | 0                         | 0                          | 0                          | 0                         | 0                         | 0                         | 0                        | 0                         | 0                         | 0                          |
|     |                                   | 0                              | 0                          | $-\frac{\sqrt{15}}{20}$   | 0                        | $-\frac{\sqrt{30}}{20}$   | 0                          | 0                          | 0                         | 0                         | 0                         | 0                        | 0                         | 0                         | 0                          |
|     |                                   | 0                              | 0                          | 0                         | $-\frac{\sqrt{5}}{20}$   | 0                         | $-\frac{\sqrt{2}}{4}$      | 0                          | 0                         | 0                         | 0                         | 0                        | 0                         | 0                         | 0                          |
| 357 | symmetry                          | $z$                            |                            |                           |                          |                           |                            |                            |                           |                           |                           |                          |                           |                           |                            |
|     | $\mathbb{G}_{1,2}^{(1,1;a)}(T_1)$ | 0                              | 0                          | 0                         | 0                        | 0                         | 0                          | 0                          | 0                         | 0                         | 0                         | 0                        | 0                         | 0                         | 0                          |
|     |                                   | 0                              | 0                          | 0                         | 0                        | 0                         | 0                          | 0                          | 0                         | 0                         | 0                         | 0                        | 0                         | 0                         | 0                          |
|     |                                   | 0                              | $-\frac{\sqrt{10}i}{10}$   | 0                         | 0                        | 0                         | 0                          | 0                          | 0                         | 0                         | 0                         | 0                        | 0                         | 0                         | 0                          |
|     |                                   | 0                              | 0                          | $-\frac{\sqrt{15}i}{10}$  | 0                        | 0                         | 0                          | 0                          | 0                         | 0                         | 0                         | 0                        | 0                         | 0                         | 0                          |
|     |                                   | 0                              | 0                          | 0                         | $-\frac{\sqrt{15}i}{10}$ | 0                         | 0                          | 0                          | 0                         | 0                         | 0                         | 0                        | 0                         | 0                         | 0                          |
|     |                                   | 0                              | 0                          | 0                         | 0                        | $-\frac{\sqrt{10}i}{10}$  | 0                          | 0                          | 0                         | 0                         | 0                         | 0                        | 0                         | 0                         | 0                          |
| 358 | symmetry                          | $\sqrt{15}xyz$                 |                            |                           |                          |                           |                            |                            |                           |                           |                           |                          |                           |                           |                            |
|     | $\mathbb{G}_3^{(1,1;a)}(A_2)$     | $-\frac{\sqrt{6}}{14}$         | 0                          | 0                         | 0                        | $\frac{\sqrt{30}}{14}$    | 0                          | 0                          | $\frac{3}{56}$            | 0                         | 0                         | 0                        | $-\frac{\sqrt{3}}{56}$    | 0                         | 0                          |
|     |                                   | 0                              | $\frac{\sqrt{30}}{14}$     | 0                         | 0                        | 0                         | $-\frac{\sqrt{6}}{14}$     | 0                          | 0                         | $\frac{\sqrt{3}}{56}$     | 0                         | 0                        | 0                         | $-\frac{3}{56}$           | 0                          |
|     |                                   | 0                              | 0                          | 0                         | $\frac{3\sqrt{10}}{56}$  | 0                         | 0                          | $\frac{\sqrt{42}}{168}$    | 0                         | 0                         | 0                         | $-\frac{\sqrt{30}}{168}$ | 0                         | 0                         | 0                          |
|     |                                   | $\frac{5\sqrt{3}}{56}$         | 0                          | 0                         | 0                        | $\frac{\sqrt{15}}{56}$    | 0                          | 0                          | $-\frac{\sqrt{2}}{56}$    | 0                         | 0                         | 0                        | $-\frac{\sqrt{6}}{56}$    | 0                         | 0                          |
|     |                                   | 0                              | $-\frac{\sqrt{15}}{56}$    | 0                         | 0                        | 0                         | $-\frac{5\sqrt{3}}{56}$    | 0                          | 0                         | $-\frac{\sqrt{6}}{56}$    | 0                         | 0                        | 0                         | $-\frac{\sqrt{2}}{56}$    | 0                          |
|     |                                   | 0                              | 0                          | $-\frac{3\sqrt{10}}{56}$  | 0                        | 0                         | 0                          | 0                          | 0                         | $-\frac{\sqrt{30}}{168}$  | 0                         | 0                        | 0                         | 0                         | $\frac{\sqrt{42}}{168}$    |
| 359 | symmetry                          | $\frac{x(2x^2-3y^2-3z^2)}{2}$  |                            |                           |                          |                           |                            |                            |                           |                           |                           |                          |                           |                           |                            |
|     | $\mathbb{G}_{3,0}^{(1,1;a)}(T_1)$ | 0                              | $\frac{3\sqrt{2}i}{28}$    | 0                         | $-\frac{3i}{14}$         | 0                         | $\frac{3\sqrt{10}i}{28}$   | $\frac{\sqrt{105}i}{224}$  | 0                         | $-\frac{3\sqrt{5}i}{224}$ | 0                         | $\frac{3\sqrt{3}i}{224}$ | 0                         | $-\frac{\sqrt{15}i}{224}$ | 0                          |
|     |                                   | $\frac{3\sqrt{10}i}{28}$       | 0                          | $-\frac{3i}{14}$          | 0                        | $\frac{3\sqrt{2}i}{28}$   | 0                          | 0                          | $\frac{\sqrt{15}i}{224}$  | 0                         | $-\frac{3\sqrt{3}i}{224}$ | 0                        | $\frac{3\sqrt{5}i}{224}$  | 0                         | $-\frac{\sqrt{105}i}{224}$ |
|     |                                   | $\frac{3\sqrt{15}i}{224}$      | 0                          | $-\frac{9\sqrt{6}i}{224}$ | 0                        | $\frac{15\sqrt{3}i}{224}$ | 0                          | 0                          | $-\frac{\sqrt{10}i}{112}$ | 0                         | $\frac{\sqrt{2}i}{56}$    | 0                        | $-\frac{\sqrt{30}i}{336}$ | 0                         | 0                          |
|     |                                   | 0                              | $-\frac{3i}{32}$           | 0                         | $\frac{3\sqrt{2}i}{224}$ | 0                         | $\frac{15\sqrt{5}i}{224}$  | $-\frac{\sqrt{210}i}{336}$ | 0                         | 0                         | 0                         | $\frac{\sqrt{6}i}{112}$  | 0                         | $-\frac{\sqrt{30}i}{168}$ | 0                          |
|     |                                   | $-\frac{15\sqrt{5}i}{224}$     | 0                          | $-\frac{3\sqrt{2}i}{224}$ | 0                        | $\frac{3i}{32}$           | 0                          | 0                          | $-\frac{\sqrt{30}i}{168}$ | 0                         | $\frac{\sqrt{6}i}{112}$   | 0                        | 0                         | 0                         | $-\frac{\sqrt{210}i}{336}$ |
|     |                                   | 0                              | $-\frac{15\sqrt{3}i}{224}$ | 0                         | $\frac{9\sqrt{6}i}{224}$ | 0                         | $-\frac{3\sqrt{15}i}{224}$ | 0                          | 0                         | $-\frac{\sqrt{30}i}{336}$ | 0                         | $\frac{\sqrt{2}i}{56}$   | 0                         | $-\frac{\sqrt{10}i}{112}$ | 0                          |
| 360 | symmetry                          | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ |                            |                           |                          |                           |                            |                            |                           |                           |                           |                          |                           |                           |                            |

continued ...

Table 7

| No. | multipole                         | matrix                            |                           |                            |                           |                           |                            |                           |                           |                           |                           |                          |                          |                           |                          |
|-----|-----------------------------------|-----------------------------------|---------------------------|----------------------------|---------------------------|---------------------------|----------------------------|---------------------------|---------------------------|---------------------------|---------------------------|--------------------------|--------------------------|---------------------------|--------------------------|
|     | $\mathbb{G}_{3,1}^{(1,1;a)}(T_1)$ | 0                                 | $-\frac{3\sqrt{2}}{28}$   | 0                          | $-\frac{3}{14}$           | 0                         | $-\frac{3\sqrt{10}}{28}$   | $\frac{\sqrt{105}}{224}$  | 0                         | $\frac{3\sqrt{5}}{224}$   | 0                         | $\frac{3\sqrt{3}}{224}$  | 0                        | $\frac{\sqrt{15}}{224}$   | 0                        |
|     |                                   | $\frac{3\sqrt{10}}{28}$           | 0                         | $\frac{3}{14}$             | 0                         | $\frac{3\sqrt{2}}{28}$    | 0                          | 0                         | $\frac{\sqrt{15}}{224}$   | 0                         | $\frac{3\sqrt{3}}{224}$   | 0                        | $\frac{3\sqrt{5}}{224}$  | 0                         | $\frac{\sqrt{105}}{224}$ |
|     |                                   | $-\frac{3\sqrt{15}}{224}$         | 0                         | $-\frac{9\sqrt{6}}{224}$   | 0                         | $-\frac{15\sqrt{3}}{224}$ | 0                          | 0                         | $\frac{\sqrt{10}}{112}$   | 0                         | $\frac{\sqrt{2}}{56}$     | 0                        | $\frac{\sqrt{30}}{336}$  | 0                         | 0                        |
|     |                                   | 0                                 | $\frac{3}{32}$            | 0                          | $\frac{3\sqrt{2}}{224}$   | 0                         | $-\frac{15\sqrt{5}}{224}$  | $-\frac{\sqrt{210}}{336}$ | 0                         | 0                         | 0                         | $\frac{\sqrt{6}}{112}$   | 0                        | $\frac{\sqrt{30}}{168}$   | 0                        |
|     |                                   | $-\frac{15\sqrt{5}}{224}$         | 0                         | $\frac{3\sqrt{2}}{224}$    | 0                         | $\frac{3}{32}$            | 0                          | 0                         | $-\frac{\sqrt{30}}{168}$  | 0                         | $-\frac{\sqrt{6}}{112}$   | 0                        | 0                        | 0                         | $\frac{\sqrt{210}}{336}$ |
|     |                                   | 0                                 | $-\frac{15\sqrt{3}}{224}$ | 0                          | $-\frac{9\sqrt{6}}{224}$  | 0                         | $-\frac{3\sqrt{15}}{224}$  | 0                         | 0                         | $-\frac{\sqrt{30}}{336}$  | 0                         | $-\frac{\sqrt{2}}{56}$   | 0                        | $-\frac{\sqrt{10}}{112}$  | 0                        |
| 361 | symmetry                          | $-\frac{z(3x^2+3y^2-2z^2)}{2}$    |                           |                            |                           |                           |                            |                           |                           |                           |                           |                          |                          |                           |                          |
|     | $\mathbb{G}_{3,2}^{(1,1;a)}(T_1)$ | 0                                 | 0                         | $\frac{3i}{7}$             | 0                         | 0                         | 0                          | 0                         | 0                         | $-\frac{\sqrt{3}i}{28}$   | 0                         | 0                        | 0                        | 0                         | 0                        |
|     |                                   | 0                                 | 0                         | 0                          | $-\frac{3i}{7}$           | 0                         | 0                          | 0                         | 0                         | 0                         | $-\frac{\sqrt{3}i}{28}$   | 0                        | 0                        | 0                         | 0                        |
|     |                                   | 0                                 | $\frac{3\sqrt{3}i}{28}$   | 0                          | 0                         | 0                         | 0                          | 0                         | $-\frac{\sqrt{30}i}{84}$  | 0                         | 0                         | 0                        | 0                        | 0                         | 0                        |
|     |                                   | 0                                 | 0                         | $-\frac{3\sqrt{2}i}{28}$   | 0                         | 0                         | 0                          | 0                         | 0                         | $-\frac{\sqrt{6}i}{84}$   | 0                         | 0                        | 0                        | 0                         | 0                        |
|     |                                   | 0                                 | 0                         | 0                          | $-\frac{3\sqrt{2}i}{28}$  | 0                         | 0                          | 0                         | 0                         | 0                         | $\frac{\sqrt{6}i}{84}$    | 0                        | 0                        | 0                         | 0                        |
|     |                                   | 0                                 | 0                         | 0                          | 0                         | $\frac{3\sqrt{3}i}{28}$   | 0                          | 0                         | 0                         | 0                         | 0                         | $\frac{\sqrt{30}i}{84}$  | 0                        | 0                         | 0                        |
| 362 | symmetry                          | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$  |                           |                            |                           |                           |                            |                           |                           |                           |                           |                          |                          |                           |                          |
|     | $\mathbb{G}_{3,0}^{(1,1;a)}(T_2)$ | 0                                 | $\frac{\sqrt{30}i}{28}$   | 0                          | $-\frac{\sqrt{15}i}{14}$  | 0                         | $-\frac{3\sqrt{6}i}{28}$   | $-\frac{3\sqrt{7}i}{224}$ | 0                         | $-\frac{5\sqrt{3}i}{224}$ | 0                         | $\frac{3\sqrt{5}i}{224}$ | 0                        | $\frac{3i}{224}$          | 0                        |
|     |                                   | $-\frac{3\sqrt{6}i}{28}$          | 0                         | $-\frac{\sqrt{15}i}{14}$   | 0                         | $\frac{\sqrt{30}i}{28}$   | 0                          | 0                         | $-\frac{3i}{224}$         | 0                         | $-\frac{3\sqrt{5}i}{224}$ | 0                        | $\frac{5\sqrt{3}i}{224}$ | 0                         | $\frac{3\sqrt{7}i}{224}$ |
|     |                                   | $\frac{15i}{224}$                 | 0                         | $-\frac{9\sqrt{10}i}{224}$ | 0                         | $-\frac{9\sqrt{5}i}{224}$ | 0                          | 0                         | $-\frac{5\sqrt{6}i}{336}$ | 0                         | $\frac{\sqrt{30}i}{168}$  | 0                        | $\frac{\sqrt{2}i}{112}$  | 0                         | 0                        |
|     |                                   | 0                                 | $-\frac{\sqrt{15}i}{32}$  | 0                          | $\frac{\sqrt{30}i}{224}$  | 0                         | $-\frac{15\sqrt{3}i}{224}$ | $\frac{\sqrt{14}i}{112}$  | 0                         | 0                         | 0                         | $\frac{\sqrt{10}i}{112}$ | 0                        | $\frac{\sqrt{2}i}{56}$    | 0                        |
|     |                                   | $\frac{15\sqrt{3}i}{224}$         | 0                         | $-\frac{\sqrt{30}i}{224}$  | 0                         | $\frac{\sqrt{15}i}{32}$   | 0                          | 0                         | $\frac{\sqrt{2}i}{56}$    | 0                         | $\frac{\sqrt{10}i}{112}$  | 0                        | 0                        | 0                         | $\frac{\sqrt{14}i}{112}$ |
|     |                                   | 0                                 | $\frac{9\sqrt{5}i}{224}$  | 0                          | $\frac{9\sqrt{10}i}{224}$ | 0                         | $-\frac{15i}{224}$         | 0                         | 0                         | $\frac{\sqrt{2}i}{112}$   | 0                         | $\frac{\sqrt{30}i}{168}$ | 0                        | $-\frac{5\sqrt{6}i}{336}$ | 0                        |
| 363 | symmetry                          | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |                           |                            |                           |                           |                            |                           |                           |                           |                           |                          |                          |                           |                          |
|     | $\mathbb{G}_{3,1}^{(1,1;a)}(T_2)$ | 0                                 | $\frac{\sqrt{30}}{28}$    | 0                          | $\frac{\sqrt{15}}{14}$    | 0                         | $-\frac{3\sqrt{6}}{28}$    | $\frac{3\sqrt{7}}{224}$   | 0                         | $-\frac{5\sqrt{3}}{224}$  | 0                         | $-\frac{3\sqrt{5}}{224}$ | 0                        | $\frac{3}{224}$           | 0                        |
|     |                                   | $\frac{3\sqrt{6}}{28}$            | 0                         | $-\frac{\sqrt{15}}{14}$    | 0                         | $-\frac{\sqrt{30}}{28}$   | 0                          | 0                         | $\frac{3}{224}$           | 0                         | $-\frac{3\sqrt{5}}{224}$  | 0                        | $-\frac{5\sqrt{3}}{224}$ | 0                         | $\frac{3\sqrt{7}}{224}$  |
|     |                                   | $\frac{15}{224}$                  | 0                         | $\frac{9\sqrt{10}}{224}$   | 0                         | $-\frac{9\sqrt{5}}{224}$  | 0                          | 0                         | $-\frac{5\sqrt{6}}{336}$  | 0                         | $-\frac{\sqrt{30}}{168}$  | 0                        | $\frac{\sqrt{2}}{112}$   | 0                         | 0                        |
|     |                                   | 0                                 | $-\frac{\sqrt{15}}{32}$   | 0                          | $-\frac{\sqrt{30}}{224}$  | 0                         | $-\frac{15\sqrt{3}}{224}$  | $-\frac{\sqrt{14}}{112}$  | 0                         | 0                         | 0                         | $-\frac{\sqrt{10}}{112}$ | 0                        | $\frac{\sqrt{2}}{56}$     | 0                        |
|     |                                   | $-\frac{15\sqrt{3}}{224}$         | 0                         | $-\frac{\sqrt{30}}{224}$   | 0                         | $-\frac{\sqrt{15}}{32}$   | 0                          | 0                         | $-\frac{\sqrt{2}}{56}$    | 0                         | $\frac{\sqrt{10}}{112}$   | 0                        | 0                        | 0                         | $\frac{\sqrt{14}}{112}$  |
|     |                                   | 0                                 | $-\frac{9\sqrt{5}}{224}$  | 0                          | $\frac{9\sqrt{10}}{224}$  | 0                         | $\frac{15}{224}$           | 0                         | 0                         | $-\frac{\sqrt{2}}{112}$   | 0                         | $\frac{\sqrt{30}}{168}$  | 0                        | $\frac{5\sqrt{6}}{336}$   | 0                        |
| 364 | symmetry                          | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$  |                           |                            |                           |                           |                            |                           |                           |                           |                           |                          |                          |                           |                          |

continued ...

Table 7

| No. | multipole                         | matrix   |                          |                          |                          |                         |                          |                           |                        |                         |                          |                           |                         |                         |                          |
|-----|-----------------------------------|--|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|---------------------------|------------------------|-------------------------|--------------------------|---------------------------|-------------------------|-------------------------|--------------------------|
|     | $\mathbb{G}_{3,2}^{(1,1;a)}(T_2)$ | $\frac{\sqrt{6}i}{14}$   | 0                        | 0                        | 0                        | $\frac{\sqrt{30}i}{14}$ | 0                        | 0                         | $-\frac{3i}{56}$       | 0                       | 0                        | 0                         | $-\frac{\sqrt{3}i}{56}$ | 0                       | 0                        |
|     |                                   | 0  | $-\frac{\sqrt{30}i}{14}$ | 0                        | 0                        | 0                       | $-\frac{\sqrt{6}i}{14}$  | 0                         | 0                      | $-\frac{\sqrt{3}i}{56}$ | 0                        | 0                         | 0                       | $-\frac{3i}{56}$        | 0                        |
|     |                                   | 0  | 0                        | 0                        | $\frac{3\sqrt{10}i}{56}$ | 0                       | 0                        | $-\frac{\sqrt{42}i}{168}$ | 0                      | 0                       | 0                        | $-\frac{\sqrt{30}i}{168}$ | 0                       | 0                       | 0                        |
|     |                                   | $-\frac{5\sqrt{3}i}{56}$   | 0                        | 0                        | 0                        | $\frac{\sqrt{15}i}{56}$ | 0                        | 0                         | $\frac{\sqrt{2}i}{56}$ | 0                       | 0                        | 0                         | $-\frac{\sqrt{6}i}{56}$ | 0                       | 0                        |
|     |                                   | 0  | $\frac{\sqrt{15}i}{56}$  | 0                        | 0                        | 0                       | $-\frac{5\sqrt{3}i}{56}$ | 0                         | 0                      | $\frac{\sqrt{6}i}{56}$  | 0                        | 0                         | 0                       | $-\frac{\sqrt{2}i}{56}$ | 0                        |
|     |                                   | 0  | 0                        | $\frac{3\sqrt{10}i}{56}$ | 0                        | 0                       | 0                        | 0                         | 0                      | 0                       | $\frac{\sqrt{30}i}{168}$ | 0                         | 0                       | 0                       | $\frac{\sqrt{42}i}{168}$ |
| 365 | symmetry                          | $-\frac{x^2}{2}-\frac{y^2}{2}+z^2$   |                          |                          |                          |                         |                          |                           |                        |                         |                          |                           |                         |                         |                          |
|     | $\mathbb{T}_{2,0}^{(a)}(E)$       | $\begin{bmatrix} 0 & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{i}{7} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}i}{14} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{6}i}{42} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{3\sqrt{2}i}{14} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{6}i}{42} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{3\sqrt{2}i}{14} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{i}{7} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}i}{14} & 0 & 0 & 0 \end{bmatrix}$   |                          |                          |                          |                         |                          |                           |                        |                         |                          |                           |                         |                         |                          |
| 366 | symmetry                          | $\frac{\sqrt{3}(x-y)(x+y)}{2}$   |                          |                          |                          |                         |                          |                           |                        |                         |                          |                           |                         |                         |                          |
|     | $\mathbb{T}_{2,1}^{(a)}(E)$       | $\begin{bmatrix} \frac{\sqrt{10}i}{12} & 0 & 0 & 0 & \frac{\sqrt{2}i}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}i}{12} & 0 & 0 & 0 & \frac{\sqrt{10}i}{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{6}i}{42} & 0 & 0 & \frac{\sqrt{70}i}{28} & 0 & 0 & 0 & \frac{\sqrt{2}i}{28} & 0 & 0 & 0 & 0 \\ \frac{\sqrt{5}i}{21} & 0 & 0 & 0 & -\frac{2i}{21} & 0 & 0 & \frac{\sqrt{30}i}{28} & 0 & 0 & 0 & \frac{\sqrt{10}i}{28} & 0 & 0 & 0 \\ 0 & \frac{2i}{21} & 0 & 0 & 0 & -\frac{\sqrt{5}i}{21} & 0 & 0 & \frac{\sqrt{10}i}{28} & 0 & 0 & 0 & \frac{\sqrt{30}i}{28} & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}i}{42} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{28} & 0 & 0 & 0 & \frac{\sqrt{70}i}{28} & 0 \end{bmatrix}$  |                          |                          |                          |                         |                          |                           |                        |                         |                          |                           |                         |                         |                          |
| 367 | symmetry                          | $\sqrt{3}yz$   |                          |                          |                          |                         |                          |                           |                        |                         |                          |                           |                         |                         |                          |
|     | $\mathbb{T}_{2,0}^{(a)}(T_2)$     | $\begin{bmatrix} 0 & \frac{\sqrt{2}}{6} & 0 & \frac{1}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{1}{6} & 0 & \frac{\sqrt{2}}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{15}}{42} & 0 & -\frac{\sqrt{6}}{28} & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{14} & 0 & \frac{\sqrt{2}}{14} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{42} & 0 & -\frac{5\sqrt{2}}{84} & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{14} & 0 & \frac{\sqrt{6}}{14} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{5\sqrt{2}}{84} & 0 & -\frac{1}{42} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{14} & 0 & \frac{\sqrt{10}}{14} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{6}}{28} & 0 & \frac{\sqrt{15}}{42} & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{14} & 0 & \frac{\sqrt{10}}{14} & 0 & 0 \end{bmatrix}$ |                          |                          |                          |                         |                          |                           |                        |                         |                          |                           |                         |                         |                          |
| 368 | symmetry                          | $\sqrt{3}xz$   |                          |                          |                          |                         |                          |                           |                        |                         |                          |                           |                         |                         |                          |

continued ...

Table 7

| No. | multipole                     | matrix   |                        |                          |                          |                         |                         |                          |                            |                           |                           |                         |                          |                            |   |
|-----|-------------------------------|--|------------------------|--------------------------|--------------------------|-------------------------|-------------------------|--------------------------|----------------------------|---------------------------|---------------------------|-------------------------|--------------------------|----------------------------|---|
|     | $\mathbb{T}_{2,1}^{(a)}(T_2)$ | 0  | $-\frac{\sqrt{2}i}{6}$ | 0                        | $\frac{i}{6}$            | 0                       | 0                       | 0                        | 0                          | 0                         | 0                         | 0                       | 0                        | 0                          | 0 |
|     |                               | 0  | 0                      | $-\frac{i}{6}$           | 0                        | $\frac{\sqrt{2}i}{6}$   | 0                       | 0                        | 0                          | 0                         | 0                         | 0                       | 0                        | 0                          | 0 |
|     |                               | $\frac{\sqrt{15}i}{42}$  | 0                      | $-\frac{\sqrt{6}i}{28}$  | 0                        | 0                       | 0                       | 0                        | $-\frac{\sqrt{10}i}{14}$   | 0                         | $\frac{\sqrt{2}i}{14}$    | 0                       | 0                        | 0                          | 0 |
|     |                               | 0  | $-\frac{i}{42}$        | 0                        | $-\frac{5\sqrt{2}i}{84}$ | 0                       | 0                       | 0                        | 0                          | $-\frac{\sqrt{10}i}{14}$  | 0                         | $\frac{\sqrt{6}i}{14}$  | 0                        | 0                          | 0 |
|     |                               | 0  | 0                      | $-\frac{5\sqrt{2}i}{84}$ | 0                        | $-\frac{i}{42}$         | 0                       | 0                        | 0                          | 0                         | $-\frac{\sqrt{6}i}{14}$   | 0                       | $\frac{\sqrt{10}i}{14}$  | 0                          | 0 |
|     |                               | 0  | 0                      | 0                        | $-\frac{\sqrt{6}i}{28}$  | 0                       | $\frac{\sqrt{15}i}{42}$ | 0                        | 0                          | 0                         | 0                         | $-\frac{\sqrt{2}i}{14}$ | 0                        | $\frac{\sqrt{10}i}{14}$    | 0 |
| 369 | symmetry                      | $\sqrt{3}xy$   |                        |                          |                          |                         |                         |                          |                            |                           |                           |                         |                          |                            |   |
|     | $\mathbb{T}_{2,2}^{(a)}(T_2)$ | $-\frac{\sqrt{10}}{12}$  | 0                      | 0                        | 0                        | $\frac{\sqrt{2}}{12}$   | 0                       | 0                        | 0                          | 0                         | 0                         | 0                       | 0                        | 0                          | 0 |
|     |                               | 0  | $-\frac{\sqrt{2}}{12}$ | 0                        | 0                        | 0                       | $\frac{\sqrt{10}}{12}$  | 0                        | 0                          | 0                         | 0                         | 0                       | 0                        | 0                          | 0 |
|     |                               | 0  | 0                      | 0                        | $-\frac{\sqrt{6}}{42}$   | 0                       | 0                       | $-\frac{\sqrt{70}}{28}$  | 0                          | 0                         | 0                         | $\frac{\sqrt{2}}{28}$   | 0                        | 0                          | 0 |
|     |                               | $-\frac{\sqrt{5}}{21}$   | 0                      | 0                        | 0                        | $-\frac{2}{21}$         | 0                       | 0                        | $-\frac{\sqrt{30}}{28}$    | 0                         | 0                         | 0                       | $\frac{\sqrt{10}}{28}$   | 0                          | 0 |
|     |                               | 0  | $-\frac{2}{21}$        | 0                        | 0                        | 0                       | $-\frac{\sqrt{5}}{21}$  | 0                        | 0                          | $-\frac{\sqrt{10}}{28}$   | 0                         | 0                       | 0                        | $\frac{\sqrt{30}}{28}$     | 0 |
|     |                               | 0  | 0                      | $-\frac{\sqrt{6}}{42}$   | 0                        | 0                       | 0                       | 0                        | 0                          | $-\frac{\sqrt{2}}{28}$    | 0                         | 0                       | 0                        | $\frac{\sqrt{70}}{28}$     | 0 |
| 370 | symmetry                      | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$     |                        |                          |                          |                         |                         |                          |                            |                           |                           |                         |                          |                            |   |
|     | $\mathbb{T}_4^{(a)}(A_1)$     | 0  | 0                      | 0                        | 0                        | 0                       | 0                       | 0                        | 0                          | $-\frac{\sqrt{7}i}{12}$   | 0                         | 0                       | 0                        | $-\frac{\sqrt{5}i}{12}$    | 0 |
|     |                               | 0  | 0                      | 0                        | 0                        | 0                       | $\frac{\sqrt{5}i}{12}$  | 0                        | 0                          | 0                         | $\frac{\sqrt{7}i}{12}$    | 0                       | 0                        | 0                          | 0 |
|     |                               | 0  | $\frac{\sqrt{7}i}{28}$ | 0                        | 0                        | 0                       | $\frac{\sqrt{35}i}{28}$ | 0                        | 0                          | $-\frac{\sqrt{70}i}{56}$  | 0                         | 0                       | 0                        | $-\frac{\sqrt{210}i}{168}$ | 0 |
|     |                               | 0  | 0                      | $-\frac{\sqrt{42}i}{28}$ | 0                        | 0                       | 0                       | 0                        | 0                          | $\frac{5\sqrt{14}i}{168}$ | 0                         | 0                       | 0                        | $-\frac{\sqrt{10}i}{24}$   | 0 |
|     |                               | 0  | 0                      | 0                        | $\frac{\sqrt{42}i}{28}$  | 0                       | 0                       | $-\frac{\sqrt{10}i}{24}$ | 0                          | 0                         | $\frac{5\sqrt{14}i}{168}$ | 0                       | 0                        | 0                          | 0 |
|     |                               | $-\frac{\sqrt{35}i}{28}$                                       | 0                      | 0                        | 0                        | $-\frac{\sqrt{7}i}{28}$ | 0                       | 0                        | $-\frac{\sqrt{210}i}{168}$ | 0                         | 0                         | 0                       | $-\frac{\sqrt{70}i}{56}$ | 0                          | 0 |
| 371 | symmetry                      | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ |                        |                          |                          |                         |                         |                          |                            |                           |                           |                         |                          |                            |   |
|     | $\mathbb{T}_{4,0}^{(a)}(E)$   | 0  | 0                      | 0                        | 0                        | 0                       | 0                       | 0                        | 0                          | $-\frac{\sqrt{5}i}{12}$   | 0                         | 0                       | 0                        | $\frac{\sqrt{7}i}{12}$     | 0 |
|     |                               | 0  | 0                      | 0                        | 0                        | 0                       | $-\frac{\sqrt{7}i}{12}$ | 0                        | 0                          | 0                         | $\frac{\sqrt{5}i}{12}$    | 0                       | 0                        | 0                          | 0 |
|     |                               | 0  | $\frac{\sqrt{5}i}{28}$ | 0                        | 0                        | 0                       | $-\frac{i}{4}$          | 0                        | 0                          | $-\frac{5\sqrt{2}i}{56}$  | 0                         | 0                       | 0                        | $\frac{\sqrt{6}i}{24}$     | 0 |
|     |                               | 0  | 0                      | $-\frac{\sqrt{30}i}{28}$ | 0                        | 0                       | 0                       | 0                        | 0                          | $\frac{5\sqrt{10}i}{168}$ | 0                         | 0                       | 0                        | $\frac{\sqrt{14}i}{24}$    | 0 |
|     |                               | 0  | 0                      | 0                        | $\frac{\sqrt{30}i}{28}$  | 0                       | 0                       | $\frac{\sqrt{14}i}{24}$  | 0                          | 0                         | $\frac{5\sqrt{10}i}{168}$ | 0                       | 0                        | 0                          | 0 |
|     |                               | $\frac{i}{4}$  | 0                      | 0                        | 0                        | $-\frac{\sqrt{5}i}{28}$ | 0                       | 0                        | $\frac{\sqrt{6}i}{24}$     | 0                         | 0                         | 0                       | $-\frac{5\sqrt{2}i}{56}$ | 0                          | 0 |
| 372 | symmetry                      | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$                   |                        |                          |                          |                         |                         |                          |                            |                           |                           |                         |                          |                            |   |

continued ...

Table 7

| No. | multipole                     | matrix                               |                            |                            |                            |                            |                           |                         |                            |                           |                            |                           |                          |                            |                         |  |
|-----|-------------------------------|--------------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|-------------------------|----------------------------|---------------------------|----------------------------|---------------------------|--------------------------|----------------------------|-------------------------|--|
|     | $\mathbb{T}_{4,1}^{(a)}(E)$   | 0                                    | 0                          | 0                          | 0                          | 0                          | 0                         | 0                       | $\frac{\sqrt{3}i}{12}$     | 0                         | 0                          | 0                         | $\frac{i}{4}$            | 0                          | 0                       |  |
|     |                               | 0                                    | 0                          | 0                          | 0                          | 0                          | 0                         | 0                       | 0                          | $-\frac{i}{4}$            | 0                          | 0                         | 0                        | $-\frac{\sqrt{3}i}{12}$    | 0                       |  |
|     |                               | 0                                    | 0                          | 0                          | $-\frac{\sqrt{30}i}{28}$   | 0                          | 0                         | $\frac{\sqrt{14}i}{56}$ | 0                          | 0                         | 0                          | $\frac{3\sqrt{10}i}{56}$  | 0                        | 0                          | 0                       |  |
|     |                               | $\frac{3i}{28}$                      | 0                          | 0                          | 0                          | $\frac{3\sqrt{5}i}{28}$    | 0                         | 0                       | $-\frac{11\sqrt{6}i}{168}$ | 0                         | 0                          | 0                         | $\frac{\sqrt{2}i}{56}$   | 0                          | 0                       |  |
|     |                               | 0                                    | $-\frac{3\sqrt{5}i}{28}$   | 0                          | 0                          | 0                          | $-\frac{3i}{28}$          | 0                       | 0                          | $\frac{\sqrt{2}i}{56}$    | 0                          | 0                         | 0                        | $-\frac{11\sqrt{6}i}{168}$ | 0                       |  |
|     |                               | 0                                    | 0                          | $\frac{\sqrt{30}i}{28}$    | 0                          | 0                          | 0                         | 0                       | 0                          | 0                         | $\frac{3\sqrt{10}i}{56}$   | 0                         | 0                        | 0                          | $\frac{\sqrt{14}i}{56}$ |  |
| 373 | symmetry                      | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$    |                            |                            |                            |                            |                           |                         |                            |                           |                            |                           |                          |                            |                         |  |
|     | $\mathbb{T}_{4,0}^{(a)}(T_1)$ | 0                                    | 0                          | 0                          | 0                          | 0                          | 0                         | $\frac{\sqrt{3}}{48}$   | 0                          | $\frac{\sqrt{7}}{16}$     | 0                          | $\frac{\sqrt{105}}{48}$   | 0                        | $\frac{\sqrt{21}}{48}$     | 0                       |  |
|     |                               | 0                                    | 0                          | 0                          | 0                          | 0                          | 0                         | 0                       | $-\frac{\sqrt{21}}{48}$    | 0                         | $-\frac{\sqrt{105}}{48}$   | 0                         | $-\frac{\sqrt{7}}{16}$   | 0                          | $-\frac{\sqrt{3}}{48}$  |  |
|     |                               | $-\frac{\sqrt{21}}{112}$             | 0                          | $-\frac{\sqrt{210}}{112}$  | 0                          | $-\frac{\sqrt{105}}{112}$  | 0                         | 0                       | $\frac{3\sqrt{14}}{112}$   | 0                         | $\frac{\sqrt{70}}{56}$     | 0                         | $\frac{\sqrt{42}}{112}$  | 0                          | 0                       |  |
|     |                               | 0                                    | $\frac{3\sqrt{35}}{112}$   | 0                          | $\frac{3\sqrt{70}}{112}$   | 0                          | $\frac{3\sqrt{7}}{112}$   | $-\frac{\sqrt{6}}{48}$  | 0                          | $-\frac{\sqrt{14}}{28}$   | 0                          | $-\frac{\sqrt{210}}{336}$ | 0                        | $\frac{\sqrt{42}}{168}$    | 0                       |  |
|     |                               | $-\frac{3\sqrt{7}}{112}$             | 0                          | $-\frac{3\sqrt{70}}{112}$  | 0                          | $-\frac{3\sqrt{35}}{112}$  | 0                         | 0                       | $\frac{\sqrt{42}}{168}$    | 0                         | $-\frac{\sqrt{210}}{336}$  | 0                         | $-\frac{\sqrt{14}}{28}$  | 0                          | $-\frac{\sqrt{6}}{48}$  |  |
|     |                               | 0                                    | $\frac{\sqrt{105}}{112}$   | 0                          | $\frac{\sqrt{210}}{112}$   | 0                          | $\frac{\sqrt{21}}{112}$   | 0                       | 0                          | $\frac{\sqrt{42}}{112}$   | 0                          | $\frac{\sqrt{70}}{56}$    | 0                        | $\frac{3\sqrt{14}}{112}$   | 0                       |  |
| 374 | symmetry                      | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$   |                            |                            |                            |                            |                           |                         |                            |                           |                            |                           |                          |                            |                         |  |
|     | $\mathbb{T}_{4,1}^{(a)}(T_1)$ | 0                                    | 0                          | 0                          | 0                          | 0                          | 0                         | $-\frac{\sqrt{3}i}{48}$ | 0                          | $\frac{\sqrt{7}i}{16}$    | 0                          | $-\frac{\sqrt{105}i}{48}$ | 0                        | $\frac{\sqrt{21}i}{48}$    | 0                       |  |
|     |                               | 0                                    | 0                          | 0                          | 0                          | 0                          | 0                         | 0                       | $\frac{\sqrt{21}i}{48}$    | 0                         | $-\frac{\sqrt{105}i}{48}$  | 0                         | $\frac{\sqrt{7}i}{16}$   | 0                          | $-\frac{\sqrt{3}i}{48}$ |  |
|     |                               | $-\frac{\sqrt{21}i}{112}$            | 0                          | $\frac{\sqrt{210}i}{112}$  | 0                          | $-\frac{\sqrt{105}i}{112}$ | 0                         | 0                       | $\frac{3\sqrt{14}i}{112}$  | 0                         | $-\frac{\sqrt{70}i}{56}$   | 0                         | $\frac{\sqrt{42}i}{112}$ | 0                          | 0                       |  |
|     |                               | 0                                    | $\frac{3\sqrt{35}i}{112}$  | 0                          | $-\frac{3\sqrt{70}i}{112}$ | 0                          | $\frac{3\sqrt{7}i}{112}$  | $\frac{\sqrt{6}i}{48}$  | 0                          | $-\frac{\sqrt{14}i}{28}$  | 0                          | $\frac{\sqrt{210}i}{336}$ | 0                        | $\frac{\sqrt{42}i}{168}$   | 0                       |  |
|     |                               | $\frac{3\sqrt{7}i}{112}$             | 0                          | $-\frac{3\sqrt{70}i}{112}$ | 0                          | $\frac{3\sqrt{35}i}{112}$  | 0                         | 0                       | $-\frac{\sqrt{42}i}{168}$  | 0                         | $-\frac{\sqrt{210}i}{336}$ | 0                         | $\frac{\sqrt{14}i}{28}$  | 0                          | $-\frac{\sqrt{6}i}{48}$ |  |
|     |                               | 0                                    | $-\frac{\sqrt{105}i}{112}$ | 0                          | $\frac{\sqrt{210}i}{112}$  | 0                          | $-\frac{\sqrt{21}i}{112}$ | 0                       | 0                          | $-\frac{\sqrt{42}i}{112}$ | 0                          | $\frac{\sqrt{70}i}{56}$   | 0                        | $-\frac{3\sqrt{14}i}{112}$ | 0                       |  |
| 375 | symmetry                      | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$    |                            |                            |                            |                            |                           |                         |                            |                           |                            |                           |                          |                            |                         |  |
|     | $\mathbb{T}_{4,2}^{(a)}(T_1)$ | 0                                    | 0                          | 0                          | 0                          | 0                          | 0                         | 0                       | 0                          | 0                         | 0                          | 0                         | 0                        | $-\frac{\sqrt{3}}{6}$      |                         |  |
|     |                               | 0                                    | 0                          | 0                          | 0                          | 0                          | 0                         | $-\frac{\sqrt{3}}{6}$   | 0                          | 0                         | 0                          | 0                         | 0                        | 0                          |                         |  |
|     |                               | 0                                    | 0                          | 0                          | 0                          | 0                          | $\frac{\sqrt{21}}{14}$    | 0                       | 0                          | 0                         | 0                          | 0                         | $-\frac{\sqrt{14}}{28}$  | 0                          |                         |  |
|     |                               | 0                                    | 0                          | 0                          | 0                          | 0                          | 0                         | 0                       | 0                          | 0                         | 0                          | 0                         | 0                        | $-\frac{\sqrt{6}}{12}$     |                         |  |
|     |                               | 0                                    | 0                          | 0                          | 0                          | 0                          | 0                         | $\frac{\sqrt{6}}{12}$   | 0                          | 0                         | 0                          | 0                         | 0                        | 0                          |                         |  |
|     |                               | $\frac{\sqrt{21}}{14}$               | 0                          | 0                          | 0                          | 0                          | 0                         | 0                       | $\frac{\sqrt{14}}{28}$     | 0                         | 0                          | 0                         | 0                        | 0                          |                         |  |
| 376 | symmetry                      | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$ |                            |                            |                            |                            |                           |                         |                            |                           |                            |                           |                          |                            |                         |  |

continued ...

Table 7

| No. | multipole                      | matrix   |                           |                           |                           |                           |                           |                          |                           |                          |                            |                            |                          |                          |                          |  |
|-----|--------------------------------|--|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|--------------------------|---------------------------|--------------------------|----------------------------|----------------------------|--------------------------|--------------------------|--------------------------|--|
|     | $\mathbb{T}_{4,0}^{(a)}(T_2)$  | 0  | 0                         | 0                         | 0                         | 0                         | 0                         | $-\frac{\sqrt{21}}{48}$  | 0                         | $\frac{1}{16}$           | 0                          | $\frac{\sqrt{15}}{48}$     | 0                        | $-\frac{7\sqrt{3}}{48}$  | 0                        |  |
|     |                                | 0  | 0                         | 0                         | 0                         | 0                         | 0                         | 0                        | $\frac{7\sqrt{3}}{48}$    | 0                        | $-\frac{\sqrt{15}}{48}$    | 0                          | $-\frac{1}{16}$          | 0                        | $\frac{\sqrt{21}}{48}$   |  |
|     |                                | $-\frac{\sqrt{3}}{112}$  | 0                         | $-\frac{\sqrt{30}}{112}$  | 0                         | $\frac{\sqrt{15}}{16}$    | 0                         | 0                        | $\frac{3\sqrt{2}}{112}$   | 0                        | $\frac{\sqrt{10}}{56}$     | 0                          | $-\frac{\sqrt{6}}{16}$   | 0                        | 0                        |  |
|     |                                | 0  | $\frac{3\sqrt{5}}{112}$   | 0                         | $\frac{3\sqrt{10}}{112}$  | 0                         | $-\frac{3}{16}$           | $\frac{\sqrt{42}}{48}$   | 0                         | $-\frac{\sqrt{2}}{28}$   | 0                          | $-\frac{\sqrt{30}}{336}$   | 0                        | $-\frac{\sqrt{6}}{24}$   | 0                        |  |
|     |                                | $\frac{3}{16}$   | 0                         | $-\frac{3\sqrt{10}}{112}$ | 0                         | $-\frac{3\sqrt{5}}{112}$  | 0                         | 0                        | $-\frac{\sqrt{6}}{24}$    | 0                        | $-\frac{\sqrt{30}}{336}$   | 0                          | $-\frac{\sqrt{2}}{28}$   | 0                        | $\frac{\sqrt{42}}{48}$   |  |
|     |                                | 0  | $-\frac{\sqrt{15}}{16}$   | 0                         | $\frac{\sqrt{30}}{112}$   | 0                         | $\frac{\sqrt{3}}{112}$    | 0                        | 0                         | $-\frac{\sqrt{6}}{16}$   | 0                          | $\frac{\sqrt{10}}{56}$     | 0                        | $\frac{3\sqrt{2}}{112}$  | 0                        |  |
| 377 | symmetry                       | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$                          |                           |                           |                           |                           |                           |                          |                           |                          |                            |                            |                          |                          |                          |  |
|     | $\mathbb{T}_{4,1}^{(a)}(T_2)$  | 0  | 0                         | 0                         | 0                         | 0                         | 0                         | $-\frac{\sqrt{21}i}{48}$ | 0                         | $-\frac{i}{16}$          | 0                          | $\frac{\sqrt{15}i}{48}$    | 0                        | $\frac{7\sqrt{3}i}{48}$  | 0                        |  |
|     |                                | 0  | 0                         | 0                         | 0                         | 0                         | 0                         | 0                        | $\frac{7\sqrt{3}i}{48}$   | 0                        | $\frac{\sqrt{15}i}{48}$    | 0                          | $-\frac{i}{16}$          | 0                        | $-\frac{\sqrt{21}i}{48}$ |  |
|     |                                | $\frac{\sqrt{3}i}{112}$  | 0                         | $-\frac{\sqrt{30}i}{112}$ | 0                         | $-\frac{\sqrt{15}i}{16}$  | 0                         | 0                        | $-\frac{3\sqrt{2}i}{112}$ | 0                        | $\frac{\sqrt{10}i}{56}$    | 0                          | $\frac{\sqrt{6}i}{16}$   | 0                        | 0                        |  |
|     |                                | 0  | $-\frac{3\sqrt{5}i}{112}$ | 0                         | $\frac{3\sqrt{10}i}{112}$ | 0                         | $\frac{3i}{16}$           | $\frac{\sqrt{42}i}{48}$  | 0                         | $\frac{\sqrt{2}i}{28}$   | 0                          | $-\frac{\sqrt{30}i}{336}$  | 0                        | $\frac{\sqrt{6}i}{24}$   | 0                        |  |
|     |                                | $\frac{3i}{16}$  | 0                         | $\frac{3\sqrt{10}i}{112}$ | 0                         | $-\frac{3\sqrt{5}i}{112}$ | 0                         | 0                        | $-\frac{\sqrt{6}i}{24}$   | 0                        | $\frac{\sqrt{30}i}{336}$   | 0                          | $-\frac{\sqrt{2}i}{28}$  | 0                        | $-\frac{\sqrt{42}i}{48}$ |  |
|     |                                | 0  | $-\frac{\sqrt{15}i}{16}$  | 0                         | $-\frac{\sqrt{30}i}{112}$ | 0                         | $\frac{\sqrt{3}i}{112}$   | 0                        | 0                         | $-\frac{\sqrt{6}i}{16}$  | 0                          | $-\frac{\sqrt{10}i}{56}$   | 0                        | $\frac{3\sqrt{2}i}{112}$ | 0                        |  |
| 378 | symmetry                       | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$                          |                           |                           |                           |                           |                           |                          |                           |                          |                            |                            |                          |                          |                          |  |
|     | $\mathbb{T}_{4,2}^{(a)}(T_2)$  | 0  | 0                         | 0                         | 0                         | 0                         | 0                         | 0                        | $\frac{\sqrt{3}}{12}$     | 0                        | 0                          | 0                          | $-\frac{1}{4}$           | 0                        | 0                        |  |
|     |                                | 0  | 0                         | 0                         | 0                         | 0                         | 0                         | 0                        | 0                         | $-\frac{1}{4}$           | 0                          | 0                          | 0                        | $\frac{\sqrt{3}}{12}$    | 0                        |  |
|     |                                | 0  | 0                         | 0                         | $\frac{\sqrt{30}}{28}$    | 0                         | 0                         | $\frac{\sqrt{14}}{56}$   | 0                         | 0                        | 0                          | $-\frac{3\sqrt{10}}{56}$   | 0                        | 0                        | 0                        |  |
|     |                                | $\frac{3}{28}$   | 0                         | 0                         | 0                         | $-\frac{3\sqrt{5}}{28}$   | 0                         | 0                        | $-\frac{11\sqrt{6}}{168}$ | 0                        | 0                          | 0                          | $-\frac{\sqrt{2}}{56}$   | 0                        | 0                        |  |
|     |                                | 0  | $-\frac{3\sqrt{5}}{28}$   | 0                         | 0                         | 0                         | $\frac{3}{28}$            | 0                        | 0                         | $\frac{\sqrt{2}}{56}$    | 0                          | 0                          | 0                        | $\frac{11\sqrt{6}}{168}$ | 0                        |  |
|     |                                | 0  | 0                         | $\frac{\sqrt{30}}{28}$    | 0                         | 0                         | 0                         | 0                        | 0                         | 0                        | $\frac{3\sqrt{10}}{56}$    | 0                          | 0                        | 0                        | $-\frac{\sqrt{14}}{56}$  |  |
| 379 | symmetry                       | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$     |                           |                           |                           |                           |                           |                          |                           |                          |                            |                            |                          |                          |                          |  |
|     | $\mathbb{T}_4^{(1,-1;a)}(A_1)$ | 0  | 0                         | 0                         | 0                         | 0                         | 0                         | 0                        | 0                         | 0                        | $-\frac{\sqrt{21}i}{24}$   | 0                          | 0                        | 0                        | $-\frac{\sqrt{15}i}{24}$ |  |
|     |                                | 0  | 0                         | 0                         | 0                         | 0                         | 0                         | $\frac{\sqrt{15}i}{24}$  | 0                         | 0                        | 0                          | $\frac{\sqrt{21}i}{24}$    | 0                        | 0                        | 0                        |  |
|     |                                | 0  | $\frac{\sqrt{21}i}{168}$  | 0                         | 0                         | 0                         | $\frac{\sqrt{105}i}{168}$ | 0                        | 0                         | $\frac{\sqrt{210}i}{56}$ | 0                          | 0                          | 0                        | $\frac{\sqrt{70}i}{56}$  | 0                        |  |
|     |                                | 0  | 0                         | $-\frac{\sqrt{14}i}{56}$  | 0                         | 0                         | 0                         | 0                        | 0                         | 0                        | $-\frac{5\sqrt{42}i}{168}$ | 0                          | 0                        | 0                        | $\frac{\sqrt{30}i}{24}$  |  |
|     |                                | 0  | 0                         | 0                         | $\frac{\sqrt{14}i}{56}$   | 0                         | 0                         | $\frac{\sqrt{30}i}{24}$  | 0                         | 0                        | 0                          | $-\frac{5\sqrt{42}i}{168}$ | 0                        | 0                        | 0                        |  |
|     |                                | $-\frac{\sqrt{105}i}{168}$                                     | 0                         | 0                         | 0                         | $-\frac{\sqrt{21}i}{168}$ | 0                         | 0                        | $\frac{\sqrt{70}i}{56}$   | 0                        | 0                          | 0                          | $\frac{\sqrt{210}i}{56}$ | 0                        | 0                        |  |
| 380 | symmetry                       | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ |                           |                           |                           |                           |                           |                          |                           |                          |                            |                            |                          |                          |                          |  |

continued ...

Table 7

| No. | multipole                          | matrix                                       |                           |                            |                            |                           |                          |                          |                            |                           |                            |                            |                            |                           |                          |
|-----|------------------------------------|--|---------------------------|----------------------------|----------------------------|---------------------------|--------------------------|--------------------------|----------------------------|---------------------------|----------------------------|----------------------------|----------------------------|---------------------------|--------------------------|
|     | $\mathbb{T}_{4,0}^{(1,-1;a)}(E)$   | 0  | 0                         | 0                          | 0                          | 0                         | 0                        | 0                        | 0                          | 0                         | $-\frac{\sqrt{15}i}{24}$   | 0                          | 0                          | 0                         | $\frac{\sqrt{21}i}{24}$  |
|     |                                    | 0  | 0                         | 0                          | 0                          | 0                         | 0                        | $-\frac{\sqrt{21}i}{24}$ | 0                          | 0                         | 0                          | $\frac{\sqrt{15}i}{24}$    | 0                          | 0                         | 0                        |
|     |                                    | 0  | $\frac{\sqrt{15}i}{168}$  | 0                          | 0                          | 0                         | $-\frac{\sqrt{3}i}{24}$  | 0                        | 0                          | $\frac{5\sqrt{6}i}{56}$   | 0                          | 0                          | 0                          | $-\frac{\sqrt{2}i}{8}$    | 0                        |
|     |                                    | 0  | 0                         | $-\frac{\sqrt{10}i}{56}$   | 0                          | 0                         | 0                        | 0                        | 0                          | 0                         | $-\frac{5\sqrt{30}i}{168}$ | 0                          | 0                          | 0                         | $-\frac{\sqrt{42}i}{24}$ |
|     |                                    | 0  | 0                         | 0                          | $\frac{\sqrt{10}i}{56}$    | 0                         | 0                        | $-\frac{\sqrt{42}i}{24}$ | 0                          | 0                         | 0                          | $-\frac{5\sqrt{30}i}{168}$ | 0                          | 0                         | 0                        |
|     |                                    | $\frac{\sqrt{3}i}{24}$                       | 0                         | 0                          | 0                          | $-\frac{\sqrt{15}i}{168}$ | 0                        | 0                        | $-\frac{\sqrt{2}i}{8}$     | 0                         | 0                          | 0                          | $\frac{5\sqrt{6}i}{56}$    | 0                         | 0                        |
| 381 | symmetry                           | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6x^2)}{4}$ |                           |                            |                            |                           |                          |                          |                            |                           |                            |                            |                            |                           |                          |
|     | $\mathbb{T}_{4,1}^{(1,-1;a)}(E)$   | 0  | 0                         | 0                          | 0                          | 0                         | 0                        | $\frac{i}{8}$            | 0                          | 0                         | 0                          | $\frac{\sqrt{3}i}{8}$      | 0                          | 0                         |                          |
|     |                                    | 0  | 0                         | 0                          | 0                          | 0                         | 0                        | 0                        | $-\frac{\sqrt{3}i}{8}$     | 0                         | 0                          | 0                          | 0                          | $-\frac{i}{8}$            | 0                        |
|     |                                    | 0  | 0                         | 0                          | $-\frac{\sqrt{10}i}{56}$   | 0                         | 0                        | $-\frac{\sqrt{42}i}{56}$ | 0                          | 0                         | 0                          | $-\frac{3\sqrt{30}i}{56}$  | 0                          | 0                         | 0                        |
|     |                                    | $\frac{\sqrt{3}i}{56}$                       | 0                         | 0                          | 0                          | $\frac{\sqrt{15}i}{56}$   | 0                        | 0                        | $\frac{11\sqrt{2}i}{56}$   | 0                         | 0                          | 0                          | $-\frac{\sqrt{6}i}{56}$    | 0                         | 0                        |
|     |                                    | 0  | $-\frac{\sqrt{15}i}{56}$  | 0                          | 0                          | 0                         | $-\frac{\sqrt{3}i}{56}$  | 0                        | 0                          | $-\frac{\sqrt{6}i}{56}$   | 0                          | 0                          | 0                          | $\frac{11\sqrt{2}i}{56}$  | 0                        |
|     |                                    | 0  | 0                         | $\frac{\sqrt{10}i}{56}$    | 0                          | 0                         | 0                        | 0                        | 0                          | $-\frac{3\sqrt{30}i}{56}$ | 0                          | 0                          | 0                          | 0                         | $-\frac{\sqrt{42}i}{56}$ |
| 382 | symmetry                           | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$            |                           |                            |                            |                           |                          |                          |                            |                           |                            |                            |                            |                           |                          |
|     | $\mathbb{T}_{4,0}^{(1,-1;a)}(T_1)$ | 0  | 0                         | 0                          | 0                          | 0                         | 0                        | $\frac{1}{32}$           | 0                          | $\frac{\sqrt{21}}{32}$    | 0                          | $\frac{\sqrt{35}}{32}$     | 0                          | $\frac{\sqrt{7}}{32}$     | 0                        |
|     |                                    | 0  | 0                         | 0                          | 0                          | 0                         | 0                        | 0                        | $-\frac{\sqrt{7}}{32}$     | 0                         | $-\frac{\sqrt{35}}{32}$    | 0                          | $-\frac{\sqrt{21}}{32}$    | 0                         | $-\frac{1}{32}$          |
|     |                                    | $-\frac{\sqrt{7}}{224}$                      | 0                         | $-\frac{\sqrt{70}}{224}$   | 0                          | $-\frac{\sqrt{35}}{224}$  | 0                        | 0                        | $-\frac{3\sqrt{42}}{112}$  | 0                         | $-\frac{\sqrt{210}}{56}$   | 0                          | $-\frac{3\sqrt{14}}{112}$  | 0                         | 0                        |
|     |                                    | 0  | $\frac{\sqrt{105}}{224}$  | 0                          | $\frac{\sqrt{210}}{224}$   | 0                         | $\frac{\sqrt{21}}{224}$  | $\frac{\sqrt{2}}{16}$    | 0                          | $\frac{\sqrt{42}}{28}$    | 0                          | $\frac{\sqrt{70}}{112}$    | 0                          | $-\frac{\sqrt{14}}{56}$   | 0                        |
|     |                                    | $-\frac{\sqrt{21}}{224}$                     | 0                         | $-\frac{\sqrt{210}}{224}$  | 0                          | $-\frac{\sqrt{105}}{224}$ | 0                        | 0                        | $-\frac{\sqrt{14}}{56}$    | 0                         | $\frac{\sqrt{70}}{112}$    | 0                          | $\frac{\sqrt{42}}{28}$     | 0                         | $\frac{\sqrt{2}}{16}$    |
|     |                                    | 0  | $\frac{\sqrt{35}}{224}$   | 0                          | $\frac{\sqrt{70}}{224}$    | 0                         | $\frac{\sqrt{7}}{224}$   | 0                        | 0                          | $-\frac{3\sqrt{14}}{112}$ | 0                          | $-\frac{\sqrt{210}}{56}$   | 0                          | $-\frac{3\sqrt{42}}{112}$ | 0                        |
| 383 | symmetry                           | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$           |                           |                            |                            |                           |                          |                          |                            |                           |                            |                            |                            |                           |                          |
|     | $\mathbb{T}_{4,1}^{(1,-1;a)}(T_1)$ | 0  | 0                         | 0                          | 0                          | 0                         | 0                        | $-\frac{i}{32}$          | 0                          | $\frac{\sqrt{21}i}{32}$   | 0                          | $-\frac{\sqrt{35}i}{32}$   | 0                          | $\frac{\sqrt{7}i}{32}$    | 0                        |
|     |                                    | 0  | 0                         | 0                          | 0                          | 0                         | 0                        | 0                        | $\frac{\sqrt{7}i}{32}$     | 0                         | $-\frac{\sqrt{35}i}{32}$   | 0                          | $\frac{\sqrt{21}i}{32}$    | 0                         | $-\frac{i}{32}$          |
|     |                                    | $-\frac{\sqrt{7}i}{224}$                     | 0                         | $\frac{\sqrt{70}i}{224}$   | 0                          | $-\frac{\sqrt{35}i}{224}$ | 0                        | 0                        | $-\frac{3\sqrt{42}i}{112}$ | 0                         | $\frac{\sqrt{210}i}{56}$   | 0                          | $-\frac{3\sqrt{14}i}{112}$ | 0                         | 0                        |
|     |                                    | 0  | $\frac{\sqrt{105}i}{224}$ | 0                          | $-\frac{\sqrt{210}i}{224}$ | 0                         | $\frac{\sqrt{21}i}{224}$ | $-\frac{\sqrt{2}i}{16}$  | 0                          | $\frac{\sqrt{42}i}{28}$   | 0                          | $-\frac{\sqrt{70}i}{112}$  | 0                          | $-\frac{\sqrt{14}i}{56}$  | 0                        |
|     |                                    | $\frac{\sqrt{21}i}{224}$                     | 0                         | $-\frac{\sqrt{210}i}{224}$ | 0                          | $\frac{\sqrt{105}i}{224}$ | 0                        | 0                        | $\frac{\sqrt{14}i}{56}$    | 0                         | $\frac{\sqrt{70}i}{112}$   | 0                          | $-\frac{\sqrt{42}i}{28}$   | 0                         | $\frac{\sqrt{2}i}{16}$   |
|     |                                    | 0  | $-\frac{\sqrt{35}i}{224}$ | 0                          | $\frac{\sqrt{70}i}{224}$   | 0                         | $-\frac{\sqrt{7}i}{224}$ | 0                        | 0                          | $\frac{3\sqrt{14}i}{112}$ | 0                          | $-\frac{\sqrt{210}i}{56}$  | 0                          | $\frac{3\sqrt{42}i}{112}$ | 0                        |
| 384 | symmetry                           | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$            |                           |                            |                            |                           |                          |                          |                            |                           |                            |                            |                            |                           |                          |

continued ...



Table 7

| No. | multipole | matrix  |
|-----|-----------|---|
|     |           | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{1}{4} \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{1}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{28} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{42}}{28} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{7}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{42}}{28} & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$  |
| 385 | symmetry  | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{32} & 0 & \frac{\sqrt{3}}{32} & 0 & \frac{\sqrt{5}}{32} & 0 & -\frac{7}{32} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{7}{32} & 0 & -\frac{\sqrt{5}}{32} & 0 & -\frac{\sqrt{3}}{32} & 0 & \frac{\sqrt{7}}{32} \\ -\frac{1}{224} & 0 & -\frac{\sqrt{10}}{224} & 0 & \frac{\sqrt{5}}{32} & 0 & 0 & -\frac{3\sqrt{6}}{112} & 0 & -\frac{\sqrt{30}}{56} & 0 & \frac{3\sqrt{2}}{16} & 0 & 0 \\ 0 & \frac{\sqrt{15}}{224} & 0 & \frac{\sqrt{30}}{224} & 0 & -\frac{\sqrt{3}}{32} & -\frac{\sqrt{14}}{16} & 0 & \frac{\sqrt{6}}{28} & 0 & \frac{\sqrt{10}}{112} & 0 & \frac{\sqrt{2}}{8} & 0 \\ \frac{\sqrt{3}}{32} & 0 & -\frac{\sqrt{30}}{224} & 0 & -\frac{\sqrt{15}}{224} & 0 & 0 & \frac{\sqrt{2}}{8} & 0 & \frac{\sqrt{10}}{112} & 0 & \frac{\sqrt{6}}{28} & 0 & -\frac{\sqrt{14}}{16} \\ 0 & -\frac{\sqrt{5}}{32} & 0 & \frac{\sqrt{10}}{224} & 0 & \frac{1}{224} & 0 & 0 & \frac{3\sqrt{2}}{16} & 0 & -\frac{\sqrt{30}}{56} & 0 & -\frac{3\sqrt{6}}{112} & 0 \end{bmatrix}$                                   |
| 386 | symmetry  | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}i}{32} & 0 & -\frac{\sqrt{3}i}{32} & 0 & \frac{\sqrt{5}i}{32} & 0 & \frac{7i}{32} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{7i}{32} & 0 & \frac{\sqrt{5}i}{32} & 0 & -\frac{\sqrt{3}i}{32} & 0 & -\frac{\sqrt{7}i}{32} \\ \frac{i}{224} & 0 & -\frac{\sqrt{10}i}{224} & 0 & -\frac{\sqrt{5}i}{32} & 0 & 0 & \frac{3\sqrt{6}i}{112} & 0 & -\frac{\sqrt{30}i}{56} & 0 & -\frac{3\sqrt{2}i}{16} & 0 & 0 \\ 0 & -\frac{\sqrt{15}i}{224} & 0 & \frac{\sqrt{30}i}{224} & 0 & \frac{\sqrt{3}i}{32} & -\frac{\sqrt{14}i}{16} & 0 & -\frac{\sqrt{6}i}{28} & 0 & \frac{\sqrt{10}i}{112} & 0 & -\frac{\sqrt{2}i}{8} & 0 \\ \frac{\sqrt{3}i}{32} & 0 & \frac{\sqrt{30}i}{224} & 0 & -\frac{\sqrt{15}i}{224} & 0 & 0 & \frac{\sqrt{2}i}{8} & 0 & -\frac{\sqrt{10}i}{112} & 0 & \frac{\sqrt{6}i}{28} & 0 & \frac{\sqrt{14}i}{16} \\ 0 & -\frac{\sqrt{5}i}{32} & 0 & -\frac{\sqrt{10}i}{224} & 0 & \frac{i}{224} & 0 & 0 & \frac{3\sqrt{2}i}{16} & 0 & \frac{\sqrt{30}i}{56} & 0 & -\frac{3\sqrt{6}i}{112} & 0 \end{bmatrix}$ |
| 387 | symmetry  | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{8} & 0 & 0 & 0 & -\frac{\sqrt{3}}{8} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{8} & 0 & 0 & 0 & \frac{1}{8} & 0 \\ 0 & 0 & 0 & \frac{\sqrt{10}}{56} & 0 & 0 & -\frac{\sqrt{42}}{56} & 0 & 0 & 0 & \frac{3\sqrt{30}}{56} & 0 & 0 & 0 \\ \frac{\sqrt{3}}{56} & 0 & 0 & 0 & -\frac{\sqrt{15}}{56} & 0 & 0 & \frac{11\sqrt{2}}{56} & 0 & 0 & 0 & \frac{\sqrt{6}}{56} & 0 & 0 \\ 0 & -\frac{\sqrt{15}}{56} & 0 & 0 & 0 & \frac{\sqrt{3}}{56} & 0 & 0 & -\frac{\sqrt{6}}{56} & 0 & 0 & 0 & -\frac{11\sqrt{2}}{56} & 0 \\ 0 & 0 & \frac{\sqrt{10}}{56} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{30}}{56} & 0 & 0 & 0 & \frac{\sqrt{42}}{56} \end{bmatrix}$  |
| 388 | symmetry  | $-\frac{x^2}{2}-\frac{y^2}{2}+z^2$  |

continued ...

Table 7

| No. | multipole                         | matrix                         |                           |                            |                            |                           |                            |                           |                          |                          |                        |                         |                          |                          |                           |   |
|-----|-----------------------------------|--------------------------------|---------------------------|----------------------------|----------------------------|---------------------------|----------------------------|---------------------------|--------------------------|--------------------------|------------------------|-------------------------|--------------------------|--------------------------|---------------------------|---|
|     | $\mathbb{T}_{2,0}^{(1,0;a)}(E)$   | 0                              | 0                         | $\frac{\sqrt{2}i}{6}$      | 0                          | 0                         | 0                          | 0                         | 0                        | 0                        | 0                      | 0                       | 0                        | 0                        | 0                         | 0 |
|     |                                   | 0                              | 0                         | 0                          | $\frac{\sqrt{2}i}{6}$      | 0                         | 0                          | 0                         | 0                        | 0                        | 0                      | 0                       | 0                        | 0                        | 0                         | 0 |
|     |                                   | 0                              | $-\frac{5\sqrt{6}i}{42}$  | 0                          | 0                          | 0                         | 0                          | 0                         | $-\frac{\sqrt{15}i}{21}$ | 0                        | 0                      | 0                       | 0                        | 0                        | 0                         | 0 |
|     |                                   | 0                              | 0                         | $-\frac{5i}{42}$           | 0                          | 0                         | 0                          | 0                         | 0                        | $-\frac{\sqrt{3}i}{7}$   | 0                      | 0                       | 0                        | 0                        | 0                         | 0 |
|     |                                   | 0                              | 0                         | 0                          | $\frac{5i}{42}$            | 0                         | 0                          | 0                         | 0                        | 0                        | $-\frac{\sqrt{3}i}{7}$ | 0                       | 0                        | 0                        | 0                         | 0 |
|     |                                   | 0                              | 0                         | 0                          | 0                          | $\frac{5\sqrt{6}i}{42}$   | 0                          | 0                         | 0                        | 0                        | 0                      | 0                       | $-\frac{\sqrt{15}i}{21}$ | 0                        | 0                         | 0 |
| 389 | symmetry                          | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ |                           |                            |                            |                           |                            |                           |                          |                          |                        |                         |                          |                          |                           |   |
|     | $\mathbb{T}_{2,1}^{(1,0;a)}(E)$   | $\frac{\sqrt{15}i}{18}$        | 0                         | 0                          | 0                          | $\frac{\sqrt{3}i}{18}$    | 0                          | 0                         | 0                        | 0                        | 0                      | 0                       | 0                        | 0                        | 0                         | 0 |
|     |                                   | 0                              | $\frac{\sqrt{3}i}{18}$    | 0                          | 0                          | 0                         | $\frac{\sqrt{15}i}{18}$    | 0                         | 0                        | 0                        | 0                      | 0                       | 0                        | 0                        | 0                         | 0 |
|     |                                   | 0                              | 0                         | 0                          | $-\frac{5i}{42}$           | 0                         | 0                          | $-\frac{\sqrt{105}i}{42}$ | 0                        | 0                        | 0                      | $-\frac{\sqrt{3}i}{42}$ | 0                        | 0                        | 0                         | 0 |
|     |                                   | $\frac{5\sqrt{30}i}{126}$      | 0                         | 0                          | 0                          | $-\frac{5\sqrt{6}i}{63}$  | 0                          | 0                         | $-\frac{\sqrt{5}i}{14}$  | 0                        | 0                      | 0                       | $-\frac{\sqrt{15}i}{42}$ | 0                        | 0                         | 0 |
|     |                                   | 0                              | $\frac{5\sqrt{6}i}{63}$   | 0                          | 0                          | 0                         | $-\frac{5\sqrt{30}i}{126}$ | 0                         | 0                        | $-\frac{\sqrt{15}i}{42}$ | 0                      | 0                       | 0                        | $-\frac{\sqrt{5}i}{14}$  | 0                         | 0 |
|     |                                   | 0                              | 0                         | $\frac{5i}{42}$            | 0                          | 0                         | 0                          | 0                         | 0                        | $-\frac{\sqrt{3}i}{42}$  | 0                      | 0                       | 0                        | 0                        | $-\frac{\sqrt{105}i}{42}$ | 0 |
| 390 | symmetry                          | $\sqrt{3}yz$                   |                           |                            |                            |                           |                            |                           |                          |                          |                        |                         |                          |                          |                           |   |
|     | $\mathbb{T}_{2,0}^{(1,0;a)}(T_2)$ | 0                              | $\frac{\sqrt{3}}{9}$      | 0                          | $\frac{\sqrt{6}}{18}$      | 0                         | 0                          | 0                         | 0                        | 0                        | 0                      | 0                       | 0                        | 0                        | 0                         | 0 |
|     |                                   | 0                              | 0                         | $\frac{\sqrt{6}}{18}$      | 0                          | $\frac{\sqrt{3}}{9}$      | 0                          | 0                         | 0                        | 0                        | 0                      | 0                       | 0                        | 0                        | 0                         | 0 |
|     |                                   | $-\frac{5\sqrt{10}}{84}$       | 0                         | $-\frac{5}{28}$            | 0                          | 0                         | 0                          | $-\frac{\sqrt{15}}{21}$   | 0                        | $-\frac{\sqrt{3}}{21}$   | 0                      | 0                       | 0                        | 0                        | 0                         | 0 |
|     |                                   | 0                              | $\frac{5\sqrt{6}}{252}$   | 0                          | $-\frac{25\sqrt{3}}{252}$  | 0                         | 0                          | 0                         | 0                        | $-\frac{\sqrt{15}}{21}$  | 0                      | $-\frac{1}{7}$          | 0                        | 0                        | 0                         | 0 |
|     |                                   | 0                              | 0                         | $\frac{25\sqrt{3}}{252}$   | 0                          | $-\frac{5\sqrt{6}}{252}$  | 0                          | 0                         | 0                        | 0                        | $-\frac{1}{7}$         | 0                       | $-\frac{\sqrt{15}}{21}$  | 0                        | 0                         | 0 |
|     |                                   | 0                              | 0                         | 0                          | $\frac{5}{28}$             | 0                         | $\frac{5\sqrt{10}}{84}$    | 0                         | 0                        | 0                        | 0                      | $-\frac{\sqrt{3}}{21}$  | 0                        | $-\frac{\sqrt{15}}{21}$  | 0                         | 0 |
| 391 | symmetry                          | $\sqrt{3}xz$                   |                           |                            |                            |                           |                            |                           |                          |                          |                        |                         |                          |                          |                           |   |
|     | $\mathbb{T}_{2,1}^{(1,0;a)}(T_2)$ | 0                              | $-\frac{\sqrt{3}i}{9}$    | 0                          | $\frac{\sqrt{6}i}{18}$     | 0                         | 0                          | 0                         | 0                        | 0                        | 0                      | 0                       | 0                        | 0                        | 0                         | 0 |
|     |                                   | 0                              | 0                         | $-\frac{\sqrt{6}i}{18}$    | 0                          | $\frac{\sqrt{3}i}{9}$     | 0                          | 0                         | 0                        | 0                        | 0                      | 0                       | 0                        | 0                        | 0                         | 0 |
|     |                                   | $\frac{5\sqrt{10}i}{84}$       | 0                         | $-\frac{5i}{28}$           | 0                          | 0                         | 0                          | $\frac{\sqrt{15}i}{21}$   | 0                        | $-\frac{\sqrt{3}i}{21}$  | 0                      | 0                       | 0                        | 0                        | 0                         | 0 |
|     |                                   | 0                              | $-\frac{5\sqrt{6}i}{252}$ | 0                          | $-\frac{25\sqrt{3}i}{252}$ | 0                         | 0                          | 0                         | 0                        | $\frac{\sqrt{15}i}{21}$  | 0                      | $-\frac{i}{7}$          | 0                        | 0                        | 0                         | 0 |
|     |                                   | 0                              | 0                         | $-\frac{25\sqrt{3}i}{252}$ | 0                          | $-\frac{5\sqrt{6}i}{252}$ | 0                          | 0                         | 0                        | 0                        | $\frac{i}{7}$          | 0                       | $-\frac{\sqrt{15}i}{21}$ | 0                        | 0                         | 0 |
|     |                                   | 0                              | 0                         | 0                          | $-\frac{5i}{28}$           | 0                         | $\frac{5\sqrt{10}i}{84}$   | 0                         | 0                        | 0                        | 0                      | $\frac{\sqrt{3}i}{21}$  | 0                        | $-\frac{\sqrt{15}i}{21}$ | 0                         | 0 |
| 392 | symmetry                          | $\sqrt{3}xy$                   |                           |                            |                            |                           |                            |                           |                          |                          |                        |                         |                          |                          |                           |   |

continued ...

Table 7

| No. | multipole                         | matrix   |                         |                           |                          |                          |                           |                           |                            |                           |                           |                           |                           |                            |                           |
|-----|-----------------------------------|--|-------------------------|---------------------------|--------------------------|--------------------------|---------------------------|---------------------------|----------------------------|---------------------------|---------------------------|---------------------------|---------------------------|----------------------------|---------------------------|
|     | $\mathbb{T}_{2,2}^{(1,0;a)}(T_2)$ | $-\frac{\sqrt{15}}{18}$  | 0                       | 0                         | 0                        | $\frac{\sqrt{3}}{18}$    | 0                         | 0                         | 0                          | 0                         | 0                         | 0                         | 0                         | 0                          | 0                         |
|     |                                   | 0  | $-\frac{\sqrt{3}}{18}$  | 0                         | 0                        | 0                        | $\frac{\sqrt{15}}{18}$    | 0                         | 0                          | 0                         | 0                         | 0                         | 0                         | 0                          | 0                         |
|     |                                   | 0  | 0                       | 0                         | $-\frac{5}{42}$          | 0                        | 0                         | $\frac{\sqrt{105}}{42}$   | 0                          | 0                         | 0                         | $-\frac{\sqrt{3}}{42}$    | 0                         | 0                          | 0                         |
|     |                                   | $-\frac{5\sqrt{30}}{126}$                                      | 0                       | 0                         | 0                        | $-\frac{5\sqrt{6}}{63}$  | 0                         | 0                         | $\frac{\sqrt{5}}{14}$      | 0                         | 0                         | 0                         | $-\frac{\sqrt{15}}{42}$   | 0                          | 0                         |
|     |                                   | 0  | $-\frac{5\sqrt{6}}{63}$ | 0                         | 0                        | 0                        | $-\frac{5\sqrt{30}}{126}$ | 0                         | 0                          | $\frac{\sqrt{15}}{42}$    | 0                         | 0                         | 0                         | $-\frac{\sqrt{5}}{14}$     | 0                         |
|     |                                   | 0  | 0                       | $-\frac{5}{42}$           | 0                        | 0                        | 0                         | 0                         | 0                          | 0                         | $\frac{\sqrt{3}}{42}$     | 0                         | 0                         | 0                          | $-\frac{\sqrt{105}}{42}$  |
| 393 | symmetry                          | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$     |                         |                           |                          |                          |                           |                           |                            |                           |                           |                           |                           |                            |                           |
|     | $\mathbb{T}_4^{(1,0;a)}(A_1)$     | 0  | 0                       | 0                         | 0                        | 0                        | 0                         | 0                         | 0                          | 0                         | $\frac{\sqrt{35}i}{24}$   | 0                         | 0                         | 0                          | $\frac{5i}{24}$           |
|     |                                   | 0  | 0                       | 0                         | 0                        | 0                        | 0                         | $-\frac{5i}{24}$          | 0                          | 0                         | 0                         | $-\frac{\sqrt{35}i}{24}$  | 0                         | 0                          | 0                         |
|     |                                   | 0  | $\frac{\sqrt{35}i}{56}$ | 0                         | 0                        | 0                        | $\frac{5\sqrt{7}i}{56}$   | 0                         | 0                          | $\frac{\sqrt{14}i}{56}$   | 0                         | 0                         | 0                         | $\frac{\sqrt{42}i}{168}$   | 0                         |
|     |                                   | 0  | 0                       | $-\frac{\sqrt{210}i}{56}$ | 0                        | 0                        | 0                         | 0                         | 0                          | 0                         | $-\frac{\sqrt{70}i}{168}$ | 0                         | 0                         | 0                          | $\frac{\sqrt{2}i}{24}$    |
|     |                                   | 0  | 0                       | 0                         | $\frac{\sqrt{210}i}{56}$ | 0                        | 0                         | $\frac{\sqrt{2}i}{24}$    | 0                          | 0                         | 0                         | $-\frac{\sqrt{70}i}{168}$ | 0                         | 0                          | 0                         |
|     |                                   | $-\frac{5\sqrt{7}i}{56}$                                       | 0                       | 0                         | 0                        | $-\frac{\sqrt{35}i}{56}$ | 0                         | 0                         | $\frac{\sqrt{42}i}{168}$   | 0                         | 0                         | 0                         | $\frac{\sqrt{14}i}{56}$   | 0                          | 0                         |
| 394 | symmetry                          | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ |                         |                           |                          |                          |                           |                           |                            |                           |                           |                           |                           |                            |                           |
|     | $\mathbb{T}_{4,0}^{(1,0;a)}(E)$   | 0  | 0                       | 0                         | 0                        | 0                        | 0                         | 0                         | 0                          | $\frac{5i}{24}$           | 0                         | 0                         | 0                         | $-\frac{\sqrt{35}i}{24}$   |                           |
|     |                                   | 0  | 0                       | 0                         | 0                        | 0                        | $\frac{\sqrt{35}i}{24}$   | 0                         | 0                          | 0                         | $-\frac{5i}{24}$          | 0                         | 0                         | 0                          |                           |
|     |                                   | 0  | $\frac{5i}{56}$         | 0                         | 0                        | 0                        | $-\frac{\sqrt{5}i}{8}$    | 0                         | 0                          | $\frac{\sqrt{10}i}{56}$   | 0                         | 0                         | 0                         | $-\frac{\sqrt{30}i}{120}$  | 0                         |
|     |                                   | 0  | 0                       | $-\frac{5\sqrt{6}i}{56}$  | 0                        | 0                        | 0                         | 0                         | 0                          | $-\frac{5\sqrt{2}i}{168}$ | 0                         | 0                         | 0                         | $-\frac{\sqrt{70}i}{120}$  |                           |
|     |                                   | 0  | 0                       | 0                         | $\frac{5\sqrt{6}i}{56}$  | 0                        | 0                         | $-\frac{\sqrt{70}i}{120}$ | 0                          | 0                         | 0                         | $-\frac{5\sqrt{2}i}{168}$ | 0                         | 0                          | 0                         |
|     |                                   | $\frac{\sqrt{5}i}{8}$  | 0                       | 0                         | 0                        | $-\frac{5i}{56}$         | 0                         | 0                         | $-\frac{\sqrt{30}i}{120}$  | 0                         | 0                         | 0                         | $\frac{\sqrt{10}i}{56}$   | 0                          | 0                         |
| 395 | symmetry                          | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$                   |                         |                           |                          |                          |                           |                           |                            |                           |                           |                           |                           |                            |                           |
|     | $\mathbb{T}_{4,1}^{(1,0;a)}(E)$   | 0  | 0                       | 0                         | 0                        | 0                        | 0                         | $-\frac{\sqrt{15}i}{24}$  | 0                          | 0                         | 0                         | $-\frac{\sqrt{5}i}{8}$    | 0                         | 0                          |                           |
|     |                                   | 0  | 0                       | 0                         | 0                        | 0                        | 0                         | 0                         | $\frac{\sqrt{5}i}{8}$      | 0                         | 0                         | 0                         | 0                         | $\frac{\sqrt{15}i}{24}$    | 0                         |
|     |                                   | 0  | 0                       | 0                         | $-\frac{5\sqrt{6}i}{56}$ | 0                        | 0                         | $-\frac{\sqrt{70}i}{280}$ | 0                          | 0                         | 0                         | $-\frac{3\sqrt{2}i}{56}$  | 0                         | 0                          | 0                         |
|     |                                   | $\frac{3\sqrt{5}i}{56}$  | 0                       | 0                         | 0                        | $\frac{15i}{56}$         | 0                         | 0                         | $\frac{11\sqrt{30}i}{840}$ | 0                         | 0                         | 0                         | $-\frac{\sqrt{10}i}{280}$ | 0                          | 0                         |
|     |                                   | 0  | $-\frac{15i}{56}$       | 0                         | 0                        | 0                        | $-\frac{3\sqrt{5}i}{56}$  | 0                         | 0                          | $-\frac{\sqrt{10}i}{280}$ | 0                         | 0                         | 0                         | $\frac{11\sqrt{30}i}{840}$ | 0                         |
|     |                                   | 0  | 0                       | $\frac{5\sqrt{6}i}{56}$   | 0                        | 0                        | 0                         | 0                         | 0                          | $-\frac{3\sqrt{2}i}{56}$  | 0                         | 0                         | 0                         | 0                          | $-\frac{\sqrt{70}i}{280}$ |
| 396 | symmetry                          | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$                              |                         |                           |                          |                          |                           |                           |                            |                           |                           |                           |                           |                            |                           |

continued ...

Table 7

| No. | multipole                         | matrix   |                            |                             |                             |                            |                            |                           |                            |                           |                          |                           |                            |                            |                           |  |
|-----|-----------------------------------|--|----------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|---------------------------|----------------------------|---------------------------|--------------------------|---------------------------|----------------------------|----------------------------|---------------------------|--|
|     | $\mathbb{T}_{4,0}^{(1,0;a)}(T_1)$ | 0  | 0                          | 0                           | 0                           | 0                          | 0                          | $-\frac{\sqrt{15}}{96}$   | 0                          | $-\frac{\sqrt{35}}{32}$   | 0                        | $-\frac{5\sqrt{21}}{96}$  | 0                          | $-\frac{\sqrt{105}}{96}$   | 0                         |  |
|     |                                   | 0  | 0                          | 0                           | 0                           | 0                          | 0                          | $\frac{\sqrt{105}}{96}$   | 0                          | $\frac{5\sqrt{21}}{96}$   | 0                        | $\frac{\sqrt{35}}{32}$    | 0                          | $\frac{\sqrt{15}}{96}$     |                           |  |
|     |                                   | $-\frac{\sqrt{105}}{224}$  | 0                          | $-\frac{5\sqrt{42}}{224}$   | 0                           | $-\frac{5\sqrt{21}}{224}$  | 0                          | 0                         | $-\frac{3\sqrt{70}}{560}$  | 0                         | $-\frac{\sqrt{14}}{56}$  | 0                         | $-\frac{\sqrt{210}}{560}$  | 0                          | 0                         |  |
|     |                                   | 0  | $\frac{15\sqrt{7}}{224}$   | 0                           | $\frac{15\sqrt{14}}{224}$   | 0                          | $\frac{3\sqrt{35}}{224}$   | $\frac{\sqrt{30}}{240}$   | 0                          | $\frac{\sqrt{70}}{140}$   | 0                        | $\frac{\sqrt{42}}{336}$   | 0                          | $-\frac{\sqrt{210}}{840}$  | 0                         |  |
|     |                                   | $-\frac{3\sqrt{35}}{224}$  | 0                          | $-\frac{15\sqrt{14}}{224}$  | 0                           | $-\frac{15\sqrt{7}}{224}$  | 0                          | 0                         | $-\frac{\sqrt{210}}{840}$  | 0                         | $\frac{\sqrt{42}}{336}$  | 0                         | $\frac{\sqrt{70}}{140}$    | 0                          | $\frac{\sqrt{30}}{240}$   |  |
|     |                                   | 0  | $\frac{5\sqrt{21}}{224}$   | 0                           | $\frac{5\sqrt{42}}{224}$    | 0                          | $\frac{\sqrt{105}}{224}$   | 0                         | 0                          | $-\frac{\sqrt{210}}{560}$ | 0                        | $-\frac{\sqrt{14}}{56}$   | 0                          | $-\frac{3\sqrt{70}}{560}$  | 0                         |  |
| 397 | symmetry                          | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$   |                            |                             |                             |                            |                            |                           |                            |                           |                          |                           |                            |                            |                           |  |
|     | $\mathbb{T}_{4,1}^{(1,0;a)}(T_1)$ | 0  | 0                          | 0                           | 0                           | 0                          | 0                          | $\frac{\sqrt{15}i}{96}$   | 0                          | $-\frac{\sqrt{35}i}{32}$  | 0                        | $\frac{5\sqrt{21}i}{96}$  | 0                          | $-\frac{\sqrt{105}i}{96}$  | 0                         |  |
|     |                                   | 0  | 0                          | 0                           | 0                           | 0                          | 0                          | 0                         | $-\frac{\sqrt{105}i}{96}$  | 0                         | $\frac{5\sqrt{21}i}{96}$ | 0                         | $-\frac{\sqrt{35}i}{32}$   | 0                          | $\frac{\sqrt{15}i}{96}$   |  |
|     |                                   | $-\frac{\sqrt{105}i}{224}$   | 0                          | $\frac{5\sqrt{42}i}{224}$   | 0                           | $-\frac{5\sqrt{21}i}{224}$ | 0                          | 0                         | $-\frac{3\sqrt{70}i}{560}$ | 0                         | $\frac{\sqrt{14}i}{56}$  | 0                         | $-\frac{\sqrt{210}i}{560}$ | 0                          | 0                         |  |
|     |                                   | 0  | $\frac{15\sqrt{7}i}{224}$  | 0                           | $-\frac{15\sqrt{14}i}{224}$ | 0                          | $\frac{3\sqrt{35}i}{224}$  | $-\frac{\sqrt{30}i}{240}$ | 0                          | $\frac{\sqrt{70}i}{140}$  | 0                        | $-\frac{\sqrt{42}i}{336}$ | 0                          | $-\frac{\sqrt{210}i}{840}$ | 0                         |  |
|     |                                   | $\frac{3\sqrt{35}i}{224}$  | 0                          | $-\frac{15\sqrt{14}i}{224}$ | 0                           | $\frac{15\sqrt{7}i}{224}$  | 0                          | 0                         | $\frac{\sqrt{210}i}{840}$  | 0                         | $\frac{\sqrt{42}i}{336}$ | 0                         | $-\frac{\sqrt{70}i}{140}$  | 0                          | $\frac{\sqrt{30}i}{240}$  |  |
|     |                                   | 0  | $-\frac{5\sqrt{21}i}{224}$ | 0                           | $\frac{5\sqrt{42}i}{224}$   | 0                          | $-\frac{\sqrt{105}i}{224}$ | 0                         | 0                          | $\frac{\sqrt{210}i}{560}$ | 0                        | $-\frac{\sqrt{14}i}{56}$  | 0                          | $\frac{3\sqrt{70}i}{560}$  | 0                         |  |
| 398 | symmetry                          | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$  |                            |                             |                             |                            |                            |                           |                            |                           |                          |                           |                            |                            |                           |  |
|     | $\mathbb{T}_{4,2}^{(1,0;a)}(T_1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{12} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{12} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{105}}{28} & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{70}}{140} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{60} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{60} & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{105}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}}{140} & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |                            |                             |                             |                            |                            |                           |                            |                           |                          |                           |                            |                            |                           |  |
| 399 | symmetry                          | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$   |                            |                             |                             |                            |                            |                           |                            |                           |                          |                           |                            |                            |                           |  |
|     | $\mathbb{T}_{4,0}^{(1,0;a)}(T_2)$ | 0  | 0                          | 0                           | 0                           | 0                          | 0                          | $\frac{\sqrt{105}}{96}$   | 0                          | $-\frac{\sqrt{5}}{32}$    | 0                        | $-\frac{5\sqrt{3}}{96}$   | 0                          | $\frac{7\sqrt{15}}{96}$    | 0                         |  |
|     |                                   | 0  | 0                          | 0                           | 0                           | 0                          | 0                          | 0                         | $-\frac{7\sqrt{15}}{96}$   | 0                         | $\frac{5\sqrt{3}}{96}$   | 0                         | $\frac{\sqrt{5}}{32}$      | 0                          | $-\frac{\sqrt{105}}{96}$  |  |
|     |                                   | $-\frac{\sqrt{15}}{224}$   | 0                          | $-\frac{5\sqrt{6}}{224}$    | 0                           | $\frac{5\sqrt{3}}{32}$     | 0                          | 0                         | $-\frac{3\sqrt{10}}{560}$  | 0                         | $-\frac{\sqrt{2}}{56}$   | 0                         | $\frac{\sqrt{30}}{80}$     | 0                          | 0                         |  |
|     |                                   | 0  | $\frac{15}{224}$           | 0                           | $\frac{15\sqrt{2}}{224}$    | 0                          | $-\frac{3\sqrt{5}}{32}$    | $-\frac{\sqrt{210}}{240}$ | 0                          | $\frac{\sqrt{10}}{140}$   | 0                        | $\frac{\sqrt{6}}{336}$    | 0                          | $\frac{\sqrt{30}}{120}$    | 0                         |  |
|     |                                   | $\frac{3\sqrt{5}}{32}$   | 0                          | $-\frac{15\sqrt{2}}{224}$   | 0                           | $-\frac{15}{224}$          | 0                          | 0                         | $\frac{\sqrt{30}}{120}$    | 0                         | $\frac{\sqrt{6}}{336}$   | 0                         | $\frac{\sqrt{10}}{140}$    | 0                          | $-\frac{\sqrt{210}}{240}$ |  |
|     |                                   | 0  | $-\frac{5\sqrt{3}}{32}$    | 0                           | $\frac{5\sqrt{6}}{224}$     | 0                          | $\frac{\sqrt{15}}{224}$    | 0                         | 0                          | $\frac{\sqrt{30}}{80}$    | 0                        | $-\frac{\sqrt{2}}{56}$    | 0                          | $-\frac{3\sqrt{10}}{560}$  | 0                         |  |
| 400 | symmetry                          | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$  |                            |                             |                             |                            |                            |                           |                            |                           |                          |                           |                            |                            |                           |  |

continued ...

Table 7

| No. | multipole                         | matrix                                 |                          |                           |                           |                          |                           |                            |                           |                           |                          |                          |                          |                            |                           |
|-----|-----------------------------------|--|--------------------------|---------------------------|---------------------------|--------------------------|---------------------------|----------------------------|---------------------------|---------------------------|--------------------------|--------------------------|--------------------------|----------------------------|---------------------------|
|     | $\mathbb{T}_{4,1}^{(1,0;a)}(T_2)$ | 0                                      | 0                        | 0                         | 0                         | 0                        | 0                         | $\frac{\sqrt{105}i}{96}$   | 0                         | $\frac{\sqrt{5}i}{32}$    | 0                        | $-\frac{5\sqrt{3}i}{96}$ | 0                        | $-\frac{7\sqrt{15}i}{96}$  | 0                         |
|     |                                   | 0                                      | 0                        | 0                         | 0                         | 0                        | 0                         | $-\frac{7\sqrt{15}i}{96}$  | 0                         | $-\frac{5\sqrt{3}i}{96}$  | 0                        | $\frac{\sqrt{5}i}{32}$   | 0                        | $\frac{\sqrt{105}i}{96}$   |                           |
|     |                                   | $\frac{\sqrt{15}i}{224}$               | 0                        | $-\frac{5\sqrt{6}i}{224}$ | 0                         | $-\frac{5\sqrt{3}i}{32}$ | 0                         | 0                          | $\frac{3\sqrt{10}i}{560}$ | 0                         | $-\frac{\sqrt{2}i}{56}$  | 0                        | $-\frac{\sqrt{30}i}{80}$ | 0                          | 0                         |
|     |                                   | 0                                      | $-\frac{15i}{224}$       | 0                         | $\frac{15\sqrt{2}i}{224}$ | 0                        | $\frac{3\sqrt{5}i}{32}$   | $-\frac{\sqrt{210}i}{240}$ | 0                         | $-\frac{\sqrt{10}i}{140}$ | 0                        | $\frac{\sqrt{6}i}{336}$  | 0                        | $-\frac{\sqrt{30}i}{120}$  | 0                         |
|     |                                   | $\frac{3\sqrt{5}i}{32}$                | 0                        | $\frac{15\sqrt{2}i}{224}$ | 0                         | $-\frac{15i}{224}$       | 0                         | 0                          | $\frac{\sqrt{30}i}{120}$  | 0                         | $-\frac{\sqrt{6}i}{336}$ | 0                        | $\frac{\sqrt{10}i}{140}$ | 0                          | $\frac{\sqrt{210}i}{240}$ |
|     |                                   | 0                                      | $-\frac{5\sqrt{3}i}{32}$ | 0                         | $-\frac{5\sqrt{6}i}{224}$ | 0                        | $\frac{\sqrt{15}i}{224}$  | 0                          | 0                         | $\frac{\sqrt{30}i}{80}$   | 0                        | $\frac{\sqrt{2}i}{56}$   | 0                        | $-\frac{3\sqrt{10}i}{560}$ | 0                         |
| 401 | symmetry                          | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$  |                          |                           |                           |                          |                           |                            |                           |                           |                          |                          |                          |                            |                           |
|     | $\mathbb{T}_{4,2}^{(1,0;a)}(T_2)$ | 0                                      | 0                        | 0                         | 0                         | 0                        | 0                         | $-\frac{\sqrt{15}}{24}$    | 0                         | 0                         | 0                        | $\frac{\sqrt{5}}{8}$     | 0                        | 0                          |                           |
|     |                                   | 0                                      | 0                        | 0                         | 0                         | 0                        | 0                         | 0                          | $\frac{\sqrt{5}}{8}$      | 0                         | 0                        | 0                        | $-\frac{\sqrt{15}}{24}$  | 0                          |                           |
|     |                                   | 0                                      | 0                        | 0                         | $\frac{5\sqrt{6}}{56}$    | 0                        | 0                         | $-\frac{\sqrt{70}}{280}$   | 0                         | 0                         | 0                        | $\frac{3\sqrt{2}}{56}$   | 0                        | 0                          |                           |
|     |                                   | $\frac{3\sqrt{5}}{56}$                 | 0                        | 0                         | 0                         | $-\frac{15}{56}$         | 0                         | 0                          | $\frac{11\sqrt{30}}{840}$ | 0                         | 0                        | 0                        | $\frac{\sqrt{10}}{280}$  | 0                          | 0                         |
|     |                                   | 0                                      | $-\frac{15}{56}$         | 0                         | 0                         | 0                        | $\frac{3\sqrt{5}}{56}$    | 0                          | 0                         | $-\frac{\sqrt{10}}{280}$  | 0                        | 0                        | 0                        | $-\frac{11\sqrt{30}}{840}$ | 0                         |
|     |                                   | 0                                      | 0                        | $\frac{5\sqrt{6}}{56}$    | 0                         | 0                        | 0                         | 0                          | 0                         | $-\frac{3\sqrt{2}}{56}$   | 0                        | 0                        | 0                        | $\frac{\sqrt{70}}{280}$    |                           |
| 402 | symmetry                          | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |                          |                           |                           |                          |                           |                            |                           |                           |                          |                          |                          |                            |                           |
|     | $\mathbb{T}_{2,0}^{(1,1;a)}(E)$   | 0                                      | 0                        | $-\frac{i}{3}$            | 0                         | 0                        | 0                         | 0                          | 0                         | 0                         | 0                        | 0                        | 0                        | 0                          | 0                         |
|     |                                   | 0                                      | 0                        | 0                         | $-\frac{i}{3}$            | 0                        | 0                         | 0                          | 0                         | 0                         | 0                        | 0                        | 0                        | 0                          | 0                         |
|     |                                   | 0                                      | $-\frac{4\sqrt{3}i}{21}$ | 0                         | 0                         | 0                        | 0                         | 0                          | 0                         | $\frac{\sqrt{30}i}{84}$   | 0                        | 0                        | 0                        | 0                          | 0                         |
|     |                                   | 0                                      | 0                        | $-\frac{2\sqrt{2}i}{21}$  | 0                         | 0                        | 0                         | 0                          | 0                         | 0                         | $\frac{\sqrt{6}i}{28}$   | 0                        | 0                        | 0                          | 0                         |
|     |                                   | 0                                      | 0                        | 0                         | $\frac{2\sqrt{2}i}{21}$   | 0                        | 0                         | 0                          | 0                         | 0                         | 0                        | $\frac{\sqrt{6}i}{28}$   | 0                        | 0                          | 0                         |
|     |                                   | 0                                      | 0                        | 0                         | 0                         | $\frac{4\sqrt{3}i}{21}$  | 0                         | 0                          | 0                         | 0                         | 0                        | 0                        | $\frac{\sqrt{30}i}{84}$  | 0                          | 0                         |
| 403 | symmetry                          | $\frac{\sqrt{3}(x-y)(x+y)}{2}$         |                          |                           |                           |                          |                           |                            |                           |                           |                          |                          |                          |                            |                           |
|     | $\mathbb{T}_{2,1}^{(1,1;a)}(E)$   | $-\frac{\sqrt{30}i}{18}$               | 0                        | 0                         | 0                         | $-\frac{\sqrt{6}i}{18}$  | 0                         | 0                          | 0                         | 0                         | 0                        | 0                        | 0                        | 0                          | 0                         |
|     |                                   | 0                                      | $-\frac{\sqrt{6}i}{18}$  | 0                         | 0                         | 0                        | $-\frac{\sqrt{30}i}{18}$  | 0                          | 0                         | 0                         | 0                        | 0                        | 0                        | 0                          | 0                         |
|     |                                   | 0                                      | 0                        | 0                         | $-\frac{2\sqrt{2}i}{21}$  | 0                        | 0                         | $\frac{\sqrt{210}i}{168}$  | 0                         | 0                         | 0                        | $\frac{\sqrt{6}i}{168}$  | 0                        | 0                          | 0                         |
|     |                                   | $\frac{4\sqrt{15}i}{63}$               | 0                        | 0                         | 0                         | $-\frac{8\sqrt{3}i}{63}$ | 0                         | 0                          | $\frac{\sqrt{10}i}{56}$   | 0                         | 0                        | 0                        | $\frac{\sqrt{30}i}{168}$ | 0                          | 0                         |
|     |                                   | 0                                      | $\frac{8\sqrt{3}i}{63}$  | 0                         | 0                         | 0                        | $-\frac{4\sqrt{15}i}{63}$ | 0                          | 0                         | $\frac{\sqrt{30}i}{168}$  | 0                        | 0                        | 0                        | $\frac{\sqrt{10}i}{56}$    | 0                         |
|     |                                   | 0                                      | 0                        | $\frac{2\sqrt{2}i}{21}$   | 0                         | 0                        | 0                         | 0                          | 0                         | 0                         | $\frac{\sqrt{6}i}{168}$  | 0                        | 0                        | 0                          | $\frac{\sqrt{210}i}{168}$ |
| 404 | symmetry                          | $\sqrt{3}yz$                           |                          |                           |                           |                          |                           |                            |                           |                           |                          |                          |                          |                            |                           |

continued ...

Table 7

| No. | multipole                         | matrix                        |                          |                           |                          |                          |                          |                           |                          |                           |                         |                          |                           |                          |                          |   |
|-----|-----------------------------------|-------------------------------|--------------------------|---------------------------|--------------------------|--------------------------|--------------------------|---------------------------|--------------------------|---------------------------|-------------------------|--------------------------|---------------------------|--------------------------|--------------------------|---|
|     | $\mathbb{T}_{2,0}^{(1,1;a)}(T_2)$ | 0                             | $-\frac{\sqrt{6}}{9}$    | 0                         | $-\frac{\sqrt{3}}{9}$    | 0                        | 0                        | 0                         | 0                        | 0                         | 0                       | 0                        | 0                         | 0                        | 0                        | 0 |
|     |                                   | 0                             | 0                        | $-\frac{\sqrt{3}}{9}$     | 0                        | $-\frac{\sqrt{6}}{9}$    | 0                        | 0                         | 0                        | 0                         | 0                       | 0                        | 0                         | 0                        | 0                        | 0 |
|     |                                   | $-\frac{2\sqrt{5}}{21}$       | 0                        | $-\frac{\sqrt{2}}{7}$     | 0                        | 0                        | 0                        | 0                         | $\frac{\sqrt{30}}{84}$   | 0                         | $\frac{\sqrt{6}}{84}$   | 0                        | 0                         | 0                        | 0                        | 0 |
|     |                                   | 0                             | $\frac{2\sqrt{3}}{63}$   | 0                         | $-\frac{5\sqrt{6}}{63}$  | 0                        | 0                        | 0                         | 0                        | $\frac{\sqrt{30}}{84}$    | 0                       | $\frac{\sqrt{2}}{28}$    | 0                         | 0                        | 0                        | 0 |
|     |                                   | 0                             | 0                        | $\frac{5\sqrt{6}}{63}$    | 0                        | $-\frac{2\sqrt{3}}{63}$  | 0                        | 0                         | 0                        | 0                         | $\frac{\sqrt{2}}{28}$   | 0                        | $\frac{\sqrt{30}}{84}$    | 0                        | 0                        | 0 |
|     |                                   | 0                             | 0                        | 0                         | $\frac{\sqrt{2}}{7}$     | 0                        | $\frac{2\sqrt{5}}{21}$   | 0                         | 0                        | 0                         | 0                       | $\frac{\sqrt{6}}{84}$    | 0                         | $\frac{\sqrt{30}}{84}$   | 0                        | 0 |
| 405 | symmetry                          | $\sqrt{3}xz$                  |                          |                           |                          |                          |                          |                           |                          |                           |                         |                          |                           |                          |                          |   |
|     | $\mathbb{T}_{2,1}^{(1,1;a)}(T_2)$ | 0                             | $\frac{\sqrt{6}i}{9}$    | 0                         | $-\frac{\sqrt{3}i}{9}$   | 0                        | 0                        | 0                         | 0                        | 0                         | 0                       | 0                        | 0                         | 0                        | 0                        | 0 |
|     |                                   | 0                             | 0                        | $\frac{\sqrt{3}i}{9}$     | 0                        | $-\frac{\sqrt{6}i}{9}$   | 0                        | 0                         | 0                        | 0                         | 0                       | 0                        | 0                         | 0                        | 0                        | 0 |
|     |                                   | $\frac{2\sqrt{5}i}{21}$       | 0                        | $-\frac{\sqrt{2}i}{7}$    | 0                        | 0                        | 0                        | 0                         | $-\frac{\sqrt{30}i}{84}$ | 0                         | $\frac{\sqrt{6}i}{84}$  | 0                        | 0                         | 0                        | 0                        | 0 |
|     |                                   | 0                             | $-\frac{2\sqrt{3}i}{63}$ | 0                         | $-\frac{5\sqrt{6}i}{63}$ | 0                        | 0                        | 0                         | 0                        | $-\frac{\sqrt{30}i}{84}$  | 0                       | $\frac{\sqrt{2}i}{28}$   | 0                         | 0                        | 0                        | 0 |
|     |                                   | 0                             | 0                        | $-\frac{5\sqrt{6}i}{63}$  | 0                        | $-\frac{2\sqrt{3}i}{63}$ | 0                        | 0                         | 0                        | 0                         | $-\frac{\sqrt{2}i}{28}$ | 0                        | $\frac{\sqrt{30}i}{84}$   | 0                        | 0                        | 0 |
|     |                                   | 0                             | 0                        | 0                         | $-\frac{\sqrt{2}i}{7}$   | 0                        | $\frac{2\sqrt{5}i}{21}$  | 0                         | 0                        | 0                         | 0                       | $-\frac{\sqrt{6}i}{84}$  | 0                         | $\frac{\sqrt{30}i}{84}$  | 0                        | 0 |
| 406 | symmetry                          | $\sqrt{3}xy$                  |                          |                           |                          |                          |                          |                           |                          |                           |                         |                          |                           |                          |                          |   |
|     | $\mathbb{T}_{2,2}^{(1,1;a)}(T_2)$ | $\frac{\sqrt{30}}{18}$        | 0                        | 0                         | 0                        | $-\frac{\sqrt{6}}{18}$   | 0                        | 0                         | 0                        | 0                         | 0                       | 0                        | 0                         | 0                        | 0                        | 0 |
|     |                                   | 0                             | $\frac{\sqrt{6}}{18}$    | 0                         | 0                        | 0                        | $-\frac{\sqrt{30}}{18}$  | 0                         | 0                        | 0                         | 0                       | 0                        | 0                         | 0                        | 0                        | 0 |
|     |                                   | 0                             | 0                        | 0                         | $-\frac{2\sqrt{2}}{21}$  | 0                        | 0                        | $-\frac{\sqrt{210}}{168}$ | 0                        | 0                         | 0                       | $\frac{\sqrt{6}}{168}$   | 0                         | 0                        | 0                        | 0 |
|     |                                   | $-\frac{4\sqrt{15}}{63}$      | 0                        | 0                         | 0                        | $-\frac{8\sqrt{3}}{63}$  | 0                        | 0                         | $-\frac{\sqrt{10}}{56}$  | 0                         | 0                       | 0                        | $\frac{\sqrt{30}}{168}$   | 0                        | 0                        | 0 |
|     |                                   | 0                             | $-\frac{8\sqrt{3}}{63}$  | 0                         | 0                        | 0                        | $-\frac{4\sqrt{15}}{63}$ | 0                         | 0                        | $-\frac{\sqrt{30}}{168}$  | 0                       | 0                        | 0                         | $\frac{\sqrt{10}}{56}$   | 0                        | 0 |
|     |                                   | 0                             | 0                        | $-\frac{2\sqrt{2}}{21}$   | 0                        | 0                        | 0                        | 0                         | 0                        | 0                         | $-\frac{\sqrt{6}}{168}$ | 0                        | 0                         | 0                        | $\frac{\sqrt{210}}{168}$ | 0 |
| 407 | symmetry                          | $\sqrt{15}xyz$                |                          |                           |                          |                          |                          |                           |                          |                           |                         |                          |                           |                          |                          |   |
|     | $\mathbb{M}_3^{(a)}(A_2)$         | $\frac{\sqrt{14}i}{42}$       | 0                        | 0                         | 0                        | $-\frac{\sqrt{70}i}{42}$ | 0                        | 0                         | $\frac{\sqrt{21}i}{28}$  | 0                         | 0                       | 0                        | $-\frac{\sqrt{7}i}{28}$   | 0                        | 0                        | 0 |
|     |                                   | 0                             | $-\frac{\sqrt{70}i}{42}$ | 0                         | 0                        | 0                        | $\frac{\sqrt{14}i}{42}$  | 0                         | 0                        | $\frac{\sqrt{7}i}{28}$    | 0                       | 0                        | 0                         | $-\frac{\sqrt{21}i}{28}$ | 0                        | 0 |
|     |                                   | 0                             | 0                        | 0                         | $\frac{\sqrt{210}i}{84}$ | 0                        | 0                        | $\frac{\sqrt{2}i}{8}$     | 0                        | 0                         | 0                       | $-\frac{\sqrt{70}i}{56}$ | 0                         | 0                        | 0                        | 0 |
|     |                                   | $\frac{5\sqrt{7}i}{84}$       | 0                        | 0                         | 0                        | $\frac{\sqrt{35}i}{84}$  | 0                        | 0                         | $-\frac{\sqrt{42}i}{56}$ | 0                         | 0                       | 0                        | $-\frac{3\sqrt{14}i}{56}$ | 0                        | 0                        | 0 |
|     |                                   | 0                             | $-\frac{\sqrt{35}i}{84}$ | 0                         | 0                        | 0                        | $-\frac{5\sqrt{7}i}{84}$ | 0                         | 0                        | $-\frac{3\sqrt{14}i}{56}$ | 0                       | 0                        | 0                         | $-\frac{\sqrt{42}i}{56}$ | 0                        | 0 |
|     |                                   | 0                             | 0                        | $-\frac{\sqrt{210}i}{84}$ | 0                        | 0                        | 0                        | 0                         | 0                        | $-\frac{\sqrt{70}i}{56}$  | 0                       | 0                        | 0                         | 0                        | $\frac{\sqrt{2}i}{8}$    | 0 |
| 408 | symmetry                          | $\frac{x(2x^2-3y^2-3z^2)}{2}$ |                          |                           |                          |                          |                          |                           |                          |                           |                         |                          |                           |                          |                          |   |

continued ...

Table 7

| No. | multipole                     | matrix   |
|-----|-------------------------------|--|
|     | $\mathbb{M}_{3,0}^{(a)}(T_1)$ | $\begin{bmatrix} 0 & \frac{\sqrt{42}}{84} & 0 & -\frac{\sqrt{21}}{42} & 0 & \frac{\sqrt{210}}{84} & -\frac{\sqrt{5}}{16} & 0 & \frac{\sqrt{105}}{112} & 0 & -\frac{3\sqrt{7}}{112} & 0 & \frac{\sqrt{35}}{112} & 0 \\ \frac{\sqrt{210}}{84} & 0 & -\frac{\sqrt{21}}{42} & 0 & \frac{\sqrt{42}}{84} & 0 & 0 & -\frac{\sqrt{35}}{112} & 0 & \frac{3\sqrt{7}}{112} & 0 & -\frac{\sqrt{105}}{112} & 0 & \frac{\sqrt{5}}{16} \\ -\frac{\sqrt{35}}{112} & 0 & \frac{3\sqrt{14}}{112} & 0 & -\frac{5\sqrt{7}}{112} & 0 & 0 & \frac{\sqrt{210}}{112} & 0 & -\frac{\sqrt{42}}{56} & 0 & \frac{\sqrt{70}}{112} & 0 & 0 \\ 0 & \frac{\sqrt{21}}{48} & 0 & -\frac{\sqrt{42}}{336} & 0 & -\frac{5\sqrt{105}}{336} & \frac{\sqrt{10}}{16} & 0 & 0 & 0 & -\frac{3\sqrt{14}}{112} & 0 & \frac{\sqrt{70}}{56} & 0 \\ \frac{5\sqrt{105}}{336} & 0 & \frac{\sqrt{42}}{336} & 0 & -\frac{\sqrt{21}}{48} & 0 & 0 & \frac{\sqrt{70}}{56} & 0 & -\frac{3\sqrt{14}}{112} & 0 & 0 & 0 & \frac{\sqrt{10}}{16} \\ 0 & \frac{5\sqrt{7}}{112} & 0 & -\frac{3\sqrt{14}}{112} & 0 & \frac{\sqrt{35}}{112} & 0 & 0 & \frac{\sqrt{70}}{112} & 0 & -\frac{\sqrt{42}}{56} & 0 & \frac{\sqrt{210}}{112} & 0 \end{bmatrix}$   |
| 409 | symmetry                      | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ $\mathbb{M}_{3,1}^{(a)}(T_1) = \begin{bmatrix} 0 & \frac{\sqrt{42}i}{84} & 0 & \frac{\sqrt{21}i}{42} & 0 & \frac{\sqrt{210}i}{84} & \frac{\sqrt{5}i}{16} & 0 & \frac{\sqrt{105}i}{112} & 0 & \frac{3\sqrt{7}i}{112} & 0 & \frac{\sqrt{35}i}{112} & 0 \\ -\frac{\sqrt{210}i}{84} & 0 & -\frac{\sqrt{21}i}{42} & 0 & -\frac{\sqrt{42}i}{84} & 0 & 0 & \frac{\sqrt{35}i}{112} & 0 & \frac{3\sqrt{7}i}{112} & 0 & \frac{\sqrt{105}i}{112} & 0 & \frac{\sqrt{5}i}{16} \\ -\frac{\sqrt{35}i}{112} & 0 & -\frac{3\sqrt{14}i}{112} & 0 & -\frac{5\sqrt{7}i}{112} & 0 & 0 & \frac{\sqrt{210}i}{112} & 0 & \frac{\sqrt{42}i}{56} & 0 & \frac{\sqrt{70}i}{112} & 0 & 0 \\ 0 & \frac{\sqrt{21}i}{48} & 0 & \frac{\sqrt{42}i}{336} & 0 & -\frac{5\sqrt{105}i}{336} & -\frac{\sqrt{10}i}{16} & 0 & 0 & 0 & \frac{3\sqrt{14}i}{112} & 0 & \frac{\sqrt{70}i}{56} & 0 \\ -\frac{5\sqrt{105}i}{336} & 0 & \frac{\sqrt{42}i}{336} & 0 & \frac{\sqrt{21}i}{48} & 0 & 0 & -\frac{\sqrt{70}i}{56} & 0 & -\frac{3\sqrt{14}i}{112} & 0 & 0 & 0 & \frac{\sqrt{10}i}{16} \\ 0 & -\frac{5\sqrt{7}i}{112} & 0 & -\frac{3\sqrt{14}i}{112} & 0 & -\frac{\sqrt{35}i}{112} & 0 & 0 & -\frac{\sqrt{70}i}{112} & 0 & -\frac{\sqrt{42}i}{56} & 0 & -\frac{\sqrt{210}i}{112} & 0 \end{bmatrix}$ |
| 410 | symmetry                      | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ $\mathbb{M}_{3,2}^{(a)}(T_1) = \begin{bmatrix} 0 & 0 & \frac{\sqrt{21}}{21} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{14} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{21}}{21} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{14} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{7}}{14} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{70}}{28} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{42}}{42} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{14}}{28} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{42}}{42} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{14}}{28} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{14} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}}{28} & 0 & 0 \end{bmatrix}$   |
| 411 | symmetry                      | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ $\mathbb{M}_{3,0}^{(a)}(T_2) = \begin{bmatrix} 0 & \frac{\sqrt{70}}{84} & 0 & -\frac{\sqrt{35}}{42} & 0 & -\frac{\sqrt{14}}{28} & \frac{\sqrt{3}}{16} & 0 & \frac{5\sqrt{7}}{112} & 0 & -\frac{\sqrt{105}}{112} & 0 & -\frac{\sqrt{21}}{112} & 0 \\ -\frac{\sqrt{14}}{28} & 0 & -\frac{\sqrt{35}}{42} & 0 & \frac{\sqrt{70}}{84} & 0 & 0 & \frac{\sqrt{21}}{112} & 0 & \frac{\sqrt{105}}{112} & 0 & -\frac{5\sqrt{7}}{112} & 0 & -\frac{\sqrt{3}}{16} \\ -\frac{5\sqrt{21}}{336} & 0 & \frac{\sqrt{210}}{112} & 0 & \frac{\sqrt{105}}{112} & 0 & 0 & \frac{5\sqrt{14}}{112} & 0 & -\frac{\sqrt{70}}{56} & 0 & -\frac{\sqrt{42}}{112} & 0 & 0 \\ 0 & \frac{\sqrt{35}}{48} & 0 & -\frac{\sqrt{70}}{336} & 0 & \frac{5\sqrt{7}}{112} & -\frac{\sqrt{6}}{16} & 0 & 0 & 0 & -\frac{\sqrt{210}}{112} & 0 & -\frac{\sqrt{42}}{56} & 0 \\ -\frac{5\sqrt{7}}{112} & 0 & \frac{\sqrt{70}}{336} & 0 & -\frac{\sqrt{35}}{48} & 0 & 0 & -\frac{\sqrt{42}}{56} & 0 & -\frac{\sqrt{210}}{112} & 0 & 0 & 0 & -\frac{\sqrt{6}}{16} \\ 0 & -\frac{\sqrt{105}}{112} & 0 & -\frac{\sqrt{210}}{112} & 0 & \frac{5\sqrt{21}}{336} & 0 & 0 & -\frac{\sqrt{42}}{112} & 0 & -\frac{\sqrt{70}}{56} & 0 & \frac{5\sqrt{14}}{112} & 0 \end{bmatrix}$                                  |
| 412 | symmetry                      | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$  |

continued ...

Table 7

| No. | multipole                          | matrix                           |                            |                           |                           |                            |                           |                          |                            |                           |                            |                            |                           |                           |                          |
|-----|------------------------------------|----------------------------------|----------------------------|---------------------------|---------------------------|----------------------------|---------------------------|--------------------------|----------------------------|---------------------------|----------------------------|----------------------------|---------------------------|---------------------------|--------------------------|
|     | $\mathbb{M}_{3,1}^{(a)}(T_2)$      | 0                                | $-\frac{\sqrt{70}i}{84}$   | 0                         | $-\frac{\sqrt{35}i}{42}$  | 0                          | $\frac{\sqrt{14}i}{28}$   | $\frac{\sqrt{3}i}{16}$   | 0                          | $-\frac{5\sqrt{7}i}{112}$ | 0                          | $-\frac{\sqrt{105}i}{112}$ | 0                         | $\frac{\sqrt{21}i}{112}$  | 0                        |
|     |                                    | $-\frac{\sqrt{14}i}{28}$         | 0                          | $\frac{\sqrt{35}i}{42}$   | 0                         | $\frac{\sqrt{70}i}{84}$    | 0                         | 0                        | $\frac{\sqrt{21}i}{112}$   | 0                         | $-\frac{\sqrt{105}i}{112}$ | 0                          | $-\frac{5\sqrt{7}i}{112}$ | 0                         | $\frac{\sqrt{3}i}{16}$   |
|     |                                    | $\frac{5\sqrt{21}i}{336}$        | 0                          | $\frac{\sqrt{210}i}{112}$ | 0                         | $-\frac{\sqrt{105}i}{112}$ | 0                         | 0                        | $-\frac{5\sqrt{14}i}{112}$ | 0                         | $-\frac{\sqrt{70}i}{56}$   | 0                          | $\frac{\sqrt{42}i}{112}$  | 0                         | 0                        |
|     |                                    | 0                                | $-\frac{\sqrt{35}i}{48}$   | 0                         | $-\frac{\sqrt{70}i}{336}$ | 0                          | $-\frac{5\sqrt{7}i}{112}$ | $-\frac{\sqrt{6}i}{16}$  | 0                          | 0                         | 0                          | $-\frac{\sqrt{210}i}{112}$ | 0                         | $\frac{\sqrt{42}i}{56}$   | 0                        |
|     |                                    | $-\frac{5\sqrt{7}i}{112}$        | 0                          | $-\frac{\sqrt{70}i}{336}$ | 0                         | $-\frac{\sqrt{35}i}{48}$   | 0                         | 0                        | $-\frac{\sqrt{42}i}{56}$   | 0                         | $\frac{\sqrt{210}i}{112}$  | 0                          | 0                         | 0                         | $\frac{\sqrt{6}i}{16}$   |
|     |                                    | 0                                | $-\frac{\sqrt{105}i}{112}$ | 0                         | $\frac{\sqrt{210}i}{112}$ | 0                          | $\frac{5\sqrt{21}i}{336}$ | 0                        | 0                          | $-\frac{\sqrt{42}i}{112}$ | 0                          | $\frac{\sqrt{70}i}{56}$    | 0                         | $\frac{5\sqrt{14}i}{112}$ | 0                        |
| 413 | symmetry                           | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ |                            |                           |                           |                            |                           |                          |                            |                           |                            |                            |                           |                           |                          |
|     | $\mathbb{M}_{3,2}^{(a)}(T_2)$      | $\frac{\sqrt{14}}{42}$           | 0                          | 0                         | 0                         | $\frac{\sqrt{70}}{42}$     | 0                         | 0                        | $\frac{\sqrt{21}}{28}$     | 0                         | 0                          | 0                          | $\frac{\sqrt{7}}{28}$     | 0                         | 0                        |
|     |                                    | 0                                | $-\frac{\sqrt{70}}{42}$    | 0                         | 0                         | 0                          | $-\frac{\sqrt{14}}{42}$   | 0                        | 0                          | $\frac{\sqrt{7}}{28}$     | 0                          | 0                          | 0                         | $\frac{\sqrt{21}}{28}$    | 0                        |
|     |                                    | 0                                | 0                          | 0                         | $-\frac{\sqrt{210}}{84}$  | 0                          | 0                         | $\frac{\sqrt{2}}{8}$     | 0                          | 0                         | 0                          | $\frac{\sqrt{70}}{56}$     | 0                         | 0                         | 0                        |
|     |                                    | $\frac{5\sqrt{7}}{84}$           | 0                          | 0                         | 0                         | $-\frac{\sqrt{35}}{84}$    | 0                         | 0                        | $-\frac{\sqrt{42}}{56}$    | 0                         | 0                          | 0                          | $\frac{3\sqrt{14}}{56}$   | 0                         | 0                        |
|     |                                    | 0                                | $-\frac{\sqrt{35}}{84}$    | 0                         | 0                         | 0                          | $\frac{5\sqrt{7}}{84}$    | 0                        | 0                          | $-\frac{3\sqrt{14}}{56}$  | 0                          | 0                          | 0                         | $\frac{\sqrt{42}}{56}$    | 0                        |
|     |                                    | 0                                | 0                          | $-\frac{\sqrt{210}}{84}$  | 0                         | 0                          | 0                         | 0                        | 0                          | $-\frac{\sqrt{70}}{56}$   | 0                          | 0                          | 0                         | 0                         | $-\frac{\sqrt{2}}{8}$    |
| 414 | symmetry                           | $\sqrt{15}xyz$                   |                            |                           |                           |                            |                           |                          |                            |                           |                            |                            |                           |                           |                          |
|     | $\mathbb{M}_3^{(1,-1;a)}(A_2)$     | $-\frac{\sqrt{30}i}{252}$        | 0                          | 0                         | 0                         | $\frac{5\sqrt{6}i}{252}$   | 0                         | 0                        | $-\frac{\sqrt{5}i}{7}$     | 0                         | 0                          | 0                          | $\frac{\sqrt{15}i}{21}$   | 0                         | 0                        |
|     |                                    | 0                                | $\frac{5\sqrt{6}i}{252}$   | 0                         | 0                         | 0                          | $-\frac{\sqrt{30}i}{252}$ | 0                        | 0                          | $-\frac{\sqrt{15}i}{21}$  | 0                          | 0                          | 0                         | $\frac{\sqrt{5}i}{7}$     | 0                        |
|     |                                    | 0                                | 0                          | 0                         | $-\frac{\sqrt{2}i}{21}$   | 0                          | 0                         | $\frac{\sqrt{210}i}{84}$ | 0                          | 0                         | 0                          | $-\frac{5\sqrt{6}i}{84}$   | 0                         | 0                         | 0                        |
|     |                                    | $-\frac{\sqrt{15}i}{63}$         | 0                          | 0                         | 0                         | $-\frac{\sqrt{3}i}{63}$    | 0                         | 0                        | $-\frac{\sqrt{10}i}{28}$   | 0                         | 0                          | 0                          | $-\frac{\sqrt{30}i}{28}$  | 0                         | 0                        |
|     |                                    | 0                                | $\frac{\sqrt{3}i}{63}$     | 0                         | 0                         | 0                          | $\frac{\sqrt{15}i}{63}$   | 0                        | 0                          | $-\frac{\sqrt{30}i}{28}$  | 0                          | 0                          | 0                         | $-\frac{\sqrt{10}i}{28}$  | 0                        |
|     |                                    | 0                                | 0                          | $\frac{\sqrt{2}i}{21}$    | 0                         | 0                          | 0                         | 0                        | 0                          | $-\frac{5\sqrt{6}i}{84}$  | 0                          | 0                          | 0                         | 0                         | $\frac{\sqrt{210}i}{84}$ |
| 415 | symmetry                           | $\frac{x(2x^2-3y^2-3z^2)}{2}$    |                            |                           |                           |                            |                           |                          |                            |                           |                            |                            |                           |                           |                          |
|     | $\mathbb{M}_{3,0}^{(1,-1;a)}(T_1)$ | 0                                | $-\frac{\sqrt{10}}{168}$   | 0                         | $\frac{\sqrt{5}}{84}$     | 0                          | $-\frac{5\sqrt{2}}{168}$  | $\frac{5\sqrt{21}}{84}$  | 0                          | $-\frac{5}{28}$           | 0                          | $\frac{\sqrt{15}}{28}$     | 0                         | $-\frac{5\sqrt{3}}{84}$   | 0                        |
|     |                                    | $-\frac{5\sqrt{2}}{168}$         | 0                          | $\frac{\sqrt{5}}{84}$     | 0                         | $-\frac{\sqrt{10}}{168}$   | 0                         | 0                        | $\frac{5\sqrt{3}}{84}$     | 0                         | $-\frac{\sqrt{15}}{28}$    | 0                          | $\frac{5}{28}$            | 0                         | $-\frac{5\sqrt{21}}{84}$ |
|     |                                    | $\frac{\sqrt{3}}{84}$            | 0                          | $-\frac{\sqrt{30}}{140}$  | 0                         | $\frac{\sqrt{15}}{84}$     | 0                         | 0                        | $\frac{5\sqrt{2}}{56}$     | 0                         | $-\frac{\sqrt{10}}{28}$    | 0                          | $\frac{5\sqrt{6}}{168}$   | 0                         | 0                        |
|     |                                    | 0                                | $-\frac{\sqrt{5}}{60}$     | 0                         | $\frac{\sqrt{10}}{420}$   | 0                          | $\frac{5}{84}$            | $\frac{5\sqrt{42}}{168}$ | 0                          | 0                         | 0                          | $-\frac{\sqrt{30}}{56}$    | 0                         | $\frac{5\sqrt{6}}{84}$    | 0                        |
|     |                                    | $-\frac{5}{84}$                  | 0                          | $-\frac{\sqrt{10}}{420}$  | 0                         | $\frac{\sqrt{5}}{60}$      | 0                         | 0                        | $\frac{5\sqrt{6}}{84}$     | 0                         | $-\frac{\sqrt{30}}{56}$    | 0                          | 0                         | 0                         | $\frac{5\sqrt{42}}{168}$ |
|     |                                    | 0                                | $-\frac{\sqrt{15}}{84}$    | 0                         | $\frac{\sqrt{30}}{140}$   | 0                          | $-\frac{\sqrt{3}}{84}$    | 0                        | 0                          | $\frac{5\sqrt{6}}{168}$   | 0                          | $-\frac{\sqrt{10}}{28}$    | 0                         | $\frac{5\sqrt{2}}{56}$    | 0                        |
| 416 | symmetry                           | $-\frac{y(3x^2-2y^2+3z^2)}{2}$   |                            |                           |                           |                            |                           |                          |                            |                           |                            |                            |                           |                           |                          |

continued ...



Table 7

| No. | multipole                          | matrix  |
|-----|------------------------------------|---|
|     | $\mathbb{M}_{3,1}^{(1,-1;a)}(T_1)$ | $ \begin{bmatrix} 0 & -\frac{\sqrt{10}i}{168} & 0 & -\frac{\sqrt{5}i}{84} & 0 & -\frac{5\sqrt{2}i}{168} & -\frac{5\sqrt{21}i}{84} & 0 & -\frac{5i}{28} & 0 & -\frac{\sqrt{15}i}{28} & 0 & -\frac{5\sqrt{3}i}{84} & 0 \\ \frac{5\sqrt{2}i}{168} & 0 & \frac{\sqrt{5}i}{84} & 0 & \frac{\sqrt{10}i}{168} & 0 & 0 & -\frac{5\sqrt{3}i}{84} & 0 & -\frac{\sqrt{15}i}{28} & 0 & -\frac{5i}{28} & 0 & -\frac{5\sqrt{21}i}{84} \\ \frac{\sqrt{3}i}{84} & 0 & \frac{\sqrt{30}i}{140} & 0 & \frac{\sqrt{15}i}{84} & 0 & 0 & \frac{5\sqrt{2}i}{56} & 0 & \frac{\sqrt{10}i}{28} & 0 & \frac{5\sqrt{6}i}{168} & 0 & 0 \\ 0 & -\frac{\sqrt{5}i}{60} & 0 & -\frac{\sqrt{10}i}{420} & 0 & \frac{5i}{84} & -\frac{5\sqrt{42}i}{168} & 0 & 0 & 0 & \frac{\sqrt{30}i}{56} & 0 & \frac{5\sqrt{6}i}{84} & 0 \\ \frac{5i}{84} & 0 & -\frac{\sqrt{10}i}{420} & 0 & -\frac{\sqrt{5}i}{60} & 0 & 0 & -\frac{5\sqrt{6}i}{84} & 0 & -\frac{\sqrt{30}i}{56} & 0 & 0 & 0 & \frac{5\sqrt{42}i}{168} \\ 0 & \frac{\sqrt{15}i}{84} & 0 & \frac{\sqrt{30}i}{140} & 0 & \frac{\sqrt{3}i}{84} & 0 & 0 & -\frac{5\sqrt{6}i}{168} & 0 & -\frac{\sqrt{10}i}{28} & 0 & -\frac{5\sqrt{2}i}{56} & 0 \end{bmatrix} $ |
| 417 | symmetry                           | $ -\frac{z(3x^2+3y^2-2z^2)}{2} $  |
|     | $\mathbb{M}_{3,2}^{(1,-1;a)}(T_1)$ | $ \begin{bmatrix} 0 & 0 & -\frac{\sqrt{5}}{42} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{2\sqrt{15}}{21} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{5}}{42} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{2\sqrt{15}}{21} & 0 & 0 & 0 \\ 0 & \frac{2\sqrt{15}}{105} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{5\sqrt{6}}{42} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{2\sqrt{10}}{105} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{42} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{2\sqrt{10}}{105} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{42} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{2\sqrt{15}}{105} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{5\sqrt{6}}{42} & 0 & 0 \end{bmatrix} $   |
| 418 | symmetry                           | $ \frac{\sqrt{15}x(y-z)(y+z)}{2} $  |
|     | $\mathbb{M}_{3,0}^{(1,-1;a)}(T_2)$ | $ \begin{bmatrix} 0 & -\frac{5\sqrt{6}}{504} & 0 & \frac{5\sqrt{3}}{252} & 0 & \frac{\sqrt{30}}{168} & -\frac{\sqrt{35}}{28} & 0 & -\frac{5\sqrt{15}}{84} & 0 & \frac{5}{28} & 0 & \frac{\sqrt{5}}{28} & 0 \\ \frac{\sqrt{30}}{168} & 0 & \frac{5\sqrt{3}}{252} & 0 & -\frac{5\sqrt{6}}{504} & 0 & 0 & -\frac{\sqrt{5}}{28} & 0 & -\frac{5}{28} & 0 & \frac{5\sqrt{15}}{84} & 0 & \frac{\sqrt{35}}{28} \\ \frac{\sqrt{5}}{84} & 0 & -\frac{\sqrt{2}}{28} & 0 & -\frac{1}{28} & 0 & 0 & \frac{5\sqrt{30}}{168} & 0 & -\frac{5\sqrt{6}}{84} & 0 & -\frac{\sqrt{10}}{56} & 0 & 0 \\ 0 & -\frac{\sqrt{3}}{36} & 0 & \frac{\sqrt{6}}{252} & 0 & -\frac{\sqrt{15}}{84} & -\frac{\sqrt{70}}{56} & 0 & 0 & 0 & -\frac{5\sqrt{2}}{56} & 0 & -\frac{\sqrt{10}}{28} & 0 \\ \frac{\sqrt{15}}{84} & 0 & -\frac{\sqrt{6}}{252} & 0 & \frac{\sqrt{3}}{36} & 0 & 0 & -\frac{\sqrt{10}}{28} & 0 & -\frac{5\sqrt{2}}{56} & 0 & 0 & 0 & -\frac{\sqrt{70}}{56} \\ 0 & \frac{1}{28} & 0 & \frac{\sqrt{2}}{28} & 0 & -\frac{\sqrt{5}}{84} & 0 & 0 & -\frac{\sqrt{10}}{56} & 0 & -\frac{5\sqrt{6}}{84} & 0 & \frac{5\sqrt{30}}{168} & 0 \end{bmatrix} $  |
| 419 | symmetry                           | $ -\frac{\sqrt{15}y(x-z)(x+z)}{2} $   |
|     | $\mathbb{M}_{3,1}^{(1,-1;a)}(T_2)$ | $ \begin{bmatrix} 0 & \frac{5\sqrt{6}i}{504} & 0 & \frac{5\sqrt{3}i}{252} & 0 & -\frac{\sqrt{30}i}{168} & -\frac{\sqrt{35}i}{28} & 0 & \frac{5\sqrt{15}i}{84} & 0 & \frac{5i}{28} & 0 & -\frac{\sqrt{5}i}{28} & 0 \\ \frac{\sqrt{30}i}{168} & 0 & -\frac{5\sqrt{3}i}{252} & 0 & -\frac{5\sqrt{6}i}{504} & 0 & 0 & -\frac{\sqrt{5}i}{28} & 0 & \frac{5i}{28} & 0 & \frac{5\sqrt{15}i}{84} & 0 & -\frac{\sqrt{35}i}{28} \\ -\frac{\sqrt{5}i}{84} & 0 & -\frac{\sqrt{2}i}{28} & 0 & \frac{i}{28} & 0 & 0 & -\frac{5\sqrt{30}i}{168} & 0 & -\frac{5\sqrt{6}i}{84} & 0 & \frac{\sqrt{10}i}{56} & 0 & 0 \\ 0 & \frac{\sqrt{3}i}{36} & 0 & \frac{\sqrt{6}i}{252} & 0 & \frac{\sqrt{15}i}{84} & -\frac{\sqrt{70}i}{56} & 0 & 0 & 0 & -\frac{5\sqrt{2}i}{56} & 0 & \frac{\sqrt{10}i}{28} & 0 \\ \frac{\sqrt{15}i}{84} & 0 & \frac{\sqrt{6}i}{252} & 0 & \frac{\sqrt{3}i}{36} & 0 & 0 & -\frac{\sqrt{10}i}{28} & 0 & \frac{5\sqrt{2}i}{56} & 0 & 0 & 0 & \frac{\sqrt{70}i}{56} \\ 0 & \frac{i}{28} & 0 & -\frac{\sqrt{2}i}{28} & 0 & -\frac{\sqrt{5}i}{84} & 0 & 0 & -\frac{\sqrt{10}i}{56} & 0 & \frac{5\sqrt{6}i}{84} & 0 & \frac{5\sqrt{30}i}{168} & 0 \end{bmatrix} $             |
| 420 | symmetry                           | $ \frac{\sqrt{15}z(x-y)(x+y)}{2} $  |

continued ...

Table 7

| No. | multipole                            | matrix   |                         |                       |                       |                          |                         |                         |                         |                         |                         |                        |                         |                        |                          |
|-----|--------------------------------------|--|-------------------------|-----------------------|-----------------------|--------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|------------------------|-------------------------|------------------------|--------------------------|
|     | $\mathbb{M}_{3,2}^{(1,-1;a)}(T_2)$   | $-\frac{\sqrt{30}}{252}$   | 0                       | 0                     | 0                     | $-\frac{5\sqrt{6}}{252}$ | 0                       | 0                       | $-\frac{\sqrt{5}}{7}$   | 0                       | 0                       | 0                      | $-\frac{\sqrt{15}}{21}$ | 0                      | 0                        |
|     |                                      | 0  | $\frac{5\sqrt{6}}{252}$ | 0                     | 0                     | 0                        | $\frac{\sqrt{30}}{252}$ | 0                       | 0                       | $-\frac{\sqrt{15}}{21}$ | 0                       | 0                      | 0                       | $-\frac{\sqrt{5}}{7}$  | 0                        |
|     |                                      | 0  | 0                       | 0                     | $\frac{\sqrt{2}}{21}$ | 0                        | 0                       | $\frac{\sqrt{210}}{84}$ | 0                       | 0                       | 0                       | $\frac{5\sqrt{6}}{84}$ | 0                       | 0                      | 0                        |
|     |                                      | $-\frac{\sqrt{15}}{63}$  | 0                       | 0                     | 0                     | $\frac{\sqrt{3}}{63}$    | 0                       | 0                       | $-\frac{\sqrt{10}}{28}$ | 0                       | 0                       | 0                      | $\frac{\sqrt{30}}{28}$  | 0                      | 0                        |
|     |                                      | 0  | $\frac{\sqrt{3}}{63}$   | 0                     | 0                     | 0                        | $-\frac{\sqrt{15}}{63}$ | 0                       | 0                       | $-\frac{\sqrt{30}}{28}$ | 0                       | 0                      | 0                       | $\frac{\sqrt{10}}{28}$ | 0                        |
|     |                                      | 0  | 0                       | $\frac{\sqrt{2}}{21}$ | 0                     | 0                        | 0                       | 0                       | 0                       | 0                       | $-\frac{5\sqrt{6}}{84}$ | 0                      | 0                       | 0                      | $-\frac{\sqrt{210}}{84}$ |
| 421 | symmetry                             | $\frac{3\sqrt{35}xyz(x-y)(x+y)}{2}$  |                         |                       |                       |                          |                         |                         |                         |                         |                         |                        |                         |                        |                          |
|     | $\mathbb{M}_{5,0}^{(1,-1;a)}(E)$     | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{70}i}{20} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{20} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{70}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$   |                         |                       |                       |                          |                         |                         |                         |                         |                         |                        |                         |                        |                          |
| 422 | symmetry                             | $\frac{\sqrt{105}xyz(x^2+y^2-2z^2)}{2}$  |                         |                       |                       |                          |                         |                         |                         |                         |                         |                        |                         |                        |                          |
|     | $\mathbb{M}_{5,1}^{(1,-1;a)}(E)$     | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{120} & 0 & 0 & 0 & -\frac{\sqrt{42}i}{24} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}i}{40} & 0 & 0 & 0 & \frac{\sqrt{210}i}{40} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{210}i}{40} & 0 & 0 & 0 & -\frac{\sqrt{70}i}{40} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{42}i}{24} & 0 & 0 & 0 & \frac{\sqrt{30}i}{120} & 0 \end{bmatrix}$   |                         |                       |                       |                          |                         |                         |                         |                         |                         |                        |                         |                        |                          |
| 423 | symmetry                             | $\frac{x(8x^4-40x^2y^2-40x^2z^2+15y^4+30y^2z^2+15z^4)}{8}$   |                         |                       |                       |                          |                         |                         |                         |                         |                         |                        |                         |                        |                          |
|     | $\mathbb{M}_{5,0}^{(1,-1;a)}(T_1,1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{32} & 0 & -\frac{\sqrt{10}}{32} & 0 & \frac{7\sqrt{6}}{96} & 0 & -\frac{3\sqrt{14}}{32} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{42}}{96} & 0 & -\frac{3\sqrt{2}}{32} & 0 & \frac{\sqrt{30}}{32} & 0 & -\frac{7\sqrt{6}}{96} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{7\sqrt{6}}{96} & 0 & \frac{\sqrt{30}}{32} & 0 & -\frac{3\sqrt{2}}{32} & 0 & \frac{\sqrt{42}}{96} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{14}}{32} & 0 & \frac{7\sqrt{6}}{96} & 0 & -\frac{\sqrt{10}}{32} & 0 & \frac{\sqrt{2}}{32} & 0 & 0 \end{bmatrix}$ |                         |                       |                       |                          |                         |                         |                         |                         |                         |                        |                         |                        |                          |
| 424 | symmetry                             | $\frac{y(15x^4-40x^2y^2+30x^2z^2+8y^4-40y^2z^2+15z^4)}{8}$   |                         |                       |                       |                          |                         |                         |                         |                         |                         |                        |                         |                        |                          |

continued ...

Table 7

| No. | multipole | matrix   |
|-----|-----------|--|
|     |           | $ \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{32} & 0 & \frac{\sqrt{10}i}{32} & 0 & \frac{7\sqrt{6}i}{96} & 0 & \frac{3\sqrt{14}i}{32} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{42}i}{96} & 0 & -\frac{3\sqrt{2}i}{32} & 0 & -\frac{\sqrt{30}i}{32} & 0 & -\frac{7\sqrt{6}i}{96} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{7\sqrt{6}i}{96} & 0 & \frac{\sqrt{30}i}{32} & 0 & \frac{3\sqrt{2}i}{32} & 0 & \frac{\sqrt{42}i}{96} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{14}i}{32} & 0 & -\frac{7\sqrt{6}i}{96} & 0 & -\frac{\sqrt{10}i}{32} & 0 & -\frac{\sqrt{2}i}{32} & 0 & 0 \end{bmatrix} $                       |
| 425 | symmetry  | $ \frac{z(15x^4+30x^2y^2-40x^2z^2+15y^4-40y^2z^2+8z^4)}{8} $   |
|     |           | $ \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{12} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{12} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & 0 \end{bmatrix} $   |
| 426 | symmetry  | $ \frac{3\sqrt{35}x(y^2-2yz-z^2)(y^2+2yz-z^2)}{8} $  |
|     |           | $ \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{70}}{160} & 0 & -\frac{\sqrt{14}}{32} & 0 & -\frac{3\sqrt{210}}{160} & 0 & -\frac{\sqrt{10}}{32} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{30}}{160} & 0 & -\frac{3\sqrt{70}}{160} & 0 & \frac{\sqrt{42}}{32} & 0 & \frac{3\sqrt{210}}{160} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{3\sqrt{210}}{160} & 0 & \frac{\sqrt{42}}{32} & 0 & -\frac{3\sqrt{70}}{160} & 0 & -\frac{3\sqrt{30}}{160} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{32} & 0 & -\frac{3\sqrt{210}}{160} & 0 & -\frac{\sqrt{14}}{32} & 0 & \frac{\sqrt{70}}{160} & 0 & 0 \end{bmatrix} $               |
| 427 | symmetry  | $ \frac{3\sqrt{35}y(x^2-2xz-z^2)(x^2+2xz-z^2)}{8} $  |
|     |           | $ \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{70}i}{160} & 0 & \frac{\sqrt{14}i}{32} & 0 & -\frac{3\sqrt{210}i}{160} & 0 & \frac{\sqrt{10}i}{32} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{3\sqrt{30}i}{160} & 0 & -\frac{3\sqrt{70}i}{160} & 0 & -\frac{\sqrt{42}i}{32} & 0 & \frac{3\sqrt{210}i}{160} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{210}i}{160} & 0 & \frac{\sqrt{42}i}{32} & 0 & \frac{3\sqrt{70}i}{160} & 0 & -\frac{3\sqrt{30}i}{160} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}i}{32} & 0 & \frac{3\sqrt{210}i}{160} & 0 & -\frac{\sqrt{14}i}{32} & 0 & -\frac{\sqrt{70}i}{160} & 0 & 0 \end{bmatrix} $ |
| 428 | symmetry  | $ \frac{3\sqrt{35}z(x^2-2xy-y^2)(x^2+2xy-y^2)}{8} $  |

continued ...

Table 7

| No. | multipole | matrix   |
|-----|-----------|--|
|     |           | $ \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}}{20} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{20} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{70}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix} $   |
| 429 | symmetry  | $ \frac{\sqrt{105}x(y-z)(y+z)(2x^2-y^2-z^2)}{4} $ $ \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{210}}{240} & 0 & -\frac{\sqrt{42}}{48} & 0 & \frac{\sqrt{70}}{80} & 0 & \frac{\sqrt{30}}{16} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{80} & 0 & -\frac{\sqrt{210}}{80} & 0 & \frac{\sqrt{14}}{16} & 0 & -\frac{\sqrt{70}}{80} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}}{80} & 0 & \frac{\sqrt{14}}{16} & 0 & -\frac{\sqrt{210}}{80} & 0 & \frac{\sqrt{10}}{80} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{16} & 0 & \frac{\sqrt{70}}{80} & 0 & -\frac{\sqrt{42}}{48} & 0 & \frac{\sqrt{210}}{240} & 0 & 0 \end{bmatrix} $                   |
| 430 | symmetry  | $ \frac{\sqrt{105}y(x-z)(x+z)(x^2-2y^2+z^2)}{4} $ $ \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}i}{240} & 0 & -\frac{\sqrt{42}i}{48} & 0 & -\frac{\sqrt{70}i}{80} & 0 & \frac{\sqrt{30}i}{16} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}i}{80} & 0 & \frac{\sqrt{210}i}{80} & 0 & \frac{\sqrt{14}i}{16} & 0 & \frac{\sqrt{70}i}{80} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}i}{80} & 0 & -\frac{\sqrt{14}i}{16} & 0 & -\frac{\sqrt{210}i}{80} & 0 & -\frac{\sqrt{10}i}{80} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{16} & 0 & \frac{\sqrt{70}i}{80} & 0 & \frac{\sqrt{42}i}{48} & 0 & \frac{\sqrt{210}i}{240} & 0 & 0 \end{bmatrix} $ |
| 431 | symmetry  | $ -\frac{\sqrt{105}z(x-y)(x+y)(x^2+y^2-2z^2)}{4} $ $ \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{120} & 0 & 0 & 0 & -\frac{\sqrt{42}}{24} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{70}}{40} & 0 & 0 & 0 & \frac{\sqrt{210}}{40} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}}{40} & 0 & 0 & 0 & -\frac{\sqrt{70}}{40} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{42}}{24} & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{120} \end{bmatrix} $  |
| 432 | symmetry  | $ \sqrt{15}xyz $   |

continued ...

Table 7

| No. | multipole                         | matrix                           |                            |                            |                            |                             |                            |                          |                            |                            |                            |                            |                            |                            |                          |
|-----|-----------------------------------|----------------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|----------------------------|--------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|--------------------------|
|     | $\mathbb{M}_3^{(1,0;a)}(A_2)$     | $-\frac{\sqrt{42}i}{126}$        | 0                          | 0                          | 0                          | $\frac{\sqrt{210}i}{126}$   | 0                          | 0                        | $\frac{5\sqrt{7}i}{56}$    | 0                          | 0                          | 0                          | $-\frac{5\sqrt{21}i}{168}$ | 0                          | 0                        |
|     |                                   | 0                                | $\frac{\sqrt{210}i}{126}$  | 0                          | 0                          | 0                           | $-\frac{\sqrt{42}i}{126}$  | 0                        | 0                          | $\frac{5\sqrt{21}i}{168}$  | 0                          | 0                          | 0                          | $-\frac{5\sqrt{7}i}{56}$   | 0                        |
|     |                                   | 0                                | 0                          | 0                          | $-\frac{5\sqrt{70}i}{168}$ | 0                           | 0                          | $\frac{\sqrt{6}i}{24}$   | 0                          | 0                          | 0                          | $-\frac{\sqrt{210}i}{168}$ | 0                          | 0                          | 0                        |
|     |                                   | $-\frac{25\sqrt{21}i}{504}$      | 0                          | 0                          | 0                          | $-\frac{5\sqrt{105}i}{504}$ | 0                          | 0                        | $-\frac{\sqrt{14}i}{56}$   | 0                          | 0                          | 0                          | $-\frac{\sqrt{42}i}{56}$   | 0                          | 0                        |
|     |                                   | 0                                | $\frac{5\sqrt{105}i}{504}$ | 0                          | 0                          | 0                           | $\frac{25\sqrt{21}i}{504}$ | 0                        | 0                          | $-\frac{\sqrt{42}i}{56}$   | 0                          | 0                          | 0                          | $-\frac{\sqrt{14}i}{56}$   | 0                        |
|     |                                   | 0                                | 0                          | $\frac{5\sqrt{70}i}{168}$  | 0                          | 0                           | 0                          | 0                        | 0                          | 0                          | $-\frac{\sqrt{210}i}{168}$ | 0                          | 0                          | 0                          | $\frac{\sqrt{6}i}{24}$   |
| 433 | symmetry                          | $\frac{x(2x^2-3y^2-3z^2)}{2}$    |                            |                            |                            |                             |                            |                          |                            |                            |                            |                            |                            |                            |                          |
|     | $\mathbb{M}_{3,0}^{(1,0;a)}(T_1)$ | 0                                | $-\frac{\sqrt{14}}{84}$    | 0                          | $\frac{\sqrt{7}}{42}$      | 0                           | $-\frac{\sqrt{70}}{84}$    | $-\frac{5\sqrt{15}}{96}$ | 0                          | $\frac{5\sqrt{35}}{224}$   | 0                          | $-\frac{5\sqrt{21}}{224}$  | 0                          | $\frac{5\sqrt{105}}{672}$  | 0                        |
|     |                                   | $-\frac{\sqrt{70}}{84}$          | 0                          | $\frac{\sqrt{7}}{42}$      | 0                          | $-\frac{\sqrt{14}}{84}$     | 0                          | 0                        | $-\frac{5\sqrt{105}}{672}$ | 0                          | $\frac{5\sqrt{21}}{224}$   | 0                          | $-\frac{5\sqrt{35}}{224}$  | 0                          | $\frac{5\sqrt{15}}{96}$  |
|     |                                   | $\frac{5\sqrt{105}}{672}$        | 0                          | $-\frac{5\sqrt{42}}{224}$  | 0                          | $\frac{25\sqrt{21}}{672}$   | 0                          | 0                        | $\frac{\sqrt{70}}{112}$    | 0                          | $-\frac{\sqrt{14}}{56}$    | 0                          | $\frac{\sqrt{210}}{336}$   | 0                          | 0                        |
|     |                                   | 0                                | $-\frac{5\sqrt{7}}{96}$    | 0                          | $\frac{5\sqrt{14}}{672}$   | 0                           | $\frac{25\sqrt{35}}{672}$  | $\frac{\sqrt{30}}{48}$   | 0                          | 0                          | 0                          | $-\frac{\sqrt{42}}{112}$   | 0                          | $\frac{\sqrt{210}}{168}$   | 0                        |
|     |                                   | $-\frac{25\sqrt{35}}{672}$       | 0                          | $-\frac{5\sqrt{14}}{672}$  | 0                          | $\frac{5\sqrt{7}}{96}$      | 0                          | 0                        | $\frac{\sqrt{210}}{168}$   | 0                          | $-\frac{\sqrt{42}}{112}$   | 0                          | 0                          | 0                          | $\frac{\sqrt{30}}{48}$   |
|     |                                   | 0                                | $-\frac{25\sqrt{21}}{672}$ | 0                          | $\frac{5\sqrt{42}}{224}$   | 0                           | $-\frac{5\sqrt{105}}{672}$ | 0                        | 0                          | $\frac{\sqrt{210}}{336}$   | 0                          | $-\frac{\sqrt{14}}{56}$    | 0                          | $\frac{\sqrt{70}}{112}$    | 0                        |
| 434 | symmetry                          | $-\frac{y(3x^2-2y^2+3z^2)}{2}$   |                            |                            |                            |                             |                            |                          |                            |                            |                            |                            |                            |                            |                          |
|     | $\mathbb{M}_{3,1}^{(1,0;a)}(T_1)$ | 0                                | $-\frac{\sqrt{14}i}{84}$   | 0                          | $-\frac{\sqrt{7}i}{42}$    | 0                           | $-\frac{\sqrt{70}i}{84}$   | $\frac{5\sqrt{15}i}{96}$ | 0                          | $\frac{5\sqrt{35}i}{224}$  | 0                          | $\frac{5\sqrt{21}i}{224}$  | 0                          | $\frac{5\sqrt{105}i}{672}$ | 0                        |
|     |                                   | $\frac{\sqrt{70}i}{84}$          | 0                          | $\frac{\sqrt{7}i}{42}$     | 0                          | $\frac{\sqrt{14}i}{84}$     | 0                          | 0                        | $\frac{5\sqrt{105}i}{672}$ | 0                          | $\frac{5\sqrt{21}i}{224}$  | 0                          | $\frac{5\sqrt{35}i}{224}$  | 0                          | $\frac{5\sqrt{15}i}{96}$ |
|     |                                   | $\frac{5\sqrt{105}i}{672}$       | 0                          | $\frac{5\sqrt{42}i}{224}$  | 0                          | $\frac{25\sqrt{21}i}{672}$  | 0                          | 0                        | $\frac{\sqrt{70}i}{112}$   | 0                          | $\frac{\sqrt{14}i}{56}$    | 0                          | $\frac{\sqrt{210}i}{336}$  | 0                          | 0                        |
|     |                                   | 0                                | $-\frac{5\sqrt{7}i}{96}$   | 0                          | $-\frac{5\sqrt{14}i}{672}$ | 0                           | $\frac{25\sqrt{35}i}{672}$ | $-\frac{\sqrt{30}i}{48}$ | 0                          | 0                          | 0                          | $\frac{\sqrt{42}i}{112}$   | 0                          | $\frac{\sqrt{210}i}{168}$  | 0                        |
|     |                                   | $\frac{25\sqrt{35}i}{672}$       | 0                          | $-\frac{5\sqrt{14}i}{672}$ | 0                          | $-\frac{5\sqrt{7}i}{96}$    | 0                          | 0                        | $-\frac{\sqrt{210}i}{168}$ | 0                          | $-\frac{\sqrt{42}i}{112}$  | 0                          | 0                          | 0                          | $\frac{\sqrt{30}i}{48}$  |
|     |                                   | 0                                | $\frac{25\sqrt{21}i}{672}$ | 0                          | $\frac{5\sqrt{42}i}{224}$  | 0                           | $\frac{5\sqrt{105}i}{672}$ | 0                        | 0                          | $-\frac{\sqrt{210}i}{336}$ | 0                          | $-\frac{\sqrt{14}i}{56}$   | 0                          | $-\frac{\sqrt{70}i}{112}$  | 0                        |
| 435 | symmetry                          | $-\frac{z(3x^2+3y^2-2z^2)}{2}$   |                            |                            |                            |                             |                            |                          |                            |                            |                            |                            |                            |                            |                          |
|     | $\mathbb{M}_{3,2}^{(1,0;a)}(T_1)$ | 0                                | 0                          | $-\frac{\sqrt{7}}{21}$     | 0                          | 0                           | 0                          | 0                        | 0                          | $\frac{5\sqrt{21}}{84}$    | 0                          | 0                          | 0                          | 0                          | 0                        |
|     |                                   | 0                                | 0                          | 0                          | $\frac{\sqrt{7}}{21}$      | 0                           | 0                          | 0                        | 0                          | 0                          | $\frac{5\sqrt{21}}{84}$    | 0                          | 0                          | 0                          | 0                        |
|     |                                   | 0                                | $\frac{5\sqrt{21}}{84}$    | 0                          | 0                          | 0                           | 0                          | 0                        | 0                          | $\frac{\sqrt{210}}{84}$    | 0                          | 0                          | 0                          | 0                          | 0                        |
|     |                                   | 0                                | 0                          | $-\frac{5\sqrt{14}}{84}$   | 0                          | 0                           | 0                          | 0                        | 0                          | 0                          | $\frac{\sqrt{42}}{84}$     | 0                          | 0                          | 0                          | 0                        |
|     |                                   | 0                                | 0                          | 0                          | $-\frac{5\sqrt{14}}{84}$   | 0                           | 0                          | 0                        | 0                          | 0                          | 0                          | $-\frac{\sqrt{42}}{84}$    | 0                          | 0                          | 0                        |
|     |                                   | 0                                | 0                          | 0                          | 0                          | $\frac{5\sqrt{21}}{84}$     | 0                          | 0                        | 0                          | 0                          | 0                          | 0                          | $-\frac{\sqrt{210}}{84}$   | 0                          | 0                        |
| 436 | symmetry                          | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ |                            |                            |                            |                             |                            |                          |                            |                            |                            |                            |                            |                            |                          |

continued ...

Table 7

| No. | multipole                         | matrix   |                            |                             |                             |                            |                            |                         |                            |                             |                            |                            |                             |                           |                        |  |
|-----|-----------------------------------|--|----------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|-------------------------|----------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------|---------------------------|------------------------|--|
|     | $\mathbb{M}_{3,0}^{(1,0;a)}(T_2)$ | 0  | $-\frac{\sqrt{210}}{252}$  | 0                           | $\frac{\sqrt{105}}{126}$    | 0                          | $\frac{\sqrt{42}}{84}$     | $\frac{5}{32}$          | 0                          | $\frac{25\sqrt{21}}{672}$   | 0                          | $-\frac{5\sqrt{35}}{224}$  | 0                           | $-\frac{5\sqrt{7}}{224}$  | 0                      |  |
|     |                                   | $\frac{\sqrt{42}}{84}$   | 0                          | $\frac{\sqrt{105}}{126}$    | 0                           | $-\frac{\sqrt{210}}{252}$  | 0                          | 0                       | $\frac{5\sqrt{7}}{224}$    | 0                           | $\frac{5\sqrt{35}}{224}$   | 0                          | $-\frac{25\sqrt{21}}{672}$  | 0                         | $-\frac{5}{32}$        |  |
|     |                                   | $\frac{25\sqrt{7}}{672}$   | 0                          | $-\frac{5\sqrt{70}}{224}$   | 0                           | $-\frac{5\sqrt{35}}{224}$  | 0                          | 0                       | $\frac{5\sqrt{42}}{336}$   | 0                           | $-\frac{\sqrt{210}}{168}$  | 0                          | $-\frac{\sqrt{14}}{112}$    | 0                         | 0                      |  |
|     |                                   | 0  | $-\frac{5\sqrt{105}}{288}$ | 0                           | $\frac{5\sqrt{210}}{2016}$  | 0                          | $-\frac{25\sqrt{21}}{672}$ | $-\frac{\sqrt{2}}{16}$  | 0                          | 0                           | 0                          | $-\frac{\sqrt{70}}{112}$   | 0                           | $-\frac{\sqrt{14}}{56}$   | 0                      |  |
|     |                                   | $\frac{25\sqrt{21}}{672}$  | 0                          | $-\frac{5\sqrt{210}}{2016}$ | 0                           | $\frac{5\sqrt{105}}{288}$  | 0                          | 0                       | $-\frac{\sqrt{14}}{56}$    | 0                           | $-\frac{\sqrt{70}}{112}$   | 0                          | 0                           | 0                         | $-\frac{\sqrt{2}}{16}$ |  |
|     |                                   | 0  | $\frac{5\sqrt{35}}{224}$   | 0                           | $\frac{5\sqrt{70}}{224}$    | 0                          | $-\frac{25\sqrt{7}}{672}$  | 0                       | 0                          | $-\frac{\sqrt{14}}{112}$    | 0                          | $-\frac{\sqrt{210}}{168}$  | 0                           | $\frac{5\sqrt{42}}{336}$  | 0                      |  |
| 437 | symmetry                          | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$  |                            |                             |                             |                            |                            |                         |                            |                             |                            |                            |                             |                           |                        |  |
|     | $\mathbb{M}_{3,1}^{(1,0;a)}(T_2)$ | 0  | $\frac{\sqrt{210}i}{252}$  | 0                           | $\frac{\sqrt{105}i}{126}$   | 0                          | $-\frac{\sqrt{42}i}{84}$   | $\frac{5i}{32}$         | 0                          | $-\frac{25\sqrt{21}i}{672}$ | 0                          | $-\frac{5\sqrt{35}i}{224}$ | 0                           | $\frac{5\sqrt{7}i}{224}$  | 0                      |  |
|     |                                   | $\frac{\sqrt{42}i}{84}$  | 0                          | $-\frac{\sqrt{105}i}{126}$  | 0                           | $-\frac{\sqrt{210}i}{252}$ | 0                          | 0                       | $\frac{5\sqrt{7}i}{224}$   | 0                           | $-\frac{5\sqrt{35}i}{224}$ | 0                          | $-\frac{25\sqrt{21}i}{672}$ | 0                         | $\frac{5i}{32}$        |  |
|     |                                   | $-\frac{25\sqrt{7}i}{672}$   | 0                          | $-\frac{5\sqrt{70}i}{224}$  | 0                           | $\frac{5\sqrt{35}i}{224}$  | 0                          | 0                       | $-\frac{5\sqrt{42}i}{336}$ | 0                           | $-\frac{\sqrt{210}i}{168}$ | 0                          | $\frac{\sqrt{14}i}{112}$    | 0                         | 0                      |  |
|     |                                   | 0  | $\frac{5\sqrt{105}i}{288}$ | 0                           | $\frac{5\sqrt{210}i}{2016}$ | 0                          | $\frac{25\sqrt{21}i}{672}$ | $-\frac{\sqrt{2}i}{16}$ | 0                          | 0                           | 0                          | $-\frac{\sqrt{70}i}{112}$  | 0                           | $\frac{\sqrt{14}i}{56}$   | 0                      |  |
|     |                                   | $\frac{25\sqrt{21}i}{672}$   | 0                          | $\frac{5\sqrt{210}i}{2016}$ | 0                           | $\frac{5\sqrt{105}i}{288}$ | 0                          | 0                       | $-\frac{\sqrt{14}i}{56}$   | 0                           | $\frac{\sqrt{70}i}{112}$   | 0                          | 0                           | 0                         | $\frac{\sqrt{2}i}{16}$ |  |
|     |                                   | 0  | $\frac{5\sqrt{35}i}{224}$  | 0                           | $-\frac{5\sqrt{70}i}{224}$  | 0                          | $-\frac{25\sqrt{7}i}{672}$ | 0                       | 0                          | $-\frac{\sqrt{14}i}{112}$   | 0                          | $\frac{\sqrt{210}i}{168}$  | 0                           | $\frac{5\sqrt{42}i}{336}$ | 0                      |  |
| 438 | symmetry                          | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$   |                            |                             |                             |                            |                            |                         |                            |                             |                            |                            |                             |                           |                        |  |
|     | $\mathbb{M}_{3,2}^{(1,0;a)}(T_2)$ | $-\frac{\sqrt{42}}{126}$   | 0                          | 0                           | 0                           | $-\frac{\sqrt{210}}{126}$  | 0                          | 0                       | $\frac{5\sqrt{7}}{56}$     | 0                           | 0                          | 0                          | $\frac{5\sqrt{21}}{168}$    | 0                         | 0                      |  |
|     |                                   | 0  | $\frac{\sqrt{210}}{126}$   | 0                           | 0                           | 0                          | $\frac{\sqrt{42}}{126}$    | 0                       | 0                          | $\frac{5\sqrt{21}}{168}$    | 0                          | 0                          | 0                           | $\frac{5\sqrt{7}}{56}$    | 0                      |  |
|     |                                   | 0  | 0                          | 0                           | $\frac{5\sqrt{70}}{168}$    | 0                          | 0                          | $\frac{\sqrt{6}}{24}$   | 0                          | 0                           | 0                          | $\frac{\sqrt{210}}{168}$   | 0                           | 0                         | 0                      |  |
|     |                                   | $-\frac{25\sqrt{21}}{504}$   | 0                          | 0                           | 0                           | $\frac{5\sqrt{105}}{504}$  | 0                          | 0                       | $-\frac{\sqrt{14}}{56}$    | 0                           | 0                          | 0                          | $\frac{\sqrt{42}}{56}$      | 0                         | 0                      |  |
|     |                                   | 0  | $\frac{5\sqrt{105}}{504}$  | 0                           | 0                           | 0                          | $-\frac{25\sqrt{21}}{504}$ | 0                       | 0                          | $-\frac{\sqrt{42}}{56}$     | 0                          | 0                          | 0                           | $\frac{\sqrt{14}}{56}$    | 0                      |  |
|     |                                   | 0  | 0                          | $\frac{5\sqrt{70}}{168}$    | 0                           | 0                          | 0                          | 0                       | 0                          | $-\frac{\sqrt{210}}{168}$   | 0                          | 0                          | 0                           | 0                         | $-\frac{\sqrt{6}}{24}$ |  |
| 439 | symmetry                          | $x$  |                            |                             |                             |                            |                            |                         |                            |                             |                            |                            |                             |                           |                        |  |
|     | $\mathbb{M}_{1,0}^{(1,1;a)}(T_1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{2}}{4} & 0 & -\frac{\sqrt{5}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{30}}{20} & 0 & -\frac{\sqrt{15}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{15}}{20} & 0 & -\frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{5}}{20} & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |                            |                             |                             |                            |                            |                         |                            |                             |                            |                            |                             |                           |                        |  |
| 440 | symmetry                          | $y$  |                            |                             |                             |                            |                            |                         |                            |                             |                            |                            |                             |                           |                        |  |

continued ...

Table 7

| No. | multipole                         | matrix  |
|-----|-----------------------------------|---|
|     | $\mathbb{M}_{1,1}^{(1,1;a)}(T_1)$ | $ \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{5}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{30}i}{20} & 0 & \frac{\sqrt{15}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{15}i}{20} & 0 & \frac{\sqrt{30}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{5}i}{20} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix} $  |
| 441 | symmetry                          | $ \begin{matrix} z \\ \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{10}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{15}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{15}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix} \end{matrix} $   |
| 442 | symmetry                          | $ \begin{matrix} \sqrt{15}xyz \\ \begin{bmatrix} \frac{\sqrt{6}i}{14} & 0 & 0 & 0 & -\frac{\sqrt{30}i}{14} & 0 & 0 & -\frac{3i}{56} & 0 & 0 & 0 & \frac{\sqrt{3}i}{56} & 0 & 0 \\ 0 & -\frac{\sqrt{30}i}{14} & 0 & 0 & 0 & \frac{\sqrt{6}i}{14} & 0 & 0 & -\frac{\sqrt{3}i}{56} & 0 & 0 & 0 & \frac{3i}{56} & 0 \\ 0 & 0 & 0 & -\frac{3\sqrt{10}i}{56} & 0 & 0 & -\frac{\sqrt{42}i}{168} & 0 & 0 & 0 & \frac{\sqrt{30}i}{168} & 0 & 0 & 0 \\ -\frac{5\sqrt{3}i}{56} & 0 & 0 & 0 & -\frac{\sqrt{15}i}{56} & 0 & 0 & \frac{\sqrt{2}i}{56} & 0 & 0 & 0 & \frac{\sqrt{6}i}{56} & 0 & 0 \\ 0 & \frac{\sqrt{15}i}{56} & 0 & 0 & 0 & \frac{5\sqrt{3}i}{56} & 0 & 0 & \frac{\sqrt{6}i}{56} & 0 & 0 & 0 & \frac{\sqrt{2}i}{56} & 0 \\ 0 & 0 & \frac{3\sqrt{10}i}{56} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{168} & 0 & 0 & 0 & -\frac{\sqrt{42}i}{168} \end{bmatrix} \end{matrix} $   |
| 443 | symmetry                          | $ \begin{matrix} \frac{x(2x^2-3y^2-3z^2)}{2} \\ \begin{bmatrix} 0 & \frac{3\sqrt{2}}{28} & 0 & -\frac{3}{14} & 0 & \frac{3\sqrt{10}}{28} & \frac{\sqrt{105}}{224} & 0 & -\frac{3\sqrt{5}}{224} & 0 & \frac{3\sqrt{3}}{224} & 0 & -\frac{\sqrt{15}}{224} & 0 \\ \frac{3\sqrt{10}}{28} & 0 & -\frac{3}{14} & 0 & \frac{3\sqrt{2}}{28} & 0 & 0 & \frac{\sqrt{15}}{224} & 0 & -\frac{3\sqrt{3}}{224} & 0 & \frac{3\sqrt{5}}{224} & 0 & -\frac{\sqrt{105}}{224} \\ \frac{3\sqrt{15}}{224} & 0 & -\frac{9\sqrt{6}}{224} & 0 & \frac{15\sqrt{3}}{224} & 0 & 0 & -\frac{\sqrt{10}}{112} & 0 & \frac{\sqrt{2}}{56} & 0 & -\frac{\sqrt{30}}{336} & 0 & 0 \\ 0 & -\frac{3}{32} & 0 & \frac{3\sqrt{2}}{224} & 0 & \frac{15\sqrt{5}}{224} & -\frac{\sqrt{210}}{336} & 0 & 0 & 0 & \frac{\sqrt{6}}{112} & 0 & -\frac{\sqrt{30}}{168} & 0 \\ -\frac{15\sqrt{5}}{224} & 0 & -\frac{3\sqrt{2}}{224} & 0 & \frac{3}{32} & 0 & 0 & -\frac{\sqrt{30}}{168} & 0 & \frac{\sqrt{6}}{112} & 0 & 0 & 0 & -\frac{\sqrt{210}}{336} \\ 0 & -\frac{15\sqrt{3}}{224} & 0 & \frac{9\sqrt{6}}{224} & 0 & -\frac{3\sqrt{15}}{224} & 0 & 0 & -\frac{\sqrt{30}}{336} & 0 & \frac{\sqrt{2}}{56} & 0 & -\frac{\sqrt{10}}{112} & 0 \end{bmatrix} \end{matrix} $ |
| 444 | symmetry                          | $ -\frac{y(3x^2-2y^2+3z^2)}{2} $  |

continued ...

Table 7

| No. | multipole                         | matrix  |                           |                           |                           |                           |                           |                            |                           |                           |                           |                           |                           |                           |                            |
|-----|-----------------------------------|---|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|----------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|----------------------------|
|     | $\mathbb{M}_{3,1}^{(1,1;a)}(T_1)$ | 0   | $\frac{3\sqrt{2}i}{28}$   | 0                         | $\frac{3i}{14}$           | 0                         | $\frac{3\sqrt{10}i}{28}$  | $-\frac{\sqrt{105}i}{224}$ | 0                         | $-\frac{3\sqrt{5}i}{224}$ | 0                         | $-\frac{3\sqrt{3}i}{224}$ | 0                         | $-\frac{\sqrt{15}i}{224}$ | 0                          |
|     |                                   | $-\frac{3\sqrt{10}i}{28}$   | 0                         | $-\frac{3i}{14}$          | 0                         | $-\frac{3\sqrt{2}i}{28}$  | 0                         | 0                          | $-\frac{\sqrt{15}i}{224}$ | 0                         | $-\frac{3\sqrt{3}i}{224}$ | 0                         | $-\frac{3\sqrt{5}i}{224}$ | 0                         | $-\frac{\sqrt{105}i}{224}$ |
|     |                                   | $\frac{3\sqrt{15}i}{224}$   | 0                         | $\frac{9\sqrt{6}i}{224}$  | 0                         | $\frac{15\sqrt{3}i}{224}$ | 0                         | 0                          | $-\frac{\sqrt{10}i}{112}$ | 0                         | $-\frac{\sqrt{2}i}{56}$   | 0                         | $-\frac{\sqrt{30}i}{336}$ | 0                         | 0                          |
|     |                                   | 0   | $-\frac{3i}{32}$          | 0                         | $-\frac{3\sqrt{2}i}{224}$ | 0                         | $\frac{15\sqrt{5}i}{224}$ | $\frac{\sqrt{210}i}{336}$  | 0                         | 0                         | 0                         | $-\frac{\sqrt{6}i}{112}$  | 0                         | $-\frac{\sqrt{30}i}{168}$ | 0                          |
|     |                                   | $\frac{15\sqrt{5}i}{224}$   | 0                         | $-\frac{3\sqrt{2}i}{224}$ | 0                         | $-\frac{3i}{32}$          | 0                         | 0                          | $\frac{\sqrt{30}i}{168}$  | 0                         | $\frac{\sqrt{6}i}{112}$   | 0                         | 0                         | 0                         | $-\frac{\sqrt{210}i}{336}$ |
|     |                                   | 0   | $\frac{15\sqrt{3}i}{224}$ | 0                         | $\frac{9\sqrt{6}i}{224}$  | 0                         | $\frac{3\sqrt{15}i}{224}$ | 0                          | 0                         | $\frac{\sqrt{30}i}{336}$  | 0                         | $\frac{\sqrt{2}i}{56}$    | 0                         | $\frac{\sqrt{10}i}{112}$  | 0                          |
| 445 | symmetry                          | $-\frac{z(3x^2+3y^2-2z^2)}{2}$  |                           |                           |                           |                           |                           |                            |                           |                           |                           |                           |                           |                           |                            |
|     | $\mathbb{M}_{3,2}^{(1,1;a)}(T_1)$ | $\begin{bmatrix} 0 & 0 & \frac{3}{7} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{28} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{3}{7} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{28} & 0 & 0 & 0 & 0 \\ 0 & \frac{3\sqrt{3}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{84} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{3\sqrt{2}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{84} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{3\sqrt{2}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{84} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{3\sqrt{3}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{84} & 0 & 0 & 0 \end{bmatrix}$   |                           |                           |                           |                           |                           |                            |                           |                           |                           |                           |                           |                           |                            |
| 446 | symmetry                          | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$  |                           |                           |                           |                           |                           |                            |                           |                           |                           |                           |                           |                           |                            |
|     | $\mathbb{M}_{3,0}^{(1,1;a)}(T_2)$ | $\begin{bmatrix} 0 & \frac{\sqrt{30}}{28} & 0 & -\frac{\sqrt{15}}{14} & 0 & -\frac{3\sqrt{6}}{28} & -\frac{3\sqrt{7}}{224} & 0 & -\frac{5\sqrt{3}}{224} & 0 & \frac{3\sqrt{5}}{224} & 0 & \frac{3}{224} & 0 & 0 \\ -\frac{3\sqrt{6}}{28} & 0 & -\frac{\sqrt{15}}{14} & 0 & \frac{\sqrt{30}}{28} & 0 & 0 & -\frac{3}{224} & 0 & -\frac{3\sqrt{5}}{224} & 0 & \frac{5\sqrt{3}}{224} & 0 & \frac{3\sqrt{7}}{224} & 0 \\ \frac{15}{224} & 0 & -\frac{9\sqrt{10}}{224} & 0 & -\frac{9\sqrt{5}}{224} & 0 & 0 & -\frac{5\sqrt{6}}{336} & 0 & \frac{\sqrt{30}}{168} & 0 & \frac{\sqrt{2}}{112} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{15}}{32} & 0 & \frac{\sqrt{30}}{224} & 0 & -\frac{15\sqrt{3}}{224} & \frac{\sqrt{14}}{112} & 0 & 0 & 0 & \frac{\sqrt{10}}{112} & 0 & \frac{\sqrt{2}}{56} & 0 & 0 \\ \frac{15\sqrt{3}}{224} & 0 & -\frac{\sqrt{30}}{224} & 0 & \frac{\sqrt{15}}{32} & 0 & 0 & \frac{\sqrt{2}}{56} & 0 & \frac{\sqrt{10}}{112} & 0 & 0 & 0 & \frac{\sqrt{14}}{112} & 0 \\ 0 & \frac{9\sqrt{5}}{224} & 0 & \frac{9\sqrt{10}}{224} & 0 & -\frac{15}{224} & 0 & 0 & \frac{\sqrt{2}}{112} & 0 & \frac{\sqrt{30}}{168} & 0 & -\frac{5\sqrt{6}}{336} & 0 & 0 \end{bmatrix}$  |                           |                           |                           |                           |                           |                            |                           |                           |                           |                           |                           |                           |                            |
| 447 | symmetry                          | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$   |                           |                           |                           |                           |                           |                            |                           |                           |                           |                           |                           |                           |                            |
|     | $\mathbb{M}_{3,1}^{(1,1;a)}(T_2)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{30}i}{28} & 0 & -\frac{\sqrt{15}i}{14} & 0 & \frac{3\sqrt{6}i}{28} & -\frac{3\sqrt{7}i}{224} & 0 & \frac{5\sqrt{3}i}{224} & 0 & \frac{3\sqrt{5}i}{224} & 0 & -\frac{3i}{224} & 0 & 0 \\ -\frac{3\sqrt{6}i}{28} & 0 & \frac{\sqrt{15}i}{14} & 0 & \frac{\sqrt{30}i}{28} & 0 & 0 & -\frac{3i}{224} & 0 & \frac{3\sqrt{5}i}{224} & 0 & \frac{5\sqrt{3}i}{224} & 0 & -\frac{3\sqrt{7}i}{224} & 0 \\ -\frac{15i}{224} & 0 & -\frac{9\sqrt{10}i}{224} & 0 & \frac{9\sqrt{5}i}{224} & 0 & 0 & \frac{5\sqrt{6}i}{336} & 0 & \frac{\sqrt{30}i}{168} & 0 & -\frac{\sqrt{2}i}{112} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{15}i}{32} & 0 & \frac{\sqrt{30}i}{224} & 0 & \frac{15\sqrt{3}i}{224} & \frac{\sqrt{14}i}{112} & 0 & 0 & 0 & \frac{\sqrt{10}i}{112} & 0 & -\frac{\sqrt{2}i}{56} & 0 & 0 \\ \frac{15\sqrt{3}i}{224} & 0 & \frac{\sqrt{30}i}{224} & 0 & \frac{\sqrt{15}i}{32} & 0 & 0 & \frac{\sqrt{2}i}{56} & 0 & -\frac{\sqrt{10}i}{112} & 0 & 0 & 0 & -\frac{\sqrt{14}i}{112} & 0 \\ 0 & \frac{9\sqrt{5}i}{224} & 0 & -\frac{9\sqrt{10}i}{224} & 0 & -\frac{15i}{224} & 0 & 0 & \frac{\sqrt{2}i}{112} & 0 & -\frac{\sqrt{30}i}{168} & 0 & -\frac{5\sqrt{6}i}{336} & 0 & 0 \end{bmatrix}$ |                           |                           |                           |                           |                           |                            |                           |                           |                           |                           |                           |                           |                            |
| 448 | symmetry                          | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$  |                           |                           |                           |                           |                           |                            |                           |                           |                           |                           |                           |                           |                            |

continued ...



Table 7

| No.                               | multipole | matrix                  |                         |                         |                         |                        |                         |                          |                       |                        |                         |                          |                        |                        |                         |
|-----------------------------------|-----------|-------------------------|-------------------------|-------------------------|-------------------------|------------------------|-------------------------|--------------------------|-----------------------|------------------------|-------------------------|--------------------------|------------------------|------------------------|-------------------------|
| $\mathbb{M}_{3,2}^{(1,1;a)}(T_2)$ |           | $\frac{\sqrt{6}}{14}$   | 0                       | 0                       | 0                       | $\frac{\sqrt{30}}{14}$ | 0                       | 0                        | $-\frac{3}{56}$       | 0                      | 0                       | 0                        | $-\frac{\sqrt{3}}{56}$ | 0                      | 0                       |
|                                   |           | 0                       | $-\frac{\sqrt{30}}{14}$ | 0                       | 0                       | 0                      | $-\frac{\sqrt{6}}{14}$  | 0                        | 0                     | $-\frac{\sqrt{3}}{56}$ | 0                       | 0                        | 0                      | $-\frac{3}{56}$        | 0                       |
|                                   |           | 0                       | 0                       | 0                       | $\frac{3\sqrt{10}}{56}$ | 0                      | 0                       | $-\frac{\sqrt{42}}{168}$ | 0                     | 0                      | 0                       | $-\frac{\sqrt{30}}{168}$ | 0                      | 0                      | 0                       |
|                                   |           | $-\frac{5\sqrt{3}}{56}$ | 0                       | 0                       | 0                       | $\frac{\sqrt{15}}{56}$ | 0                       | 0                        | $\frac{\sqrt{2}}{56}$ | 0                      | 0                       | 0                        | $-\frac{\sqrt{6}}{56}$ | 0                      | 0                       |
|                                   |           | 0                       | $\frac{\sqrt{15}}{56}$  | 0                       | 0                       | 0                      | $-\frac{5\sqrt{3}}{56}$ | 0                        | 0                     | $\frac{\sqrt{6}}{56}$  | 0                       | 0                        | 0                      | $-\frac{\sqrt{2}}{56}$ | 0                       |
|                                   |           | 0                       | 0                       | $\frac{3\sqrt{10}}{56}$ | 0                       | 0                      | 0                       | 0                        | 0                     | 0                      | $\frac{\sqrt{30}}{168}$ | 0                        | 0                      | 0                      | $\frac{\sqrt{42}}{168}$ |

$$\begin{aligned} \text{bra:} &= \langle \frac{3}{2}, \frac{3}{2}; d |, \langle \frac{3}{2}, \frac{1}{2}; d |, \langle \frac{3}{2}, -\frac{1}{2}; d |, \langle \frac{3}{2}, -\frac{3}{2}; d |, \langle \frac{5}{2}, \frac{5}{2}; d |, \langle \frac{5}{2}, \frac{3}{2}; d |, \langle \frac{5}{2}, \frac{1}{2}; d |, \langle \frac{5}{2}, -\frac{1}{2}; d |, \langle \frac{5}{2}, -\frac{3}{2}; d |, \langle \frac{5}{2}, -\frac{5}{2}; d | \\ \text{ket:} &= | \frac{3}{2}, \frac{3}{2}; d \rangle, | \frac{3}{2}, \frac{1}{2}; d \rangle, | \frac{3}{2}, -\frac{1}{2}; d \rangle, | \frac{3}{2}, -\frac{3}{2}; d \rangle, | \frac{5}{2}, \frac{5}{2}; d \rangle, | \frac{5}{2}, \frac{3}{2}; d \rangle, | \frac{5}{2}, \frac{1}{2}; d \rangle, | \frac{5}{2}, -\frac{1}{2}; d \rangle, | \frac{5}{2}, -\frac{3}{2}; d \rangle, | \frac{5}{2}, -\frac{5}{2}; d \rangle \end{aligned}$$

Table 8: (d,d) block.

| No. | multipole                 | matrix                                 |                        |                        |                        |                        |                        |                        |                        |                        |                        |   |
|-----|---------------------------|--|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|---|
| 449 | symmetry                  | 1                                      |                        |                        |                        |                        |                        |                        |                        |                        |                        |   |
|     | $\mathbb{Q}_0^{(a)}(A_1)$ | $\frac{\sqrt{10}}{10}$                 | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0 |
|     |                           | 0                                      | $\frac{\sqrt{10}}{10}$ | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0 |
|     |                           | 0                                      | 0                      | $\frac{\sqrt{10}}{10}$ | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0 |
|     |                           | 0                                      | 0                      | 0                      | $\frac{\sqrt{10}}{10}$ | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0 |
|     |                           | 0                                      | 0                      | 0                      | 0                      | $\frac{\sqrt{10}}{10}$ | 0                      | 0                      | 0                      | 0                      | 0                      | 0 |
|     |                           | 0                                      | 0                      | 0                      | 0                      | 0                      | $\frac{\sqrt{10}}{10}$ | 0                      | 0                      | 0                      | 0                      | 0 |
|     |                           | 0                                      | 0                      | 0                      | 0                      | 0                      | 0                      | $\frac{\sqrt{10}}{10}$ | 0                      | 0                      | 0                      | 0 |
|     |                           | 0                                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | $\frac{\sqrt{10}}{10}$ | 0                      | 0                      | 0 |
|     |                           | 0                                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | $\frac{\sqrt{10}}{10}$ | 0                      | 0 |
|     |                           | 0                                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | $\frac{\sqrt{10}}{10}$ | 0 |
| 450 | symmetry                  | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |                        |                        |                        |                        |                        |                        |                        |                        |                        |   |

*continued ...*

Table 8

| No. | multipole                   | matrix   |  |  |  |  |  |  |  |  |  |
|-----|-----------------------------|--|--|--|--|--|--|--|--|--|--|
|     | $\mathbb{Q}_{2,0}^{(a)}(E)$ | $ \begin{bmatrix} -\frac{\sqrt{7}}{10} & 0 & 0 & 0 & 0 & -\frac{3\sqrt{7}}{35} & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{7}}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{42}}{70} & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{7}}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{42}}{70} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{7}}{10} & 0 & 0 & 0 & 0 & \frac{3\sqrt{7}}{35} & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{7} & 0 & 0 & 0 & 0 & 0 \\ -\frac{3\sqrt{7}}{35} & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{35} & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{42}}{70} & 0 & 0 & 0 & 0 & \frac{4\sqrt{7}}{35} & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{42}}{70} & 0 & 0 & 0 & 0 & \frac{4\sqrt{7}}{35} & 0 & 0 \\ 0 & 0 & 0 & \frac{3\sqrt{7}}{35} & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{35} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{7} \end{bmatrix} $   |  |  |  |  |  |  |  |  |  |
| 451 | symmetry                    | $ \begin{matrix} \frac{\sqrt{3}(x-y)(x+y)}{2} \\ \begin{bmatrix} 0 & 0 & -\frac{\sqrt{7}}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{42}}{70} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{7}}{10} & \frac{\sqrt{35}}{35} & 0 & 0 & 0 & -\frac{2\sqrt{7}}{35} & 0 \\ -\frac{\sqrt{7}}{10} & 0 & 0 & 0 & 0 & \frac{2\sqrt{7}}{35} & 0 & 0 & 0 & -\frac{\sqrt{35}}{35} \\ 0 & -\frac{\sqrt{7}}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{42}}{70} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{35}}{35} & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}}{70} & 0 & 0 & 0 \\ 0 & 0 & \frac{2\sqrt{7}}{35} & 0 & 0 & 0 & 0 & -\frac{3\sqrt{42}}{70} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{42}}{70} & -\frac{\sqrt{210}}{70} & 0 & 0 & 0 & -\frac{3\sqrt{42}}{70} & 0 \\ -\frac{\sqrt{42}}{70} & 0 & 0 & 0 & 0 & -\frac{3\sqrt{42}}{70} & 0 & 0 & 0 & -\frac{\sqrt{210}}{70} \\ 0 & -\frac{2\sqrt{7}}{35} & 0 & 0 & 0 & 0 & -\frac{3\sqrt{42}}{70} & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{35}}{35} & 0 & 0 & 0 & 0 & -\frac{\sqrt{210}}{70} & 0 & 0 \end{bmatrix} \end{matrix} $ |  |  |  |  |  |  |  |  |  |
| 452 | symmetry                    | $ \begin{matrix} \sqrt{3}yz \\ \end{matrix} $  |  |  |  |  |  |  |  |  |  |

continued ...

Table 8

| No. | multipole                     | matrix                     |                          |                         |                           |                           |                          |                           |                            |                          |                           |
|-----|-------------------------------|----------------------------|--------------------------|-------------------------|---------------------------|---------------------------|--------------------------|---------------------------|----------------------------|--------------------------|---------------------------|
|     | $\mathbb{Q}_{2,0}^{(a)}(T_2)$ | 0                          | $\frac{\sqrt{7}i}{10}$   | 0                       | 0                         | $\frac{\sqrt{105}i}{70}$  | 0                        | $\frac{3\sqrt{42}i}{140}$ | 0                          | 0                        | 0                         |
|     |                               | $-\frac{\sqrt{7}i}{10}$    | 0                        | 0                       | 0                         | 0                         | $-\frac{\sqrt{7}i}{70}$  | 0                         | $\frac{\sqrt{14}i}{28}$    | 0                        | 0                         |
|     |                               | 0                          | 0                        | 0                       | $-\frac{\sqrt{7}i}{10}$   | 0                         | 0                        | $-\frac{\sqrt{14}i}{28}$  | 0                          | $\frac{\sqrt{7}i}{70}$   | 0                         |
|     |                               | 0                          | 0                        | $\frac{\sqrt{7}i}{10}$  | 0                         | 0                         | 0                        | 0                         | $-\frac{3\sqrt{42}i}{140}$ | 0                        | $-\frac{\sqrt{105}i}{70}$ |
|     |                               | $-\frac{\sqrt{105}i}{70}$  | 0                        | 0                       | 0                         | 0                         | $\frac{\sqrt{105}i}{35}$ | 0                         | 0                          | 0                        | 0                         |
|     |                               | 0                          | $\frac{\sqrt{7}i}{70}$   | 0                       | 0                         | $-\frac{\sqrt{105}i}{35}$ | 0                        | $\frac{\sqrt{42}i}{35}$   | 0                          | 0                        | 0                         |
|     |                               | $-\frac{3\sqrt{42}i}{140}$ | 0                        | $\frac{\sqrt{14}i}{28}$ | 0                         | 0                         | $-\frac{\sqrt{42}i}{35}$ | 0                         | 0                          | 0                        | 0                         |
|     |                               | 0                          | $-\frac{\sqrt{14}i}{28}$ | 0                       | $\frac{3\sqrt{42}i}{140}$ | 0                         | 0                        | 0                         | 0                          | $-\frac{\sqrt{42}i}{35}$ | 0                         |
|     |                               | 0                          | 0                        | $-\frac{\sqrt{7}i}{70}$ | 0                         | 0                         | 0                        | 0                         | $\frac{\sqrt{42}i}{35}$    | 0                        | $-\frac{\sqrt{105}i}{35}$ |
|     |                               | 0                          | 0                        | 0                       | $\frac{\sqrt{105}i}{70}$  | 0                         | 0                        | 0                         | 0                          | $\frac{\sqrt{105}i}{35}$ | 0                         |
| 453 | symmetry                      | $\sqrt{3}xz$               |                          |                         |                           |                           |                          |                           |                            |                          |                           |
|     | $\mathbb{Q}_{2,1}^{(a)}(T_2)$ | 0                          | $-\frac{\sqrt{7}}{10}$   | 0                       | 0                         | $\frac{\sqrt{105}}{70}$   | 0                        | $-\frac{3\sqrt{42}}{140}$ | 0                          | 0                        | 0                         |
|     |                               | $-\frac{\sqrt{7}}{10}$     | 0                        | 0                       | 0                         | 0                         | $-\frac{\sqrt{7}}{70}$   | 0                         | $-\frac{\sqrt{14}}{28}$    | 0                        | 0                         |
|     |                               | 0                          | 0                        | 0                       | $\frac{\sqrt{7}}{10}$     | 0                         | 0                        | $-\frac{\sqrt{14}}{28}$   | 0                          | $-\frac{\sqrt{7}}{70}$   | 0                         |
|     |                               | 0                          | 0                        | $\frac{\sqrt{7}}{10}$   | 0                         | 0                         | 0                        | 0                         | $-\frac{3\sqrt{42}}{140}$  | 0                        | $\frac{\sqrt{105}}{70}$   |
|     |                               | $\frac{\sqrt{105}}{70}$    | 0                        | 0                       | 0                         | 0                         | $-\frac{\sqrt{105}}{35}$ | 0                         | 0                          | 0                        | 0                         |
|     |                               | 0                          | $-\frac{\sqrt{7}}{70}$   | 0                       | 0                         | $-\frac{\sqrt{105}}{35}$  | 0                        | $-\frac{\sqrt{42}}{35}$   | 0                          | 0                        | 0                         |
|     |                               | $-\frac{3\sqrt{42}}{140}$  | 0                        | $-\frac{\sqrt{14}}{28}$ | 0                         | 0                         | $-\frac{\sqrt{42}}{35}$  | 0                         | 0                          | 0                        | 0                         |
|     |                               | 0                          | $-\frac{\sqrt{14}}{28}$  | 0                       | $-\frac{3\sqrt{42}}{140}$ | 0                         | 0                        | 0                         | 0                          | $\frac{\sqrt{42}}{35}$   | 0                         |
|     |                               | 0                          | 0                        | $-\frac{\sqrt{7}}{70}$  | 0                         | 0                         | 0                        | 0                         | $\frac{\sqrt{42}}{35}$     | 0                        | $\frac{\sqrt{105}}{35}$   |
|     |                               | 0                          | 0                        | 0                       | $\frac{\sqrt{105}}{70}$   | 0                         | 0                        | 0                         | 0                          | $\frac{\sqrt{105}}{35}$  | 0                         |
| 454 | symmetry                      | $\sqrt{3}xy$               |                          |                         |                           |                           |                          |                           |                            |                          |                           |

*continued ...*

Table 8

| No. | multipole                     | matrix   |                          |                          |                          |                           |                           |                           |                           |                          |                          |
|-----|-------------------------------|--|--------------------------|--------------------------|--------------------------|---------------------------|---------------------------|---------------------------|---------------------------|--------------------------|--------------------------|
|     | $\mathbb{Q}_{2,2}^{(a)}(T_2)$ | 0  | 0                        | $\frac{\sqrt{7}i}{10}$   | 0                        | 0                         | 0                         | 0                         | $\frac{\sqrt{42}i}{70}$   | 0                        | 0                        |
|     |                               | 0  | 0                        | 0                        | $\frac{\sqrt{7}i}{10}$   | $\frac{\sqrt{35}i}{35}$   | 0                         | 0                         | 0                         | $\frac{2\sqrt{7}i}{35}$  | 0                        |
|     |                               | $-\frac{\sqrt{7}i}{10}$  | 0                        | 0                        | 0                        | 0                         | $\frac{2\sqrt{7}i}{35}$   | 0                         | 0                         | 0                        | $\frac{\sqrt{35}i}{35}$  |
|     |                               | 0  | $-\frac{\sqrt{7}i}{10}$  | 0                        | 0                        | 0                         | 0                         | $\frac{\sqrt{42}i}{70}$   | 0                         | 0                        | 0                        |
|     |                               | 0  | $-\frac{\sqrt{35}i}{35}$ | 0                        | 0                        | 0                         | 0                         | $\frac{\sqrt{210}i}{70}$  | 0                         | 0                        | 0                        |
|     |                               | 0  | 0                        | $-\frac{2\sqrt{7}i}{35}$ | 0                        | 0                         | 0                         | 0                         | $\frac{3\sqrt{42}i}{70}$  | 0                        | 0                        |
|     |                               | 0  | 0                        | 0                        | $-\frac{\sqrt{42}i}{70}$ | $-\frac{\sqrt{210}i}{70}$ | 0                         | 0                         | 0                         | $\frac{3\sqrt{42}i}{70}$ | 0                        |
|     |                               | $-\frac{\sqrt{42}i}{70}$                                       | 0                        | 0                        | 0                        | 0                         | $-\frac{3\sqrt{42}i}{70}$ | 0                         | 0                         | 0                        | $\frac{\sqrt{210}i}{70}$ |
|     |                               | 0  | $-\frac{2\sqrt{7}i}{35}$ | 0                        | 0                        | 0                         | 0                         | $-\frac{3\sqrt{42}i}{70}$ | 0                         | 0                        | 0                        |
|     |                               | 0  | 0                        | $-\frac{\sqrt{35}i}{35}$ | 0                        | 0                         | 0                         | 0                         | $-\frac{\sqrt{210}i}{70}$ | 0                        | 0                        |
| 455 | symmetry                      | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$     |                          |                          |                          |                           |                           |                           |                           |                          |                          |
|     | $\mathbb{Q}_4^{(a)}(A_1)$     | 0  | 0                        | 0                        | 0                        | 0                         | $\frac{\sqrt{15}}{30}$    | 0                         | 0                         | 0                        | $\frac{\sqrt{3}}{6}$     |
|     |                               | 0  | 0                        | 0                        | 0                        | 0                         | 0                         | $-\frac{\sqrt{10}}{10}$   | 0                         | 0                        | 0                        |
|     |                               | 0  | 0                        | 0                        | 0                        | 0                         | 0                         | 0                         | $\frac{\sqrt{10}}{10}$    | 0                        | 0                        |
|     |                               | 0  | 0                        | 0                        | 0                        | $-\frac{\sqrt{3}}{6}$     | 0                         | 0                         | 0                         | $-\frac{\sqrt{15}}{30}$  | 0                        |
|     |                               | 0  | 0                        | 0                        | $-\frac{\sqrt{3}}{6}$    | $\frac{\sqrt{15}}{60}$    | 0                         | 0                         | 0                         | $\frac{\sqrt{3}}{12}$    | 0                        |
|     |                               | $\frac{\sqrt{15}}{30}$   | 0                        | 0                        | 0                        | 0                         | $-\frac{\sqrt{15}}{20}$   | 0                         | 0                         | 0                        | $\frac{\sqrt{3}}{12}$    |
|     |                               | 0  | $-\frac{\sqrt{10}}{10}$  | 0                        | 0                        | 0                         | 0                         | $\frac{\sqrt{15}}{30}$    | 0                         | 0                        | 0                        |
|     |                               | 0  | 0                        | $\frac{\sqrt{10}}{10}$   | 0                        | 0                         | 0                         | 0                         | $\frac{\sqrt{15}}{30}$    | 0                        | 0                        |
|     |                               | 0  | 0                        | 0                        | $-\frac{\sqrt{15}}{30}$  | $\frac{\sqrt{3}}{12}$     | 0                         | 0                         | 0                         | $-\frac{\sqrt{15}}{20}$  | 0                        |
|     |                               | $\frac{\sqrt{3}}{6}$   | 0                        | 0                        | 0                        | 0                         | $\frac{\sqrt{3}}{12}$     | 0                         | 0                         | 0                        | $\frac{\sqrt{15}}{60}$   |
| 456 | symmetry                      | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ |                          |                          |                          |                           |                           |                           |                           |                          |                          |

continued ...

Table 8

| No. | multipole                   | matrix                                       |                         |                          |                         |                           |                          |                           |                           |                          |                           |
|-----|-----------------------------|--|-------------------------|--------------------------|-------------------------|---------------------------|--------------------------|---------------------------|---------------------------|--------------------------|---------------------------|
|     | $\mathbb{Q}_{4,0}^{(a)}(E)$ | 0  | 0                       | 0                        | 0                       | 0                         | $\frac{\sqrt{21}}{42}$   | 0                         | 0                         | 0                        | $-\frac{\sqrt{105}}{30}$  |
|     |                             | 0  | 0                       | 0                        | 0                       | 0                         | 0                        | $-\frac{\sqrt{14}}{14}$   | 0                         | 0                        | 0                         |
|     |                             | 0  | 0                       | 0                        | 0                       | 0                         | 0                        | 0                         | $\frac{\sqrt{14}}{14}$    | 0                        | 0                         |
|     |                             | 0  | 0                       | 0                        | 0                       | $\frac{\sqrt{105}}{30}$   | 0                        | 0                         | 0                         | $-\frac{\sqrt{21}}{42}$  | 0                         |
|     |                             | 0  | 0                       | 0                        | $\frac{\sqrt{105}}{30}$ | $\frac{\sqrt{21}}{84}$    | 0                        | 0                         | 0                         | $-\frac{\sqrt{105}}{60}$ | 0                         |
|     |                             | $\frac{\sqrt{21}}{42}$                       | 0                       | 0                        | 0                       | 0                         | $-\frac{\sqrt{21}}{28}$  | 0                         | 0                         | 0                        | $-\frac{\sqrt{105}}{60}$  |
|     |                             | 0  | $-\frac{\sqrt{14}}{14}$ | 0                        | 0                       | 0                         | 0                        | $\frac{\sqrt{21}}{42}$    | 0                         | 0                        | 0                         |
|     |                             | 0  | 0                       | $\frac{\sqrt{14}}{14}$   | 0                       | 0                         | 0                        | 0                         | $\frac{\sqrt{21}}{42}$    | 0                        | 0                         |
|     |                             | 0  | 0                       | 0                        | $-\frac{\sqrt{21}}{42}$ | $-\frac{\sqrt{105}}{60}$  | 0                        | 0                         | 0                         | $-\frac{\sqrt{21}}{28}$  | 0                         |
|     |                             | $-\frac{\sqrt{105}}{30}$                     | 0                       | 0                        | 0                       | 0                         | $-\frac{\sqrt{105}}{60}$ | 0                         | 0                         | 0                        | $\frac{\sqrt{21}}{84}$    |
| 457 | symmetry                    | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ |                         |                          |                         |                           |                          |                           |                           |                          |                           |
|     | $\mathbb{Q}_{4,1}^{(a)}(E)$ | 0  | 0                       | 0                        | 0                       | 0                         | 0                        | $-\frac{\sqrt{14}}{14}$   | 0                         | 0                        |                           |
|     |                             | 0  | 0                       | 0                        | 0                       | $\frac{\sqrt{105}}{70}$   | 0                        | 0                         | 0                         | $\frac{\sqrt{21}}{14}$   | 0                         |
|     |                             | 0  | 0                       | 0                        | 0                       | 0                         | $-\frac{\sqrt{21}}{14}$  | 0                         | 0                         | 0                        | $-\frac{\sqrt{105}}{70}$  |
|     |                             | 0  | 0                       | 0                        | 0                       | 0                         | 0                        | $\frac{\sqrt{14}}{14}$    | 0                         | 0                        | 0                         |
|     |                             | 0  | $\frac{\sqrt{105}}{70}$ | 0                        | 0                       | 0                         | 0                        | $-\frac{3\sqrt{70}}{140}$ | 0                         | 0                        | 0                         |
|     |                             | 0  | 0                       | $-\frac{\sqrt{21}}{14}$  | 0                       | 0                         | 0                        | 0                         | $\frac{\sqrt{14}}{28}$    | 0                        | 0                         |
|     |                             | 0  | 0                       | 0                        | $\frac{\sqrt{14}}{14}$  | $-\frac{3\sqrt{70}}{140}$ | 0                        | 0                         | 0                         | $\frac{\sqrt{14}}{28}$   | 0                         |
|     |                             | $-\frac{\sqrt{14}}{14}$                      | 0                       | 0                        | 0                       | 0                         | $\frac{\sqrt{14}}{28}$   | 0                         | 0                         | 0                        | $-\frac{3\sqrt{70}}{140}$ |
|     |                             | 0  | $\frac{\sqrt{21}}{14}$  | 0                        | 0                       | 0                         | 0                        | $\frac{\sqrt{14}}{28}$    | 0                         | 0                        | 0                         |
|     |                             | 0  | 0                       | $-\frac{\sqrt{105}}{70}$ | 0                       | 0                         | 0                        | 0                         | $-\frac{3\sqrt{70}}{140}$ | 0                        | 0                         |
| 458 | symmetry                    | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$            |                         |                          |                         |                           |                          |                           |                           |                          |                           |

continued ...

Table 8

| No. | multipole                     | matrix                             |                         |                          |                        |                          |                        |                         |                         |                        |                          |
|-----|-------------------------------|------------------------------------|-------------------------|--------------------------|------------------------|--------------------------|------------------------|-------------------------|-------------------------|------------------------|--------------------------|
|     | $\mathbb{Q}_{4,0}^{(a)}(T_1)$ | 0                                  | 0                       | 0                        | 0                      | $\frac{\sqrt{5}i}{40}$   | 0                      | $\frac{\sqrt{2}i}{8}$   | 0                       | $\frac{i}{8}$          | 0                        |
|     |                               | 0                                  | 0                       | 0                        | 0                      | 0                        | $-\frac{\sqrt{3}i}{8}$ | 0                       | $-\frac{\sqrt{6}i}{8}$  | 0                      | $-\frac{\sqrt{15}i}{40}$ |
|     |                               | 0                                  | 0                       | 0                        | 0                      | $\frac{\sqrt{15}i}{40}$  | 0                      | $\frac{\sqrt{6}i}{8}$   | 0                       | $\frac{\sqrt{3}i}{8}$  | 0                        |
|     |                               | 0                                  | 0                       | 0                        | 0                      | 0                        | $-\frac{i}{8}$         | 0                       | $-\frac{\sqrt{2}i}{8}$  | 0                      | $-\frac{\sqrt{5}i}{40}$  |
|     |                               | $-\frac{\sqrt{5}i}{40}$            | 0                       | $-\frac{\sqrt{15}i}{40}$ | 0                      | 0                        | $\frac{\sqrt{5}i}{20}$ | 0                       | $\frac{\sqrt{10}i}{40}$ | 0                      | 0                        |
|     |                               | 0                                  | $\frac{\sqrt{3}i}{8}$   | 0                        | $\frac{i}{8}$          | $-\frac{\sqrt{5}i}{20}$  | 0                      | $-\frac{\sqrt{2}i}{8}$  | 0                       | 0                      | 0                        |
|     |                               | $-\frac{\sqrt{2}i}{8}$             | 0                       | $-\frac{\sqrt{6}i}{8}$   | 0                      | 0                        | $\frac{\sqrt{2}i}{8}$  | 0                       | 0                       | 0                      | $-\frac{\sqrt{10}i}{40}$ |
|     |                               | 0                                  | $\frac{\sqrt{6}i}{8}$   | 0                        | $\frac{\sqrt{2}i}{8}$  | $-\frac{\sqrt{10}i}{40}$ | 0                      | 0                       | 0                       | $\frac{\sqrt{2}i}{8}$  | 0                        |
|     |                               | $-\frac{i}{8}$                     | 0                       | $-\frac{\sqrt{3}i}{8}$   | 0                      | 0                        | 0                      | 0                       | $-\frac{\sqrt{2}i}{8}$  | 0                      | $-\frac{\sqrt{5}i}{20}$  |
|     |                               | 0                                  | $\frac{\sqrt{15}i}{40}$ | 0                        | $\frac{\sqrt{5}i}{40}$ | 0                        | 0                      | $\frac{\sqrt{10}i}{40}$ | 0                       | $\frac{\sqrt{5}i}{20}$ | 0                        |
| 459 | symmetry                      | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ |                         |                          |                        |                          |                        |                         |                         |                        |                          |
|     | $\mathbb{Q}_{4,1}^{(a)}(T_1)$ | 0                                  | 0                       | 0                        | 0                      | $-\frac{\sqrt{5}}{40}$   | 0                      | $\frac{\sqrt{2}}{8}$    | 0                       | $-\frac{1}{8}$         | 0                        |
|     |                               | 0                                  | 0                       | 0                        | 0                      | 0                        | $\frac{\sqrt{3}}{8}$   | 0                       | $-\frac{\sqrt{6}}{8}$   | 0                      | $\frac{\sqrt{15}}{40}$   |
|     |                               | 0                                  | 0                       | 0                        | 0                      | $\frac{\sqrt{15}}{40}$   | 0                      | $-\frac{\sqrt{6}}{8}$   | 0                       | $\frac{\sqrt{3}}{8}$   | 0                        |
|     |                               | 0                                  | 0                       | 0                        | 0                      | 0                        | $-\frac{1}{8}$         | 0                       | $\frac{\sqrt{2}}{8}$    | 0                      | $-\frac{\sqrt{5}}{40}$   |
|     |                               | $-\frac{\sqrt{5}}{40}$             | 0                       | $\frac{\sqrt{15}}{40}$   | 0                      | 0                        | $\frac{\sqrt{5}}{20}$  | 0                       | $-\frac{\sqrt{10}}{40}$ | 0                      | 0                        |
|     |                               | 0                                  | $\frac{\sqrt{3}}{8}$    | 0                        | $-\frac{1}{8}$         | $\frac{\sqrt{5}}{20}$    | 0                      | $-\frac{\sqrt{2}}{8}$   | 0                       | 0                      | 0                        |
|     |                               | $\frac{\sqrt{2}}{8}$               | 0                       | $-\frac{\sqrt{6}}{8}$    | 0                      | 0                        | $-\frac{\sqrt{2}}{8}$  | 0                       | 0                       | 0                      | $\frac{\sqrt{10}}{40}$   |
|     |                               | 0                                  | $-\frac{\sqrt{6}}{8}$   | 0                        | $\frac{\sqrt{2}}{8}$   | $-\frac{\sqrt{10}}{40}$  | 0                      | 0                       | 0                       | $\frac{\sqrt{2}}{8}$   | 0                        |
|     |                               | $-\frac{1}{8}$                     | 0                       | $\frac{\sqrt{3}}{8}$     | 0                      | 0                        | 0                      | 0                       | $\frac{\sqrt{2}}{8}$    | 0                      | $-\frac{\sqrt{5}}{20}$   |
|     |                               | 0                                  | $\frac{\sqrt{15}}{40}$  | 0                        | $-\frac{\sqrt{5}}{40}$ | 0                        | 0                      | $\frac{\sqrt{10}}{40}$  | 0                       | $-\frac{\sqrt{5}}{20}$ | 0                        |
| 460 | symmetry                      | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$  |                         |                          |                        |                          |                        |                         |                         |                        |                          |

continued ...

Table 8

| No. | multipole                     | matrix   |  |  |  |  |  |  |  |  |  |
|-----|-------------------------------|--|--|--|--|--|--|--|--|--|--|
|     | $\mathbb{Q}_{4,2}^{(a)}(T_1)$ | $ \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{5} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{5} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{5}i}{5} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{10} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{5}i}{5} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 \end{bmatrix} $   |  |  |  |  |  |  |  |  |  |
| 461 | symmetry                      | $ \frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2} $   |  |  |  |  |  |  |  |  |  |
|     | $\mathbb{Q}_{4,0}^{(a)}(T_2)$ | $ \begin{bmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{35}i}{280} & 0 & \frac{\sqrt{14}i}{56} & 0 & -\frac{\sqrt{7}i}{8} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}i}{56} & 0 & -\frac{\sqrt{42}i}{56} & 0 & \frac{\sqrt{105}i}{40} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{105}i}{40} & 0 & \frac{\sqrt{42}i}{56} & 0 & \frac{\sqrt{21}i}{56} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}i}{8} & 0 & -\frac{\sqrt{14}i}{56} & 0 & -\frac{\sqrt{35}i}{280} \\ -\frac{\sqrt{35}i}{280} & 0 & \frac{\sqrt{105}i}{40} & 0 & 0 & \frac{\sqrt{35}i}{140} & 0 & -\frac{\sqrt{70}i}{40} & 0 & 0 \\ 0 & \frac{\sqrt{21}i}{56} & 0 & -\frac{\sqrt{7}i}{8} & -\frac{\sqrt{35}i}{140} & 0 & -\frac{\sqrt{14}i}{56} & 0 & 0 & 0 \\ -\frac{\sqrt{14}i}{56} & 0 & -\frac{\sqrt{42}i}{56} & 0 & 0 & \frac{\sqrt{14}i}{56} & 0 & 0 & 0 & \frac{\sqrt{70}i}{40} \\ 0 & \frac{\sqrt{42}i}{56} & 0 & \frac{\sqrt{14}i}{56} & \frac{\sqrt{70}i}{40} & 0 & 0 & 0 & \frac{\sqrt{14}i}{56} & 0 \\ \frac{\sqrt{7}i}{8} & 0 & -\frac{\sqrt{21}i}{56} & 0 & 0 & 0 & 0 & -\frac{\sqrt{14}i}{56} & 0 & -\frac{\sqrt{35}i}{140} \\ 0 & -\frac{\sqrt{105}i}{40} & 0 & \frac{\sqrt{35}i}{280} & 0 & 0 & -\frac{\sqrt{70}i}{40} & 0 & \frac{\sqrt{35}i}{140} & 0 \end{bmatrix} $ |  |  |  |  |  |  |  |  |  |
| 462 | symmetry                      | $ -\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2} $  |  |  |  |  |  |  |  |  |  |

continued ...

Table 8

| No. | multipole                     | matrix                                 |                          |                          |                         |                           |                          |                            |                           |                         |                            |
|-----|-------------------------------|--|--------------------------|--------------------------|-------------------------|---------------------------|--------------------------|----------------------------|---------------------------|-------------------------|----------------------------|
|     | $\mathbb{Q}_{4,1}^{(a)}(T_2)$ | 0                                      | 0                        | 0                        | 0                       | $\frac{\sqrt{35}}{280}$   | 0                        | $-\frac{\sqrt{14}}{56}$    | 0                         | $-\frac{\sqrt{7}}{8}$   | 0                          |
|     |                               | 0                                      | 0                        | 0                        | 0                       | 0                         | $-\frac{\sqrt{21}}{56}$  | 0                          | $\frac{\sqrt{42}}{56}$    | 0                       | $\frac{\sqrt{105}}{40}$    |
|     |                               | 0                                      | 0                        | 0                        | 0                       | $\frac{\sqrt{105}}{40}$   | 0                        | $\frac{\sqrt{42}}{56}$     | 0                         | $-\frac{\sqrt{21}}{56}$ | 0                          |
|     |                               | 0                                      | 0                        | 0                        | 0                       | 0                         | $-\frac{\sqrt{7}}{8}$    | 0                          | $-\frac{\sqrt{14}}{56}$   | 0                       | $\frac{\sqrt{35}}{280}$    |
|     |                               | $\frac{\sqrt{35}}{280}$                | 0                        | $\frac{\sqrt{105}}{40}$  | 0                       | 0                         | $-\frac{\sqrt{35}}{140}$ | 0                          | $-\frac{\sqrt{70}}{40}$   | 0                       | 0                          |
|     |                               | 0                                      | $-\frac{\sqrt{21}}{56}$  | 0                        | $-\frac{\sqrt{7}}{8}$   | $-\frac{\sqrt{35}}{140}$  | 0                        | $\frac{\sqrt{14}}{56}$     | 0                         | 0                       | 0                          |
|     |                               | $-\frac{\sqrt{14}}{56}$                | 0                        | $\frac{\sqrt{42}}{56}$   | 0                       | 0                         | $\frac{\sqrt{14}}{56}$   | 0                          | 0                         | 0                       | $\frac{\sqrt{70}}{40}$     |
|     |                               | 0                                      | $\frac{\sqrt{42}}{56}$   | 0                        | $-\frac{\sqrt{14}}{56}$ | $-\frac{\sqrt{70}}{40}$   | 0                        | 0                          | 0                         | $-\frac{\sqrt{14}}{56}$ | 0                          |
|     |                               | $-\frac{\sqrt{7}}{8}$                  | 0                        | $-\frac{\sqrt{21}}{56}$  | 0                       | 0                         | 0                        | 0                          | $-\frac{\sqrt{14}}{56}$   | 0                       | $\frac{\sqrt{35}}{140}$    |
|     |                               | 0                                      | $\frac{\sqrt{105}}{40}$  | 0                        | $\frac{\sqrt{35}}{280}$ | 0                         | 0                        | $\frac{\sqrt{70}}{40}$     | 0                         | $\frac{\sqrt{35}}{140}$ | 0                          |
| 463 | symmetry                      | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$  |                          |                          |                         |                           |                          |                            |                           |                         |                            |
|     | $\mathbb{Q}_{4,2}^{(a)}(T_2)$ | 0                                      | 0                        | 0                        | 0                       | 0                         | 0                        | $-\frac{\sqrt{14}i}{14}$   | 0                         | 0                       | 0                          |
|     |                               | 0                                      | 0                        | 0                        | 0                       | $-\frac{\sqrt{105}i}{70}$ | 0                        | 0                          | 0                         | $\frac{\sqrt{21}i}{14}$ | 0                          |
|     |                               | 0                                      | 0                        | 0                        | 0                       | 0                         | $\frac{\sqrt{21}i}{14}$  | 0                          | 0                         | 0                       | $-\frac{\sqrt{105}i}{70}$  |
|     |                               | 0                                      | 0                        | 0                        | 0                       | 0                         | 0                        | $-\frac{\sqrt{14}i}{14}$   | 0                         | 0                       | 0                          |
|     |                               | 0                                      | $\frac{\sqrt{105}i}{70}$ | 0                        | 0                       | 0                         | 0                        | $-\frac{3\sqrt{70}i}{140}$ | 0                         | 0                       | 0                          |
|     |                               | 0                                      | 0                        | $-\frac{\sqrt{21}i}{14}$ | 0                       | 0                         | 0                        | 0                          | $\frac{\sqrt{14}i}{28}$   | 0                       | 0                          |
|     |                               | 0                                      | 0                        | 0                        | $\frac{\sqrt{14}i}{14}$ | $\frac{3\sqrt{70}i}{140}$ | 0                        | 0                          | 0                         | $\frac{\sqrt{14}i}{28}$ | 0                          |
|     |                               | $\frac{\sqrt{14}i}{14}$                | 0                        | 0                        | 0                       | 0                         | $-\frac{\sqrt{14}i}{28}$ | 0                          | 0                         | 0                       | $-\frac{3\sqrt{70}i}{140}$ |
|     |                               | 0                                      | $-\frac{\sqrt{21}i}{14}$ | 0                        | 0                       | 0                         | 0                        | $-\frac{\sqrt{14}i}{28}$   | 0                         | 0                       | 0                          |
|     |                               | 0                                      | 0                        | $\frac{\sqrt{105}i}{70}$ | 0                       | 0                         | 0                        | 0                          | $\frac{3\sqrt{70}i}{140}$ | 0                       | 0                          |
| 464 | symmetry                      | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |                          |                          |                         |                           |                          |                            |                           |                         |                            |

continued ...



Table 8

| No. | multipole                        | matrix  |  |  |  |  |  |  |  |  |  |
|-----|----------------------------------|---|--|--|--|--|--|--|--|--|--|
|     | $\mathbb{Q}_{2,0}^{(1,-1;a)}(E)$ | $ \begin{bmatrix} -\frac{\sqrt{30}}{50} & 0 & 0 & 0 & 0 & -\frac{3\sqrt{30}}{50} & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{30}}{50} & 0 & 0 & 0 & 0 & -\frac{3\sqrt{5}}{50} & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{30}}{50} & 0 & 0 & 0 & 0 & \frac{3\sqrt{5}}{50} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{30}}{50} & 0 & 0 & 0 & 0 & \frac{3\sqrt{30}}{50} & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{15} & 0 & 0 & 0 & 0 & 0 \\ -\frac{3\sqrt{30}}{50} & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{75} & 0 & 0 & 0 & 0 \\ 0 & -\frac{3\sqrt{5}}{50} & 0 & 0 & 0 & 0 & -\frac{4\sqrt{30}}{75} & 0 & 0 & 0 \\ 0 & 0 & \frac{3\sqrt{5}}{50} & 0 & 0 & 0 & 0 & -\frac{4\sqrt{30}}{75} & 0 & 0 \\ 0 & 0 & 0 & \frac{3\sqrt{30}}{50} & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{75} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{15} \end{bmatrix} $  |  |  |  |  |  |  |  |  |  |
| 465 | symmetry                         | $ \frac{\sqrt{3}(x-y)(x+y)}{2} \begin{bmatrix} 0 & 0 & -\frac{\sqrt{30}}{50} & 0 & 0 & 0 & 0 & -\frac{3\sqrt{5}}{50} & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{30}}{50} & \frac{\sqrt{6}}{10} & 0 & 0 & 0 & -\frac{\sqrt{30}}{25} & 0 \\ -\frac{\sqrt{30}}{50} & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{25} & 0 & 0 & 0 & -\frac{\sqrt{6}}{10} \\ 0 & -\frac{\sqrt{30}}{50} & 0 & 0 & 0 & 0 & \frac{3\sqrt{5}}{50} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{6}}{10} & 0 & 0 & 0 & 0 & \frac{1}{5} & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{30}}{25} & 0 & 0 & 0 & 0 & \frac{3\sqrt{5}}{25} & 0 & 0 \\ 0 & 0 & 0 & \frac{3\sqrt{5}}{50} & \frac{1}{5} & 0 & 0 & 0 & \frac{3\sqrt{5}}{25} & 0 \\ -\frac{3\sqrt{5}}{50} & 0 & 0 & 0 & 0 & \frac{3\sqrt{5}}{25} & 0 & 0 & 0 & \frac{1}{5} \\ 0 & -\frac{\sqrt{30}}{25} & 0 & 0 & 0 & 0 & \frac{3\sqrt{5}}{25} & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{6}}{10} & 0 & 0 & 0 & 0 & \frac{1}{5} & 0 & 0 \end{bmatrix} $ |  |  |  |  |  |  |  |  |  |
| 466 | symmetry                         | $\sqrt{3}yz$  |  |  |  |  |  |  |  |  |  |

*continued ...*

Table 8

| No. | multipole                          | matrix                    |                          |                           |                          |                         |                           |                          |                           |                          |                          |
|-----|------------------------------------|---------------------------|--------------------------|---------------------------|--------------------------|-------------------------|---------------------------|--------------------------|---------------------------|--------------------------|--------------------------|
|     | $\mathbb{Q}_{2,0}^{(1,-1;a)}(T_2)$ | 0                         | $\frac{\sqrt{30}i}{50}$  | 0                         | 0                        | $\frac{3\sqrt{2}i}{20}$ | 0                         | $\frac{9\sqrt{5}i}{100}$ | 0                         | 0                        | 0                        |
|     |                                    | $-\frac{\sqrt{30}i}{50}$  | 0                        | 0                         | 0                        | 0                       | $-\frac{\sqrt{30}i}{100}$ | 0                        | $\frac{\sqrt{15}i}{20}$   | 0                        | 0                        |
|     |                                    | 0                         | 0                        | 0                         | $-\frac{\sqrt{30}i}{50}$ | 0                       | 0                         | $-\frac{\sqrt{15}i}{20}$ | 0                         | $\frac{\sqrt{30}i}{100}$ | 0                        |
|     |                                    | 0                         | 0                        | $\frac{\sqrt{30}i}{50}$   | 0                        | 0                       | 0                         | 0                        | $-\frac{9\sqrt{5}i}{100}$ | 0                        | $-\frac{3\sqrt{2}i}{20}$ |
|     |                                    | $-\frac{3\sqrt{2}i}{20}$  | 0                        | 0                         | 0                        | 0                       | $-\frac{\sqrt{2}i}{5}$    | 0                        | 0                         | 0                        | 0                        |
|     |                                    | 0                         | $\frac{\sqrt{30}i}{100}$ | 0                         | 0                        | $\frac{\sqrt{2}i}{5}$   | 0                         | $-\frac{2\sqrt{5}i}{25}$ | 0                         | 0                        | 0                        |
|     |                                    | $-\frac{9\sqrt{5}i}{100}$ | 0                        | $\frac{\sqrt{15}i}{20}$   | 0                        | 0                       | $\frac{2\sqrt{5}i}{25}$   | 0                        | 0                         | 0                        | 0                        |
|     |                                    | 0                         | $-\frac{\sqrt{15}i}{20}$ | 0                         | $\frac{9\sqrt{5}i}{100}$ | 0                       | 0                         | 0                        | 0                         | $\frac{2\sqrt{5}i}{25}$  | 0                        |
|     |                                    | 0                         | 0                        | $-\frac{\sqrt{30}i}{100}$ | 0                        | 0                       | 0                         | 0                        | $-\frac{2\sqrt{5}i}{25}$  | 0                        | $\frac{\sqrt{2}i}{5}$    |
|     |                                    | 0                         | 0                        | 0                         | $\frac{3\sqrt{2}i}{20}$  | 0                       | 0                         | 0                        | 0                         | $-\frac{\sqrt{2}i}{5}$   | 0                        |
| 467 | symmetry                           | $\sqrt{3}xz$              |                          |                           |                          |                         |                           |                          |                           |                          |                          |
|     | $\mathbb{Q}_{2,1}^{(1,-1;a)}(T_2)$ | 0                         | $-\frac{\sqrt{30}}{50}$  | 0                         | 0                        | $\frac{3\sqrt{2}}{20}$  | 0                         | $-\frac{9\sqrt{5}}{100}$ | 0                         | 0                        | 0                        |
|     |                                    | $-\frac{\sqrt{30}}{50}$   | 0                        | 0                         | 0                        | 0                       | $-\frac{\sqrt{30}}{100}$  | 0                        | $-\frac{\sqrt{15}}{20}$   | 0                        | 0                        |
|     |                                    | 0                         | 0                        | 0                         | $\frac{\sqrt{30}}{50}$   | 0                       | 0                         | $-\frac{\sqrt{15}}{20}$  | 0                         | $-\frac{\sqrt{30}}{100}$ | 0                        |
|     |                                    | 0                         | 0                        | $\frac{\sqrt{30}}{50}$    | 0                        | 0                       | 0                         | 0                        | $-\frac{9\sqrt{5}}{100}$  | 0                        | $\frac{3\sqrt{2}}{20}$   |
|     |                                    | $\frac{3\sqrt{2}}{20}$    | 0                        | 0                         | 0                        | 0                       | $\frac{\sqrt{2}}{5}$      | 0                        | 0                         | 0                        | 0                        |
|     |                                    | 0                         | $-\frac{\sqrt{30}}{100}$ | 0                         | 0                        | $\frac{\sqrt{2}}{5}$    | 0                         | $\frac{2\sqrt{5}}{25}$   | 0                         | 0                        | 0                        |
|     |                                    | $-\frac{9\sqrt{5}}{100}$  | 0                        | $-\frac{\sqrt{15}}{20}$   | 0                        | 0                       | $\frac{2\sqrt{5}}{25}$    | 0                        | 0                         | 0                        | 0                        |
|     |                                    | 0                         | $-\frac{\sqrt{15}}{20}$  | 0                         | $-\frac{9\sqrt{5}}{100}$ | 0                       | 0                         | 0                        | 0                         | $-\frac{2\sqrt{5}}{25}$  | 0                        |
|     |                                    | 0                         | 0                        | $-\frac{\sqrt{30}}{100}$  | 0                        | 0                       | 0                         | 0                        | $-\frac{2\sqrt{5}}{25}$   | 0                        | $-\frac{\sqrt{2}}{5}$    |
|     |                                    | 0                         | 0                        | 0                         | $\frac{3\sqrt{2}}{20}$   | 0                       | 0                         | 0                        | 0                         | $-\frac{\sqrt{2}}{5}$    | 0                        |
| 468 | symmetry                           | $\sqrt{3}xy$              |                          |                           |                          |                         |                           |                          |                           |                          |                          |

*continued ...*

Table 8

| No. | multipole                          | matrix   |                          |                          |                          |                         |                         |                         |                          |                          |                         |
|-----|------------------------------------|--|--------------------------|--------------------------|--------------------------|-------------------------|-------------------------|-------------------------|--------------------------|--------------------------|-------------------------|
|     | $\mathbb{Q}_{2,2}^{(1,-1;a)}(T_2)$ | 0  | 0                        | $\frac{\sqrt{30}i}{50}$  | 0                        | 0                       | 0                       | 0                       | $\frac{3\sqrt{5}i}{50}$  | 0                        | 0                       |
|     |                                    | 0  | 0                        | 0                        | $\frac{\sqrt{30}i}{50}$  | $\frac{\sqrt{6}i}{10}$  | 0                       | 0                       | 0                        | $\frac{\sqrt{30}i}{25}$  | 0                       |
|     |                                    | $-\frac{\sqrt{30}i}{50}$                                       | 0                        | 0                        | 0                        | 0                       | $\frac{\sqrt{30}i}{25}$ | 0                       | 0                        | 0                        | $\frac{\sqrt{6}i}{10}$  |
|     |                                    | 0  | $-\frac{\sqrt{30}i}{50}$ | 0                        | 0                        | 0                       | 0                       | $\frac{3\sqrt{5}i}{50}$ | 0                        | 0                        | 0                       |
|     |                                    | 0  | $-\frac{\sqrt{6}i}{10}$  | 0                        | 0                        | 0                       | 0                       | $-\frac{i}{5}$          | 0                        | 0                        | 0                       |
|     |                                    | 0  | 0                        | $-\frac{\sqrt{30}i}{25}$ | 0                        | 0                       | 0                       | 0                       | $-\frac{3\sqrt{5}i}{25}$ | 0                        | 0                       |
|     |                                    | 0  | 0                        | 0                        | $-\frac{3\sqrt{5}i}{50}$ | $\frac{i}{5}$           | 0                       | 0                       | 0                        | $-\frac{3\sqrt{5}i}{25}$ | 0                       |
|     |                                    | $-\frac{3\sqrt{5}i}{50}$                                       | 0                        | 0                        | 0                        | 0                       | $\frac{3\sqrt{5}i}{25}$ | 0                       | 0                        | 0                        | $-\frac{i}{5}$          |
|     |                                    | 0  | $-\frac{\sqrt{30}i}{25}$ | 0                        | 0                        | 0                       | 0                       | $\frac{3\sqrt{5}i}{25}$ | 0                        | 0                        | 0                       |
|     |                                    | 0  | 0                        | $-\frac{\sqrt{6}i}{10}$  | 0                        | 0                       | 0                       | 0                       | $\frac{i}{5}$            | 0                        | 0                       |
| 469 | symmetry                           | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$     |                          |                          |                          |                         |                         |                         |                          |                          |                         |
|     | $\mathbb{Q}_4^{(1,-1;a)}(A_1)$     | 0  | 0                        | 0                        | 0                        | 0                       | $\frac{\sqrt{15}}{60}$  | 0                       | 0                        | 0                        | $\frac{\sqrt{3}}{12}$   |
|     |                                    | 0  | 0                        | 0                        | 0                        | 0                       | 0                       | $-\frac{\sqrt{10}}{20}$ | 0                        | 0                        | 0                       |
|     |                                    | 0  | 0                        | 0                        | 0                        | 0                       | 0                       | 0                       | $\frac{\sqrt{10}}{20}$   | 0                        | 0                       |
|     |                                    | 0  | 0                        | 0                        | 0                        | $-\frac{\sqrt{3}}{12}$  | 0                       | 0                       | 0                        | $-\frac{\sqrt{15}}{60}$  | 0                       |
|     |                                    | 0  | 0                        | 0                        | $-\frac{\sqrt{3}}{12}$   | $-\frac{\sqrt{15}}{30}$ | 0                       | 0                       | 0                        | $-\frac{\sqrt{3}}{6}$    | 0                       |
|     |                                    | $\frac{\sqrt{15}}{60}$   | 0                        | 0                        | 0                        | 0                       | $\frac{\sqrt{15}}{10}$  | 0                       | 0                        | 0                        | $-\frac{\sqrt{3}}{6}$   |
|     |                                    | 0  | $-\frac{\sqrt{10}}{20}$  | 0                        | 0                        | 0                       | 0                       | $-\frac{\sqrt{15}}{15}$ | 0                        | 0                        | 0                       |
|     |                                    | 0  | 0                        | $\frac{\sqrt{10}}{20}$   | 0                        | 0                       | 0                       | 0                       | $-\frac{\sqrt{15}}{15}$  | 0                        | 0                       |
|     |                                    | 0  | 0                        | 0                        | $-\frac{\sqrt{15}}{60}$  | $-\frac{\sqrt{3}}{6}$   | 0                       | 0                       | 0                        | $\frac{\sqrt{15}}{10}$   | 0                       |
|     |                                    | $\frac{\sqrt{3}}{12}$  | 0                        | 0                        | 0                        | 0                       | $-\frac{\sqrt{3}}{6}$   | 0                       | 0                        | 0                        | $-\frac{\sqrt{15}}{30}$ |
| 470 | symmetry                           | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ |                          |                          |                          |                         |                         |                         |                          |                          |                         |

continued ...

Table 8

| No. | multipole                        | matrix                                       |                          |                           |                         |                          |                         |                         |                         |                         |                           |
|-----|----------------------------------|--|--------------------------|---------------------------|-------------------------|--------------------------|-------------------------|-------------------------|-------------------------|-------------------------|---------------------------|
|     | $\mathbb{Q}_{4,0}^{(1,-1;a)}(E)$ | 0  | 0                        | 0                         | 0                       | 0                        | $\frac{\sqrt{21}}{84}$  | 0                       | 0                       | 0                       | $-\frac{\sqrt{105}}{60}$  |
|     |                                  | 0  | 0                        | 0                         | 0                       | 0                        | 0                       | $-\frac{\sqrt{14}}{28}$ | 0                       | 0                       | 0                         |
|     |                                  | 0  | 0                        | 0                         | 0                       | 0                        | 0                       | 0                       | $\frac{\sqrt{14}}{28}$  | 0                       | 0                         |
|     |                                  | 0  | 0                        | 0                         | 0                       | $\frac{\sqrt{105}}{60}$  | 0                       | 0                       | 0                       | $-\frac{\sqrt{21}}{84}$ | 0                         |
|     |                                  | 0  | 0                        | 0                         | $\frac{\sqrt{105}}{60}$ | $-\frac{\sqrt{21}}{42}$  | 0                       | 0                       | 0                       | $\frac{\sqrt{105}}{30}$ | 0                         |
|     |                                  | $\frac{\sqrt{21}}{84}$                       | 0                        | 0                         | 0                       | 0                        | $\frac{\sqrt{21}}{14}$  | 0                       | 0                       | 0                       | $\frac{\sqrt{105}}{30}$   |
|     |                                  | 0  | $-\frac{\sqrt{14}}{28}$  | 0                         | 0                       | 0                        | 0                       | $-\frac{\sqrt{21}}{21}$ | 0                       | 0                       | 0                         |
|     |                                  | 0  | 0                        | $\frac{\sqrt{14}}{28}$    | 0                       | 0                        | 0                       | 0                       | $-\frac{\sqrt{21}}{21}$ | 0                       | 0                         |
|     |                                  | 0  | 0                        | 0                         | $-\frac{\sqrt{21}}{84}$ | $\frac{\sqrt{105}}{30}$  | 0                       | 0                       | 0                       | $\frac{\sqrt{21}}{14}$  | 0                         |
|     |                                  | $-\frac{\sqrt{105}}{60}$                     | 0                        | 0                         | 0                       | 0                        | $\frac{\sqrt{105}}{30}$ | 0                       | 0                       | 0                       | $-\frac{\sqrt{21}}{42}$   |
| 471 | symmetry                         | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ |                          |                           |                         |                          |                         |                         |                         |                         |                           |
|     | $\mathbb{Q}_{4,1}^{(1,-1;a)}(E)$ | 0  | 0                        | 0                         | 0                       | 0                        | 0                       | $-\frac{\sqrt{14}}{28}$ | 0                       | 0                       |                           |
|     |                                  | 0  | 0                        | 0                         | 0                       | $\frac{\sqrt{105}}{140}$ | 0                       | 0                       | 0                       | $\frac{\sqrt{21}}{28}$  | 0                         |
|     |                                  | 0  | 0                        | 0                         | 0                       | 0                        | $-\frac{\sqrt{21}}{28}$ | 0                       | 0                       | 0                       | $-\frac{\sqrt{105}}{140}$ |
|     |                                  | 0  | 0                        | 0                         | 0                       | 0                        | 0                       | $\frac{\sqrt{14}}{28}$  | 0                       | 0                       | 0                         |
|     |                                  | 0  | $\frac{\sqrt{105}}{140}$ | 0                         | 0                       | 0                        | 0                       | $\frac{3\sqrt{70}}{70}$ | 0                       | 0                       | 0                         |
|     |                                  | 0  | 0                        | $-\frac{\sqrt{21}}{28}$   | 0                       | 0                        | 0                       | 0                       | $-\frac{\sqrt{14}}{14}$ | 0                       | 0                         |
|     |                                  | 0  | 0                        | 0                         | $\frac{\sqrt{14}}{28}$  | $\frac{3\sqrt{70}}{70}$  | 0                       | 0                       | 0                       | $-\frac{\sqrt{14}}{14}$ | 0                         |
|     |                                  | $-\frac{\sqrt{14}}{28}$                      | 0                        | 0                         | 0                       | 0                        | $-\frac{\sqrt{14}}{14}$ | 0                       | 0                       | 0                       | $\frac{3\sqrt{70}}{70}$   |
|     |                                  | 0  | $\frac{\sqrt{21}}{28}$   | 0                         | 0                       | 0                        | 0                       | $-\frac{\sqrt{14}}{14}$ | 0                       | 0                       | 0                         |
|     |                                  | 0  | 0                        | $-\frac{\sqrt{105}}{140}$ | 0                       | 0                        | 0                       | 0                       | $\frac{3\sqrt{70}}{70}$ | 0                       | 0                         |
| 472 | symmetry                         | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$            |                          |                           |                         |                          |                         |                         |                         |                         |                           |

continued ...

Table 8

| No. | multipole                          | matrix                             |                         |                          |                        |                         |                         |                          |                          |                         |                          |
|-----|------------------------------------|------------------------------------|-------------------------|--------------------------|------------------------|-------------------------|-------------------------|--------------------------|--------------------------|-------------------------|--------------------------|
|     | $\mathbb{Q}_{4,0}^{(1,-1;a)}(T_1)$ | 0                                  | 0                       | 0                        | 0                      | $\frac{\sqrt{5}i}{80}$  | 0                       | $\frac{\sqrt{2}i}{16}$   | 0                        | $\frac{i}{16}$          | 0                        |
|     |                                    | 0                                  | 0                       | 0                        | 0                      | 0                       | $-\frac{\sqrt{3}i}{16}$ | 0                        | $-\frac{\sqrt{6}i}{16}$  | 0                       | $-\frac{\sqrt{15}i}{80}$ |
|     |                                    | 0                                  | 0                       | 0                        | 0                      | $\frac{\sqrt{15}i}{80}$ | 0                       | $\frac{\sqrt{6}i}{16}$   | 0                        | $\frac{\sqrt{3}i}{16}$  | 0                        |
|     |                                    | 0                                  | 0                       | 0                        | 0                      | 0                       | $-\frac{i}{16}$         | 0                        | $-\frac{\sqrt{2}i}{16}$  | 0                       | $-\frac{\sqrt{5}i}{80}$  |
|     |                                    | $-\frac{\sqrt{5}i}{80}$            | 0                       | $-\frac{\sqrt{15}i}{80}$ | 0                      | 0                       | $-\frac{\sqrt{5}i}{10}$ | 0                        | $-\frac{\sqrt{10}i}{20}$ | 0                       | 0                        |
|     |                                    | 0                                  | $\frac{\sqrt{3}i}{16}$  | 0                        | $\frac{i}{16}$         | $\frac{\sqrt{5}i}{10}$  | 0                       | $\frac{\sqrt{2}i}{4}$    | 0                        | 0                       | 0                        |
|     |                                    | $-\frac{\sqrt{2}i}{16}$            | 0                       | $-\frac{\sqrt{6}i}{16}$  | 0                      | 0                       | $-\frac{\sqrt{2}i}{4}$  | 0                        | 0                        | 0                       | $\frac{\sqrt{10}i}{20}$  |
|     |                                    | 0                                  | $\frac{\sqrt{6}i}{16}$  | 0                        | $\frac{\sqrt{2}i}{16}$ | $\frac{\sqrt{10}i}{20}$ | 0                       | 0                        | 0                        | $-\frac{\sqrt{2}i}{4}$  | 0                        |
|     |                                    | $-\frac{i}{16}$                    | 0                       | $-\frac{\sqrt{3}i}{16}$  | 0                      | 0                       | 0                       | 0                        | $\frac{\sqrt{2}i}{4}$    | 0                       | $\frac{\sqrt{5}i}{10}$   |
|     |                                    | 0                                  | $\frac{\sqrt{15}i}{80}$ | 0                        | $\frac{\sqrt{5}i}{80}$ | 0                       | 0                       | $-\frac{\sqrt{10}i}{20}$ | 0                        | $-\frac{\sqrt{5}i}{10}$ | 0                        |
| 473 | symmetry                           | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ |                         |                          |                        |                         |                         |                          |                          |                         |                          |
|     | $\mathbb{Q}_{4,1}^{(1,-1;a)}(T_1)$ | 0                                  | 0                       | 0                        | 0                      | $-\frac{\sqrt{5}}{80}$  | 0                       | $\frac{\sqrt{2}}{16}$    | 0                        | $-\frac{1}{16}$         | 0                        |
|     |                                    | 0                                  | 0                       | 0                        | 0                      | 0                       | $\frac{\sqrt{3}}{16}$   | 0                        | $-\frac{\sqrt{6}}{16}$   | 0                       | $\frac{\sqrt{15}}{80}$   |
|     |                                    | 0                                  | 0                       | 0                        | 0                      | $\frac{\sqrt{15}}{80}$  | 0                       | $-\frac{\sqrt{6}}{16}$   | 0                        | $\frac{\sqrt{3}}{16}$   | 0                        |
|     |                                    | 0                                  | 0                       | 0                        | 0                      | 0                       | $-\frac{1}{16}$         | 0                        | $\frac{\sqrt{2}}{16}$    | 0                       | $-\frac{\sqrt{5}}{80}$   |
|     |                                    | $-\frac{\sqrt{5}}{80}$             | 0                       | $\frac{\sqrt{15}}{80}$   | 0                      | 0                       | $-\frac{\sqrt{5}}{10}$  | 0                        | $\frac{\sqrt{10}}{20}$   | 0                       | 0                        |
|     |                                    | 0                                  | $\frac{\sqrt{3}}{16}$   | 0                        | $-\frac{1}{16}$        | $-\frac{\sqrt{5}}{10}$  | 0                       | $\frac{\sqrt{2}}{4}$     | 0                        | 0                       | 0                        |
|     |                                    | $\frac{\sqrt{2}}{16}$              | 0                       | $-\frac{\sqrt{6}}{16}$   | 0                      | 0                       | $\frac{\sqrt{2}}{4}$    | 0                        | 0                        | 0                       | $-\frac{\sqrt{10}}{20}$  |
|     |                                    | 0                                  | $-\frac{\sqrt{6}}{16}$  | 0                        | $\frac{\sqrt{2}}{16}$  | $\frac{\sqrt{10}}{20}$  | 0                       | 0                        | 0                        | $-\frac{\sqrt{2}}{4}$   | 0                        |
|     |                                    | $-\frac{1}{16}$                    | 0                       | $\frac{\sqrt{3}}{16}$    | 0                      | 0                       | 0                       | 0                        | $-\frac{\sqrt{2}}{4}$    | 0                       | $\frac{\sqrt{5}}{10}$    |
|     |                                    | 0                                  | $\frac{\sqrt{15}}{80}$  | 0                        | $-\frac{\sqrt{5}}{80}$ | 0                       | 0                       | $-\frac{\sqrt{10}}{20}$  | 0                        | $\frac{\sqrt{5}}{10}$   | 0                        |
| 474 | symmetry                           | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$  |                         |                          |                        |                         |                         |                          |                          |                         |                          |

*continued ...*

Table 8

| No. | multipole                          | matrix  |  |  |  |  |  |  |  |  |  |
|-----|------------------------------------|---|--|--|--|--|--|--|--|--|--|
|     | $\mathbb{Q}_{4,2}^{(1,-1;a)}(T_1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{10} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{5} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{5} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{5} & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{5} & 0 & 0 & 0 & 0 \end{bmatrix}$  |  |  |  |  |  |  |  |  |  |
| 475 | symmetry                           | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$ $\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{35}i}{560} & 0 & \frac{\sqrt{14}i}{112} & 0 & -\frac{\sqrt{7}i}{16} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{21}i}{112} & 0 & -\frac{\sqrt{42}i}{112} & 0 & \frac{\sqrt{105}i}{80} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{105}i}{80} & 0 & \frac{\sqrt{42}i}{112} & 0 & \frac{\sqrt{21}i}{112} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}i}{16} & 0 & -\frac{\sqrt{14}i}{112} & 0 & -\frac{\sqrt{35}i}{560} \\ -\frac{\sqrt{35}i}{560} & 0 & \frac{\sqrt{105}i}{80} & 0 & 0 & -\frac{\sqrt{35}i}{70} & 0 & \frac{\sqrt{70}i}{20} & 0 & 0 \\ 0 & \frac{\sqrt{21}i}{112} & 0 & -\frac{\sqrt{7}i}{16} & \frac{\sqrt{35}i}{70} & 0 & \frac{\sqrt{14}i}{28} & 0 & 0 & 0 \\ -\frac{\sqrt{14}i}{112} & 0 & -\frac{\sqrt{42}i}{112} & 0 & 0 & -\frac{\sqrt{14}i}{28} & 0 & 0 & 0 & -\frac{\sqrt{70}i}{20} \\ 0 & \frac{\sqrt{42}i}{112} & 0 & \frac{\sqrt{14}i}{112} & -\frac{\sqrt{70}i}{20} & 0 & 0 & 0 & -\frac{\sqrt{14}i}{28} & 0 \\ \frac{\sqrt{7}i}{16} & 0 & -\frac{\sqrt{21}i}{112} & 0 & 0 & 0 & 0 & \frac{\sqrt{14}i}{28} & 0 & \frac{\sqrt{35}i}{70} \\ 0 & -\frac{\sqrt{105}i}{80} & 0 & \frac{\sqrt{35}i}{560} & 0 & 0 & \frac{\sqrt{70}i}{20} & 0 & -\frac{\sqrt{35}i}{70} & 0 \end{bmatrix}$ |  |  |  |  |  |  |  |  |  |
| 476 | symmetry                           | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$   |  |  |  |  |  |  |  |  |  |

continued ...

Table 8

| No. | multipole                          | matrix                                |                           |                           |                          |                            |                          |                          |                           |                          |                            |
|-----|------------------------------------|---------------------------------------|---------------------------|---------------------------|--------------------------|----------------------------|--------------------------|--------------------------|---------------------------|--------------------------|----------------------------|
|     | $\mathbb{Q}_{4,1}^{(1,-1;a)}(T_2)$ | 0                                     | 0                         | 0                         | 0                        | $\frac{\sqrt{35}}{560}$    | 0                        | $-\frac{\sqrt{14}}{112}$ | 0                         | $-\frac{\sqrt{7}}{16}$   | 0                          |
|     |                                    | 0                                     | 0                         | 0                         | 0                        | 0                          | $-\frac{\sqrt{21}}{112}$ | 0                        | $\frac{\sqrt{42}}{112}$   | 0                        | $\frac{\sqrt{105}}{80}$    |
|     |                                    | 0                                     | 0                         | 0                         | 0                        | $\frac{\sqrt{105}}{80}$    | 0                        | $\frac{\sqrt{42}}{112}$  | 0                         | $-\frac{\sqrt{21}}{112}$ | 0                          |
|     |                                    | 0                                     | 0                         | 0                         | 0                        | 0                          | $-\frac{\sqrt{7}}{16}$   | 0                        | $-\frac{\sqrt{14}}{112}$  | 0                        | $\frac{\sqrt{35}}{560}$    |
|     |                                    | $\frac{\sqrt{35}}{560}$               | 0                         | $\frac{\sqrt{105}}{80}$   | 0                        | 0                          | $\frac{\sqrt{35}}{70}$   | 0                        | $\frac{\sqrt{70}}{20}$    | 0                        | 0                          |
|     |                                    | 0                                     | $-\frac{\sqrt{21}}{112}$  | 0                         | $-\frac{\sqrt{7}}{16}$   | $\frac{\sqrt{35}}{70}$     | 0                        | $-\frac{\sqrt{14}}{28}$  | 0                         | 0                        | 0                          |
|     |                                    | $-\frac{\sqrt{14}}{112}$              | 0                         | $\frac{\sqrt{42}}{112}$   | 0                        | 0                          | $-\frac{\sqrt{14}}{28}$  | 0                        | 0                         | 0                        | $-\frac{\sqrt{70}}{20}$    |
|     |                                    | 0                                     | $\frac{\sqrt{42}}{112}$   | 0                         | $-\frac{\sqrt{14}}{112}$ | $\frac{\sqrt{70}}{20}$     | 0                        | 0                        | 0                         | $\frac{\sqrt{14}}{28}$   | 0                          |
|     |                                    | $-\frac{\sqrt{7}}{16}$                | 0                         | $-\frac{\sqrt{21}}{112}$  | 0                        | 0                          | 0                        | 0                        | $\frac{\sqrt{14}}{28}$    | 0                        | $-\frac{\sqrt{35}}{70}$    |
|     |                                    | 0                                     | $\frac{\sqrt{105}}{80}$   | 0                         | $\frac{\sqrt{35}}{560}$  | 0                          | 0                        | $-\frac{\sqrt{70}}{20}$  | 0                         | $-\frac{\sqrt{35}}{70}$  | 0                          |
| 477 | symmetry                           | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ |                           |                           |                          |                            |                          |                          |                           |                          |                            |
|     | $\mathbb{Q}_{4,2}^{(1,-1;a)}(T_2)$ | 0                                     | 0                         | 0                         | 0                        | 0                          | 0                        | $-\frac{\sqrt{14}i}{28}$ | 0                         | 0                        | 0                          |
|     |                                    | 0                                     | 0                         | 0                         | 0                        | $-\frac{\sqrt{105}i}{140}$ | 0                        | 0                        | 0                         | $\frac{\sqrt{21}i}{28}$  | 0                          |
|     |                                    | 0                                     | 0                         | 0                         | 0                        | 0                          | $\frac{\sqrt{21}i}{28}$  | 0                        | 0                         | 0                        | $-\frac{\sqrt{105}i}{140}$ |
|     |                                    | 0                                     | 0                         | 0                         | 0                        | 0                          | 0                        | $-\frac{\sqrt{14}i}{28}$ | 0                         | 0                        | 0                          |
|     |                                    | 0                                     | $\frac{\sqrt{105}i}{140}$ | 0                         | 0                        | 0                          | 0                        | $\frac{3\sqrt{70}i}{70}$ | 0                         | 0                        | 0                          |
|     |                                    | 0                                     | 0                         | $-\frac{\sqrt{21}i}{28}$  | 0                        | 0                          | 0                        | 0                        | $-\frac{\sqrt{14}i}{14}$  | 0                        | 0                          |
|     |                                    | 0                                     | 0                         | 0                         | $\frac{\sqrt{14}i}{28}$  | $-\frac{3\sqrt{70}i}{70}$  | 0                        | 0                        | 0                         | $-\frac{\sqrt{14}i}{14}$ | 0                          |
|     |                                    | $\frac{\sqrt{14}i}{28}$               | 0                         | 0                         | 0                        | 0                          | $\frac{\sqrt{14}i}{14}$  | 0                        | 0                         | 0                        | $\frac{3\sqrt{70}i}{70}$   |
|     |                                    | 0                                     | $-\frac{\sqrt{21}i}{28}$  | 0                         | 0                        | 0                          | 0                        | $\frac{\sqrt{14}i}{14}$  | 0                         | 0                        | 0                          |
|     |                                    | 0                                     | 0                         | $\frac{\sqrt{105}i}{140}$ | 0                        | 0                          | 0                        | 0                        | $-\frac{3\sqrt{70}i}{70}$ | 0                        | 0                          |
| 478 | symmetry                           | 1                                     |                           |                           |                          |                            |                          |                          |                           |                          |                            |

continued ...

Table 8

| No. | multipole                     | matrix  |  |  |  |  |  |  |  |  |  |
|-----|-------------------------------|---|--|--|--|--|--|--|--|--|--|
|     | $\mathbb{Q}_0^{(1,1;a)}(A_1)$ | $\begin{bmatrix} -\frac{\sqrt{15}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{15}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{15}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{15}}{10} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{15} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{15} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{15} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{15} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{15} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{15} \end{bmatrix}$  |  |  |  |  |  |  |  |  |  |
| 479 | symmetry                      | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ $\begin{bmatrix} \frac{\sqrt{105}}{25} & 0 & 0 & 0 & 0 & -\frac{4\sqrt{105}}{175} & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{105}}{25} & 0 & 0 & 0 & 0 & -\frac{2\sqrt{70}}{175} & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{105}}{25} & 0 & 0 & 0 & 0 & \frac{2\sqrt{70}}{175} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{105}}{25} & 0 & 0 & 0 & 0 & \frac{4\sqrt{105}}{175} & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{105}}{70} & 0 & 0 & 0 & 0 & 0 \\ -\frac{4\sqrt{105}}{175} & 0 & 0 & 0 & 0 & \frac{\sqrt{105}}{350} & 0 & 0 & 0 & 0 \\ 0 & -\frac{2\sqrt{70}}{175} & 0 & 0 & 0 & 0 & \frac{2\sqrt{105}}{175} & 0 & 0 & 0 \\ 0 & 0 & \frac{2\sqrt{70}}{175} & 0 & 0 & 0 & 0 & \frac{2\sqrt{105}}{175} & 0 & 0 \\ 0 & 0 & 0 & \frac{4\sqrt{105}}{175} & 0 & 0 & 0 & 0 & \frac{\sqrt{105}}{350} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{105}}{70} \end{bmatrix}$ |  |  |  |  |  |  |  |  |  |
| 480 | symmetry                      | $\frac{\sqrt{3}(x-y)(x+y)}{2}$  |  |  |  |  |  |  |  |  |  |

continued ...



Table 8

| No. | multipole                         | matrix                     |                            |                             |                           |                           |                             |                            |                            |                            |                           |
|-----|-----------------------------------|----------------------------|----------------------------|-----------------------------|---------------------------|---------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|
|     | $\mathbb{Q}_{2,1}^{(1,1;a)}(E)$   | 0                          | 0                          | $\frac{\sqrt{105}}{25}$     | 0                         | 0                         | 0                           | 0                          | $-\frac{2\sqrt{70}}{175}$  | 0                          | 0                         |
|     |                                   | 0                          | 0                          | 0                           | $\frac{\sqrt{105}}{25}$   | $\frac{4\sqrt{21}}{105}$  | 0                           | 0                          | 0                          | $-\frac{8\sqrt{105}}{525}$ | 0                         |
|     |                                   | $\frac{\sqrt{105}}{25}$    | 0                          | 0                           | 0                         | 0                         | $\frac{8\sqrt{105}}{525}$   | 0                          | 0                          | 0                          | $-\frac{4\sqrt{21}}{105}$ |
|     |                                   | 0                          | $\frac{\sqrt{105}}{25}$    | 0                           | 0                         | 0                         | 0                           | $\frac{2\sqrt{70}}{175}$   | 0                          | 0                          | 0                         |
|     |                                   | 0                          | $\frac{4\sqrt{21}}{105}$   | 0                           | 0                         | 0                         | 0                           | $-\frac{3\sqrt{14}}{140}$  | 0                          | 0                          | 0                         |
|     |                                   | 0                          | 0                          | $\frac{8\sqrt{105}}{525}$   | 0                         | 0                         | 0                           | 0                          | $-\frac{9\sqrt{70}}{700}$  | 0                          | 0                         |
|     |                                   | 0                          | 0                          | 0                           | $\frac{2\sqrt{70}}{175}$  | $-\frac{3\sqrt{14}}{140}$ | 0                           | 0                          | 0                          | $-\frac{9\sqrt{70}}{700}$  | 0                         |
|     |                                   | $-\frac{2\sqrt{70}}{175}$  | 0                          | 0                           | 0                         | 0                         | $-\frac{9\sqrt{70}}{700}$   | 0                          | 0                          | 0                          | $-\frac{3\sqrt{14}}{140}$ |
|     |                                   | 0                          | $-\frac{8\sqrt{105}}{525}$ | 0                           | 0                         | 0                         | 0                           | $-\frac{9\sqrt{70}}{700}$  | 0                          | 0                          | 0                         |
|     |                                   | 0                          | 0                          | $-\frac{4\sqrt{21}}{105}$   | 0                         | 0                         | 0                           | 0                          | $-\frac{3\sqrt{14}}{140}$  | 0                          | 0                         |
| 481 | symmetry                          | $\sqrt{3}yz$               |                            |                             |                           |                           |                             |                            |                            |                            |                           |
|     | $\mathbb{Q}_{2,0}^{(1,1;a)}(T_2)$ | 0                          | $-\frac{\sqrt{105}i}{25}$  | 0                           | 0                         | $\frac{2\sqrt{7}i}{35}$   | 0                           | $\frac{3\sqrt{70}i}{175}$  | 0                          | 0                          | 0                         |
|     |                                   | $\frac{\sqrt{105}i}{25}$   | 0                          | 0                           | 0                         | 0                         | $-\frac{2\sqrt{105}i}{525}$ | 0                          | $\frac{\sqrt{210}i}{105}$  | 0                          | 0                         |
|     |                                   | 0                          | 0                          | 0                           | $\frac{\sqrt{105}i}{25}$  | 0                         | 0                           | $-\frac{\sqrt{210}i}{105}$ | 0                          | $\frac{2\sqrt{105}i}{525}$ | 0                         |
|     |                                   | 0                          | 0                          | $-\frac{\sqrt{105}i}{25}$   | 0                         | 0                         | 0                           | 0                          | $-\frac{3\sqrt{70}i}{175}$ | 0                          | $-\frac{2\sqrt{7}i}{35}$  |
|     |                                   | $-\frac{2\sqrt{7}i}{35}$   | 0                          | 0                           | 0                         | 0                         | $\frac{3\sqrt{7}i}{70}$     | 0                          | 0                          | 0                          | 0                         |
|     |                                   | 0                          | $\frac{2\sqrt{105}i}{525}$ | 0                           | 0                         | $-\frac{3\sqrt{7}i}{70}$  | 0                           | $\frac{3\sqrt{70}i}{350}$  | 0                          | 0                          | 0                         |
|     |                                   | $-\frac{3\sqrt{70}i}{175}$ | 0                          | $\frac{\sqrt{210}i}{105}$   | 0                         | 0                         | $-\frac{3\sqrt{70}i}{350}$  | 0                          | 0                          | 0                          | 0                         |
|     |                                   | 0                          | $-\frac{\sqrt{210}i}{105}$ | 0                           | $\frac{3\sqrt{70}i}{175}$ | 0                         | 0                           | 0                          | 0                          | $-\frac{3\sqrt{70}i}{350}$ | 0                         |
|     |                                   | 0                          | 0                          | $-\frac{2\sqrt{105}i}{525}$ | 0                         | 0                         | 0                           | 0                          | $\frac{3\sqrt{70}i}{350}$  | 0                          | $-\frac{3\sqrt{7}i}{70}$  |
|     |                                   | 0                          | 0                          | 0                           | $\frac{2\sqrt{7}i}{35}$   | 0                         | 0                           | 0                          | 0                          | $\frac{3\sqrt{7}i}{70}$    | 0                         |
| 482 | symmetry                          | $\sqrt{3}xz$               |                            |                             |                           |                           |                             |                            |                            |                            |                           |

continued ...

Table 8

| No. | multipole                         | matrix                     |                             |                             |                            |                            |                            |                            |                            |                            |                           |
|-----|-----------------------------------|----------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|
|     | $\mathbb{Q}_{2,1}^{(1,1;a)}(T_2)$ | 0                          | $\frac{\sqrt{105}}{25}$     | 0                           | 0                          | $\frac{2\sqrt{7}}{35}$     | 0                          | $-\frac{3\sqrt{70}}{175}$  | 0                          | 0                          | 0                         |
|     |                                   | $\frac{\sqrt{105}}{25}$    | 0                           | 0                           | 0                          | 0                          | $-\frac{2\sqrt{105}}{525}$ | 0                          | $-\frac{\sqrt{210}}{105}$  | 0                          | 0                         |
|     |                                   | 0                          | 0                           | 0                           | $-\frac{\sqrt{105}}{25}$   | 0                          | 0                          | $-\frac{\sqrt{210}}{105}$  | 0                          | $-\frac{2\sqrt{105}}{525}$ | 0                         |
|     |                                   | 0                          | 0                           | $-\frac{\sqrt{105}}{25}$    | 0                          | 0                          | 0                          | 0                          | $-\frac{3\sqrt{70}}{175}$  | 0                          | $\frac{2\sqrt{7}}{35}$    |
|     |                                   | $\frac{2\sqrt{7}}{35}$     | 0                           | 0                           | 0                          | 0                          | $-\frac{3\sqrt{7}}{70}$    | 0                          | 0                          | 0                          | 0                         |
|     |                                   | 0                          | $-\frac{2\sqrt{105}}{525}$  | 0                           | 0                          | $-\frac{3\sqrt{7}}{70}$    | 0                          | $-\frac{3\sqrt{70}}{350}$  | 0                          | 0                          | 0                         |
|     |                                   | $-\frac{3\sqrt{70}}{175}$  | 0                           | $-\frac{\sqrt{210}}{105}$   | 0                          | 0                          | $-\frac{3\sqrt{70}}{350}$  | 0                          | 0                          | 0                          | 0                         |
|     |                                   | 0                          | $-\frac{\sqrt{210}}{105}$   | 0                           | $-\frac{3\sqrt{70}}{175}$  | 0                          | 0                          | 0                          | 0                          | $\frac{3\sqrt{70}}{350}$   | 0                         |
|     |                                   | 0                          | 0                           | $-\frac{2\sqrt{105}}{525}$  | 0                          | 0                          | 0                          | 0                          | $\frac{3\sqrt{70}}{350}$   | 0                          | $\frac{3\sqrt{7}}{70}$    |
|     |                                   | 0                          | 0                           | 0                           | $\frac{2\sqrt{7}}{35}$     | 0                          | 0                          | 0                          | 0                          | $\frac{3\sqrt{7}}{70}$     | 0                         |
| 483 | symmetry                          | $\sqrt{3}xy$               |                             |                             |                            |                            |                            |                            |                            |                            |                           |
|     | $\mathbb{Q}_{2,2}^{(1,1;a)}(T_2)$ | 0                          | 0                           | $-\frac{\sqrt{105}i}{25}$   | 0                          | 0                          | 0                          | 0                          | $\frac{2\sqrt{70}i}{175}$  | 0                          | 0                         |
|     |                                   | 0                          | 0                           | 0                           | $-\frac{\sqrt{105}i}{25}$  | $\frac{4\sqrt{21}i}{105}$  | 0                          | 0                          | 0                          | $\frac{8\sqrt{105}i}{525}$ | 0                         |
|     |                                   | $\frac{\sqrt{105}i}{25}$   | 0                           | 0                           | 0                          | 0                          | $\frac{8\sqrt{105}i}{525}$ | 0                          | 0                          | 0                          | $\frac{4\sqrt{21}i}{105}$ |
|     |                                   | 0                          | $\frac{\sqrt{105}i}{25}$    | 0                           | 0                          | 0                          | 0                          | $\frac{2\sqrt{70}i}{175}$  | 0                          | 0                          | 0                         |
|     |                                   | 0                          | $-\frac{4\sqrt{21}i}{105}$  | 0                           | 0                          | 0                          | 0                          | $\frac{3\sqrt{14}i}{140}$  | 0                          | 0                          | 0                         |
|     |                                   | 0                          | 0                           | $-\frac{8\sqrt{105}i}{525}$ | 0                          | 0                          | 0                          | 0                          | $\frac{9\sqrt{70}i}{700}$  | 0                          | 0                         |
|     |                                   | 0                          | 0                           | 0                           | $-\frac{2\sqrt{70}i}{175}$ | $-\frac{3\sqrt{14}i}{140}$ | 0                          | 0                          | 0                          | $\frac{9\sqrt{70}i}{700}$  | 0                         |
|     |                                   | $-\frac{2\sqrt{70}i}{175}$ | 0                           | 0                           | 0                          | 0                          | $-\frac{9\sqrt{70}i}{700}$ | 0                          | 0                          | 0                          | $\frac{3\sqrt{14}i}{140}$ |
|     |                                   | 0                          | $-\frac{8\sqrt{105}i}{525}$ | 0                           | 0                          | 0                          | 0                          | $-\frac{9\sqrt{70}i}{700}$ | 0                          | 0                          | 0                         |
|     |                                   | 0                          | 0                           | $-\frac{4\sqrt{21}i}{105}$  | 0                          | 0                          | 0                          | 0                          | $-\frac{3\sqrt{14}i}{140}$ | 0                          | 0                         |
| 484 | symmetry                          | $x$                        |                             |                             |                            |                            |                            |                            |                            |                            |                           |

*continued ...*

Table 8

| No. | multipole                         | matrix                 |                          |                          |                         |                       |                         |                         |                          |                          |                        |
|-----|-----------------------------------|------------------------|--------------------------|--------------------------|-------------------------|-----------------------|-------------------------|-------------------------|--------------------------|--------------------------|------------------------|
|     | $\mathbb{G}_{1,0}^{(1,0;a)}(T_1)$ | 0                      | 0                        | 0                        | 0                       | $\frac{\sqrt{2}i}{4}$ | 0                       | $-\frac{\sqrt{5}i}{20}$ | 0                        | 0                        | 0                      |
|     |                                   | 0                      | 0                        | 0                        | 0                       | 0                     | $\frac{\sqrt{30}i}{20}$ | 0                       | $-\frac{\sqrt{15}i}{20}$ | 0                        | 0                      |
|     |                                   | 0                      | 0                        | 0                        | 0                       | 0                     | 0                       | $\frac{\sqrt{15}i}{20}$ | 0                        | $-\frac{\sqrt{30}i}{20}$ | 0                      |
|     |                                   | 0                      | 0                        | 0                        | 0                       | 0                     | 0                       | 0                       | $\frac{\sqrt{5}i}{20}$   | 0                        | $-\frac{\sqrt{2}i}{4}$ |
|     |                                   | $-\frac{\sqrt{2}i}{4}$ | 0                        | 0                        | 0                       | 0                     | 0                       | 0                       | 0                        | 0                        | 0                      |
|     |                                   | 0                      | $-\frac{\sqrt{30}i}{20}$ | 0                        | 0                       | 0                     | 0                       | 0                       | 0                        | 0                        | 0                      |
|     |                                   | $\frac{\sqrt{5}i}{20}$ | 0                        | $-\frac{\sqrt{15}i}{20}$ | 0                       | 0                     | 0                       | 0                       | 0                        | 0                        | 0                      |
|     |                                   | 0                      | $\frac{\sqrt{15}i}{20}$  | 0                        | $-\frac{\sqrt{5}i}{20}$ | 0                     | 0                       | 0                       | 0                        | 0                        | 0                      |
|     |                                   | 0                      | 0                        | $\frac{\sqrt{30}i}{20}$  | 0                       | 0                     | 0                       | 0                       | 0                        | 0                        | 0                      |
|     |                                   | 0                      | 0                        | 0                        | $\frac{\sqrt{2}i}{4}$   | 0                     | 0                       | 0                       | 0                        | 0                        | 0                      |
| 485 | symmetry                          | $y$                    |                          |                          |                         |                       |                         |                         |                          |                          |                        |
|     | $\mathbb{G}_{1,1}^{(1,0;a)}(T_1)$ | 0                      | 0                        | 0                        | 0                       | $-\frac{\sqrt{2}}{4}$ | 0                       | $-\frac{\sqrt{5}}{20}$  | 0                        | 0                        | 0                      |
|     |                                   | 0                      | 0                        | 0                        | 0                       | 0                     | $-\frac{\sqrt{30}}{20}$ | 0                       | $-\frac{\sqrt{15}}{20}$  | 0                        | 0                      |
|     |                                   | 0                      | 0                        | 0                        | 0                       | 0                     | 0                       | $-\frac{\sqrt{15}}{20}$ | 0                        | $-\frac{\sqrt{30}}{20}$  | 0                      |
|     |                                   | 0                      | 0                        | 0                        | 0                       | 0                     | 0                       | 0                       | $-\frac{\sqrt{5}}{20}$   | 0                        | $-\frac{\sqrt{2}}{4}$  |
|     |                                   | $-\frac{\sqrt{2}}{4}$  | 0                        | 0                        | 0                       | 0                     | 0                       | 0                       | 0                        | 0                        | 0                      |
|     |                                   | 0                      | $-\frac{\sqrt{30}}{20}$  | 0                        | 0                       | 0                     | 0                       | 0                       | 0                        | 0                        | 0                      |
|     |                                   | $-\frac{\sqrt{5}}{20}$ | 0                        | $-\frac{\sqrt{15}}{20}$  | 0                       | 0                     | 0                       | 0                       | 0                        | 0                        | 0                      |
|     |                                   | 0                      | $-\frac{\sqrt{15}}{20}$  | 0                        | $-\frac{\sqrt{5}}{20}$  | 0                     | 0                       | 0                       | 0                        | 0                        | 0                      |
|     |                                   | 0                      | 0                        | $-\frac{\sqrt{30}}{20}$  | 0                       | 0                     | 0                       | 0                       | 0                        | 0                        | 0                      |
|     |                                   | 0                      | 0                        | 0                        | $-\frac{\sqrt{2}}{4}$   | 0                     | 0                       | 0                       | 0                        | 0                        | 0                      |
| 486 | symmetry                          | $z$                    |                          |                          |                         |                       |                         |                         |                          |                          |                        |

*continued ...*

Table 8

| No. | multipole                         | matrix                        |                         |                         |                         |                        |                          |                          |                          |                          |                         |
|-----|-----------------------------------|-------------------------------|-------------------------|-------------------------|-------------------------|------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|
|     | $\mathbb{G}_{1,2}^{(1,0;a)}(T_1)$ | 0                             | 0                       | 0                       | 0                       | 0                      | $-\frac{\sqrt{10}i}{10}$ | 0                        | 0                        | 0                        | 0                       |
|     |                                   | 0                             | 0                       | 0                       | 0                       | 0                      | 0                        | $-\frac{\sqrt{15}i}{10}$ | 0                        | 0                        | 0                       |
|     |                                   | 0                             | 0                       | 0                       | 0                       | 0                      | 0                        | 0                        | $-\frac{\sqrt{15}i}{10}$ | 0                        | 0                       |
|     |                                   | 0                             | 0                       | 0                       | 0                       | 0                      | 0                        | 0                        | 0                        | $-\frac{\sqrt{10}i}{10}$ | 0                       |
|     |                                   | 0                             | 0                       | 0                       | 0                       | 0                      | 0                        | 0                        | 0                        | 0                        | 0                       |
|     |                                   | $\frac{\sqrt{10}i}{10}$       | 0                       | 0                       | 0                       | 0                      | 0                        | 0                        | 0                        | 0                        | 0                       |
|     |                                   | 0                             | $\frac{\sqrt{15}i}{10}$ | 0                       | 0                       | 0                      | 0                        | 0                        | 0                        | 0                        | 0                       |
|     |                                   | 0                             | 0                       | $\frac{\sqrt{15}i}{10}$ | 0                       | 0                      | 0                        | 0                        | 0                        | 0                        | 0                       |
|     |                                   | 0                             | 0                       | 0                       | $\frac{\sqrt{10}i}{10}$ | 0                      | 0                        | 0                        | 0                        | 0                        | 0                       |
|     |                                   | 0                             | 0                       | 0                       | 0                       | 0                      | 0                        | 0                        | 0                        | 0                        | 0                       |
| 487 | symmetry                          | $\sqrt{15}xyz$                |                         |                         |                         |                        |                          |                          |                          |                          |                         |
|     | $\mathbb{G}_3^{(1,0;a)}(A_2)$     | 0                             | 0                       | 0                       | 0                       | 0                      | 0                        | 0                        | $\frac{\sqrt{2}}{4}$     | 0                        | 0                       |
|     |                                   | 0                             | 0                       | 0                       | 0                       | $\frac{\sqrt{15}}{12}$ | 0                        | 0                        | 0                        | $\frac{\sqrt{3}}{12}$    | 0                       |
|     |                                   | 0                             | 0                       | 0                       | 0                       | 0                      | $-\frac{\sqrt{3}}{12}$   | 0                        | 0                        | 0                        | $-\frac{\sqrt{15}}{12}$ |
|     |                                   | 0                             | 0                       | 0                       | 0                       | 0                      | 0                        | $-\frac{\sqrt{2}}{4}$    | 0                        | 0                        | 0                       |
|     |                                   | 0                             | $\frac{\sqrt{15}}{12}$  | 0                       | 0                       | 0                      | 0                        | 0                        | 0                        | 0                        | 0                       |
|     |                                   | 0                             | 0                       | $-\frac{\sqrt{3}}{12}$  | 0                       | 0                      | 0                        | 0                        | 0                        | 0                        | 0                       |
|     |                                   | 0                             | 0                       | 0                       | $-\frac{\sqrt{2}}{4}$   | 0                      | 0                        | 0                        | 0                        | 0                        | 0                       |
|     |                                   | $\frac{\sqrt{2}}{4}$          | 0                       | 0                       | 0                       | 0                      | 0                        | 0                        | 0                        | 0                        | 0                       |
|     |                                   | 0                             | $\frac{\sqrt{3}}{12}$   | 0                       | 0                       | 0                      | 0                        | 0                        | 0                        | 0                        | 0                       |
|     |                                   | 0                             | 0                       | $-\frac{\sqrt{15}}{12}$ | 0                       | 0                      | 0                        | 0                        | 0                        | 0                        | 0                       |
| 488 | symmetry                          | $\frac{x(2x^2-3y^2-3z^2)}{2}$ |                         |                         |                         |                        |                          |                          |                          |                          |                         |

continued ...

Table 8

| No. | multipole                         | matrix                         |                          |                          |                           |                        |                          |                           |                          |                         |                         |
|-----|-----------------------------------|--------------------------------|--------------------------|--------------------------|---------------------------|------------------------|--------------------------|---------------------------|--------------------------|-------------------------|-------------------------|
|     | $\mathbb{G}_{3,0}^{(1,0;a)}(T_1)$ | 0                              | 0                        | 0                        | 0                         | $\frac{\sqrt{3}i}{16}$ | 0                        | $-\frac{3\sqrt{30}i}{80}$ | 0                        | $\frac{\sqrt{15}i}{16}$ | 0                       |
|     |                                   | 0                              | 0                        | 0                        | 0                         | 0                      | $-\frac{7\sqrt{5}i}{80}$ | 0                         | $\frac{\sqrt{10}i}{80}$  | 0                       | $\frac{5i}{16}$         |
|     |                                   | 0                              | 0                        | 0                        | 0                         | $-\frac{5i}{16}$       | 0                        | $-\frac{\sqrt{10}i}{80}$  | 0                        | $\frac{7\sqrt{5}i}{80}$ | 0                       |
|     |                                   | 0                              | 0                        | 0                        | 0                         | 0                      | $-\frac{\sqrt{15}i}{16}$ | 0                         | $\frac{3\sqrt{30}i}{80}$ | 0                       | $-\frac{\sqrt{3}i}{16}$ |
|     |                                   | $-\frac{\sqrt{3}i}{16}$        | 0                        | $\frac{5i}{16}$          | 0                         | 0                      | 0                        | 0                         | 0                        | 0                       | 0                       |
|     |                                   | 0                              | $\frac{7\sqrt{5}i}{80}$  | 0                        | $\frac{\sqrt{15}i}{16}$   | 0                      | 0                        | 0                         | 0                        | 0                       | 0                       |
|     |                                   | $\frac{3\sqrt{30}i}{80}$       | 0                        | $\frac{\sqrt{10}i}{80}$  | 0                         | 0                      | 0                        | 0                         | 0                        | 0                       | 0                       |
|     |                                   | 0                              | $-\frac{\sqrt{10}i}{80}$ | 0                        | $-\frac{3\sqrt{30}i}{80}$ | 0                      | 0                        | 0                         | 0                        | 0                       | 0                       |
|     |                                   | $-\frac{\sqrt{15}i}{16}$       | 0                        | $-\frac{7\sqrt{5}i}{80}$ | 0                         | 0                      | 0                        | 0                         | 0                        | 0                       | 0                       |
|     |                                   | 0                              | $-\frac{5i}{16}$         | 0                        | $\frac{\sqrt{3}i}{16}$    | 0                      | 0                        | 0                         | 0                        | 0                       | 0                       |
| 489 | symmetry                          | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ |                          |                          |                           |                        |                          |                           |                          |                         |                         |
|     | $\mathbb{G}_{3,1}^{(1,0;a)}(T_1)$ | 0                              | 0                        | 0                        | 0                         | $-\frac{\sqrt{3}}{16}$ | 0                        | $-\frac{3\sqrt{30}}{80}$  | 0                        | $-\frac{\sqrt{15}}{16}$ | 0                       |
|     |                                   | 0                              | 0                        | 0                        | 0                         | 0                      | $\frac{7\sqrt{5}}{80}$   | 0                         | $\frac{\sqrt{10}}{80}$   | 0                       | $-\frac{5}{16}$         |
|     |                                   | 0                              | 0                        | 0                        | 0                         | $-\frac{5}{16}$        | 0                        | $\frac{\sqrt{10}}{80}$    | 0                        | $\frac{7\sqrt{5}}{80}$  | 0                       |
|     |                                   | 0                              | 0                        | 0                        | 0                         | 0                      | $-\frac{\sqrt{15}}{16}$  | 0                         | $-\frac{3\sqrt{30}}{80}$ | 0                       | $-\frac{\sqrt{3}}{16}$  |
|     |                                   | $-\frac{\sqrt{3}}{16}$         | 0                        | $-\frac{5}{16}$          | 0                         | 0                      | 0                        | 0                         | 0                        | 0                       | 0                       |
|     |                                   | 0                              | $\frac{7\sqrt{5}}{80}$   | 0                        | $-\frac{\sqrt{15}}{16}$   | 0                      | 0                        | 0                         | 0                        | 0                       | 0                       |
|     |                                   | $-\frac{3\sqrt{30}}{80}$       | 0                        | $\frac{\sqrt{10}}{80}$   | 0                         | 0                      | 0                        | 0                         | 0                        | 0                       | 0                       |
|     |                                   | 0                              | $\frac{\sqrt{10}}{80}$   | 0                        | $-\frac{3\sqrt{30}}{80}$  | 0                      | 0                        | 0                         | 0                        | 0                       | 0                       |
|     |                                   | $-\frac{\sqrt{15}}{16}$        | 0                        | $\frac{7\sqrt{5}}{80}$   | 0                         | 0                      | 0                        | 0                         | 0                        | 0                       | 0                       |
|     |                                   | 0                              | $-\frac{5}{16}$          | 0                        | $-\frac{\sqrt{3}}{16}$    | 0                      | 0                        | 0                         | 0                        | 0                       | 0                       |
| 490 | symmetry                          | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ |                          |                          |                           |                        |                          |                           |                          |                         |                         |

*continued ...*

Table 8

| No. | multipole                         | matrix  |  |  |  |  |  |  |  |  |  |
|-----|-----------------------------------|---|--|--|--|--|--|--|--|--|--|
|     | $\mathbb{G}_{3,2}^{(1,0;a)}(T_1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{10} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}i}{10} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}i}{10} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{10} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{15}i}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{10}i}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{10}i}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{15}i}{10} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$  |  |  |  |  |  |  |  |  |  |
| 491 | symmetry                          | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ $\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{16} & 0 & -\frac{3\sqrt{2}i}{16} & 0 & -\frac{3i}{16} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{7\sqrt{3}i}{48} & 0 & \frac{\sqrt{6}i}{48} & 0 & -\frac{\sqrt{15}i}{16} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{16} & 0 & -\frac{\sqrt{6}i}{48} & 0 & \frac{7\sqrt{3}i}{48} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{3i}{16} & 0 & \frac{3\sqrt{2}i}{16} & 0 & -\frac{\sqrt{5}i}{16} \\ -\frac{\sqrt{5}i}{16} & 0 & -\frac{\sqrt{15}i}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{7\sqrt{3}i}{48} & 0 & -\frac{3i}{16} & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{3\sqrt{2}i}{16} & 0 & \frac{\sqrt{6}i}{48} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{6}i}{48} & 0 & -\frac{3\sqrt{2}i}{16} & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{3i}{16} & 0 & -\frac{7\sqrt{3}i}{48} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{15}i}{16} & 0 & \frac{\sqrt{5}i}{16} & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |  |  |  |  |  |  |  |  |  |
| 492 | symmetry                          | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$   |  |  |  |  |  |  |  |  |  |

continued ...

Table 8

| No. | multipole                         | matrix                                 |                         |                         |                        |                          |                         |                        |                        |                         |                          |
|-----|-----------------------------------|--|-------------------------|-------------------------|------------------------|--------------------------|-------------------------|------------------------|------------------------|-------------------------|--------------------------|
|     | $\mathbb{G}_{3,1}^{(1,0;a)}(T_2)$ | 0                                      | 0                       | 0                       | 0                      | $\frac{\sqrt{5}}{16}$    | 0                       | $\frac{3\sqrt{2}}{16}$ | 0                      | $-\frac{3}{16}$         | 0                        |
|     |                                   | 0                                      | 0                       | 0                       | 0                      | 0                        | $-\frac{7\sqrt{3}}{48}$ | 0                      | $-\frac{\sqrt{6}}{48}$ | 0                       | $-\frac{\sqrt{15}}{16}$  |
|     |                                   | 0                                      | 0                       | 0                       | 0                      | $-\frac{\sqrt{15}}{16}$  | 0                       | $-\frac{\sqrt{6}}{48}$ | 0                      | $-\frac{7\sqrt{3}}{48}$ | 0                        |
|     |                                   | 0                                      | 0                       | 0                       | 0                      | 0                        | $-\frac{3}{16}$         | 0                      | $\frac{3\sqrt{2}}{16}$ | 0                       | $\frac{\sqrt{5}}{16}$    |
|     |                                   | $\frac{\sqrt{5}}{16}$                  | 0                       | $-\frac{\sqrt{15}}{16}$ | 0                      | 0                        | 0                       | 0                      | 0                      | 0                       | 0                        |
|     |                                   | 0                                      | $-\frac{7\sqrt{3}}{48}$ | 0                       | $-\frac{3}{16}$        | 0                        | 0                       | 0                      | 0                      | 0                       | 0                        |
|     |                                   | $\frac{3\sqrt{2}}{16}$                 | 0                       | $-\frac{\sqrt{6}}{48}$  | 0                      | 0                        | 0                       | 0                      | 0                      | 0                       | 0                        |
|     |                                   | 0                                      | $-\frac{\sqrt{6}}{48}$  | 0                       | $\frac{3\sqrt{2}}{16}$ | 0                        | 0                       | 0                      | 0                      | 0                       | 0                        |
|     |                                   | $-\frac{3}{16}$                        | 0                       | $-\frac{7\sqrt{3}}{48}$ | 0                      | 0                        | 0                       | 0                      | 0                      | 0                       | 0                        |
|     |                                   | 0                                      | $-\frac{\sqrt{15}}{16}$ | 0                       | $\frac{\sqrt{5}}{16}$  | 0                        | 0                       | 0                      | 0                      | 0                       | 0                        |
| 493 | symmetry                          | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$       |                         |                         |                        |                          |                         |                        |                        |                         |                          |
|     | $\mathbb{G}_{3,2}^{(1,0;a)}(T_2)$ | 0                                      | 0                       | 0                       | 0                      | 0                        | 0                       | 0                      | $\frac{\sqrt{2}i}{4}$  | 0                       | 0                        |
|     |                                   | 0                                      | 0                       | 0                       | 0                      | $-\frac{\sqrt{15}i}{12}$ | 0                       | 0                      | 0                      | $\frac{\sqrt{3}i}{12}$  | 0                        |
|     |                                   | 0                                      | 0                       | 0                       | 0                      | 0                        | $\frac{\sqrt{3}i}{12}$  | 0                      | 0                      | 0                       | $-\frac{\sqrt{15}i}{12}$ |
|     |                                   | 0                                      | 0                       | 0                       | 0                      | 0                        | 0                       | $\frac{\sqrt{2}i}{4}$  | 0                      | 0                       | 0                        |
|     |                                   | 0                                      | $\frac{\sqrt{15}i}{12}$ | 0                       | 0                      | 0                        | 0                       | 0                      | 0                      | 0                       | 0                        |
|     |                                   | 0                                      | 0                       | $-\frac{\sqrt{3}i}{12}$ | 0                      | 0                        | 0                       | 0                      | 0                      | 0                       | 0                        |
|     |                                   | 0                                      | 0                       | 0                       | $-\frac{\sqrt{2}i}{4}$ | 0                        | 0                       | 0                      | 0                      | 0                       | 0                        |
|     |                                   | $-\frac{\sqrt{2}i}{4}$                 | 0                       | 0                       | 0                      | 0                        | 0                       | 0                      | 0                      | 0                       | 0                        |
|     |                                   | 0                                      | $-\frac{\sqrt{3}i}{12}$ | 0                       | 0                      | 0                        | 0                       | 0                      | 0                      | 0                       | 0                        |
|     |                                   | 0                                      | 0                       | $\frac{\sqrt{15}i}{12}$ | 0                      | 0                        | 0                       | 0                      | 0                      | 0                       | 0                        |
| 494 | symmetry                          | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |                         |                         |                        |                          |                         |                        |                        |                         |                          |

continued ...

Table 8

| No. | multipole                       | matrix                         |                          |                           |                         |                           |                          |                         |                         |                          |                          |
|-----|---------------------------------|--------------------------------|--------------------------|---------------------------|-------------------------|---------------------------|--------------------------|-------------------------|-------------------------|--------------------------|--------------------------|
|     | $\mathbb{T}_{2,0}^{(1,0;a)}(E)$ | 0                              | 0                        | 0                         | 0                       | 0                         | $\frac{\sqrt{42}i}{14}$  | 0                       | 0                       | 0                        | 0                        |
|     |                                 | 0                              | 0                        | 0                         | 0                       | 0                         | 0                        | $\frac{\sqrt{7}i}{14}$  | 0                       | 0                        | 0                        |
|     |                                 | 0                              | 0                        | 0                         | 0                       | 0                         | 0                        | 0                       | $-\frac{\sqrt{7}i}{14}$ | 0                        | 0                        |
|     |                                 | 0                              | 0                        | 0                         | 0                       | 0                         | 0                        | 0                       | 0                       | $-\frac{\sqrt{42}i}{14}$ | 0                        |
|     |                                 | 0                              | 0                        | 0                         | 0                       | 0                         | 0                        | 0                       | 0                       | 0                        | 0                        |
|     |                                 | $-\frac{\sqrt{42}i}{14}$       | 0                        | 0                         | 0                       | 0                         | 0                        | 0                       | 0                       | 0                        | 0                        |
|     |                                 | 0                              | $-\frac{\sqrt{7}i}{14}$  | 0                         | 0                       | 0                         | 0                        | 0                       | 0                       | 0                        | 0                        |
|     |                                 | 0                              | 0                        | $\frac{\sqrt{7}i}{14}$    | 0                       | 0                         | 0                        | 0                       | 0                       | 0                        | 0                        |
|     |                                 | 0                              | 0                        | 0                         | $\frac{\sqrt{42}i}{14}$ | 0                         | 0                        | 0                       | 0                       | 0                        | 0                        |
|     |                                 | 0                              | 0                        | 0                         | 0                       | 0                         | 0                        | 0                       | 0                       | 0                        | 0                        |
| 495 | symmetry                        | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ |                          |                           |                         |                           |                          |                         |                         |                          |                          |
|     | $\mathbb{T}_{2,1}^{(1,0;a)}(E)$ | 0                              | 0                        | 0                         | 0                       | 0                         | 0                        | 0                       | $\frac{\sqrt{7}i}{14}$  | 0                        | 0                        |
|     |                                 | 0                              | 0                        | 0                         | 0                       | $-\frac{\sqrt{210}i}{42}$ | 0                        | 0                       | 0                       | $\frac{\sqrt{42}i}{21}$  | 0                        |
|     |                                 | 0                              | 0                        | 0                         | 0                       | 0                         | $-\frac{\sqrt{42}i}{21}$ | 0                       | 0                       | 0                        | $\frac{\sqrt{210}i}{42}$ |
|     |                                 | 0                              | 0                        | 0                         | 0                       | 0                         | 0                        | $-\frac{\sqrt{7}i}{14}$ | 0                       | 0                        | 0                        |
|     |                                 | 0                              | $\frac{\sqrt{210}i}{42}$ | 0                         | 0                       | 0                         | 0                        | 0                       | 0                       | 0                        | 0                        |
|     |                                 | 0                              | 0                        | $\frac{\sqrt{42}i}{21}$   | 0                       | 0                         | 0                        | 0                       | 0                       | 0                        | 0                        |
|     |                                 | 0                              | 0                        | 0                         | $\frac{\sqrt{7}i}{14}$  | 0                         | 0                        | 0                       | 0                       | 0                        | 0                        |
|     |                                 | $-\frac{\sqrt{7}i}{14}$        | 0                        | 0                         | 0                       | 0                         | 0                        | 0                       | 0                       | 0                        | 0                        |
|     |                                 | 0                              | $-\frac{\sqrt{42}i}{21}$ | 0                         | 0                       | 0                         | 0                        | 0                       | 0                       | 0                        | 0                        |
|     |                                 | 0                              | 0                        | $-\frac{\sqrt{210}i}{42}$ | 0                       | 0                         | 0                        | 0                       | 0                       | 0                        | 0                        |
| 496 | symmetry                        | $\sqrt{3}yz$                   |                          |                           |                         |                           |                          |                         |                         |                          |                          |

continued ...



Table 8

| No. | multipole                         | matrix                   |                           |                           |                          |                          |                         |                          |                          |                         |                          |
|-----|-----------------------------------|--------------------------|---------------------------|---------------------------|--------------------------|--------------------------|-------------------------|--------------------------|--------------------------|-------------------------|--------------------------|
|     | $\mathbb{T}_{2,0}^{(1,0;a)}(T_2)$ | 0                        | 0                         | 0                         | 0                        | $\frac{\sqrt{70}}{28}$   | 0                       | $\frac{3\sqrt{7}}{28}$   | 0                        | 0                       | 0                        |
|     |                                   | 0                        | 0                         | 0                         | 0                        | 0                        | $-\frac{\sqrt{42}}{84}$ | 0                        | $\frac{5\sqrt{21}}{84}$  | 0                       | 0                        |
|     |                                   | 0                        | 0                         | 0                         | 0                        | 0                        | 0                       | $-\frac{5\sqrt{21}}{84}$ | 0                        | $\frac{\sqrt{42}}{84}$  | 0                        |
|     |                                   | 0                        | 0                         | 0                         | 0                        | 0                        | 0                       | 0                        | $-\frac{3\sqrt{7}}{28}$  | 0                       | $-\frac{\sqrt{70}}{28}$  |
|     |                                   | $\frac{\sqrt{70}}{28}$   | 0                         | 0                         | 0                        | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        |
|     |                                   | 0                        | $-\frac{\sqrt{42}}{84}$   | 0                         | 0                        | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        |
|     |                                   | $\frac{3\sqrt{7}}{28}$   | 0                         | $-\frac{5\sqrt{21}}{84}$  | 0                        | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        |
|     |                                   | 0                        | $\frac{5\sqrt{21}}{84}$   | 0                         | $-\frac{3\sqrt{7}}{28}$  | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        |
|     |                                   | 0                        | 0                         | $\frac{\sqrt{42}}{84}$    | 0                        | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        |
|     |                                   | 0                        | 0                         | 0                         | $-\frac{\sqrt{70}}{28}$  | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        |
| 497 | symmetry                          | $\sqrt{3}xz$             |                           |                           |                          |                          |                         |                          |                          |                         |                          |
|     | $\mathbb{T}_{2,1}^{(1,0;a)}(T_2)$ | 0                        | 0                         | 0                         | 0                        | $-\frac{\sqrt{70}i}{28}$ | 0                       | $\frac{3\sqrt{7}i}{28}$  | 0                        | 0                       | 0                        |
|     |                                   | 0                        | 0                         | 0                         | 0                        | 0                        | $\frac{\sqrt{42}i}{84}$ | 0                        | $\frac{5\sqrt{21}i}{84}$ | 0                       | 0                        |
|     |                                   | 0                        | 0                         | 0                         | 0                        | 0                        | 0                       | $\frac{5\sqrt{21}i}{84}$ | 0                        | $\frac{\sqrt{42}i}{84}$ | 0                        |
|     |                                   | 0                        | 0                         | 0                         | 0                        | 0                        | 0                       | 0                        | $\frac{3\sqrt{7}i}{28}$  | 0                       | $-\frac{\sqrt{70}i}{28}$ |
|     |                                   | $\frac{\sqrt{70}i}{28}$  | 0                         | 0                         | 0                        | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        |
|     |                                   | 0                        | $-\frac{\sqrt{42}i}{84}$  | 0                         | 0                        | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        |
|     |                                   | $-\frac{3\sqrt{7}i}{28}$ | 0                         | $-\frac{5\sqrt{21}i}{84}$ | 0                        | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        |
|     |                                   | 0                        | $-\frac{5\sqrt{21}i}{84}$ | 0                         | $-\frac{3\sqrt{7}i}{28}$ | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        |
|     |                                   | 0                        | 0                         | $-\frac{\sqrt{42}i}{84}$  | 0                        | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        |
|     |                                   | 0                        | 0                         | 0                         | $\frac{\sqrt{70}i}{28}$  | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        |
| 498 | symmetry                          | $\sqrt{3}xy$             |                           |                           |                          |                          |                         |                          |                          |                         |                          |

*continued ...*

Table 8

| No. | multipole                         | matrix   |                         |                         |                          |                         |                         |                       |                        |                        |                          |
|-----|-----------------------------------|--|-------------------------|-------------------------|--------------------------|-------------------------|-------------------------|-----------------------|------------------------|------------------------|--------------------------|
|     | $\mathbb{T}_{2,2}^{(1,0;a)}(T_2)$ | 0  | 0                       | 0                       | 0                        | 0                       | 0                       | 0                     | $\frac{\sqrt{7}}{14}$  | 0                      | 0                        |
|     |                                   | 0  | 0                       | 0                       | 0                        | $\frac{\sqrt{210}}{42}$ | 0                       | 0                     | 0                      | $\frac{\sqrt{42}}{21}$ | 0                        |
|     |                                   | 0  | 0                       | 0                       | 0                        | 0                       | $\frac{\sqrt{42}}{21}$  | 0                     | 0                      | 0                      | $\frac{\sqrt{210}}{42}$  |
|     |                                   | 0  | 0                       | 0                       | 0                        | 0                       | 0                       | $\frac{\sqrt{7}}{14}$ | 0                      | 0                      | 0                        |
|     |                                   | 0  | $\frac{\sqrt{210}}{42}$ | 0                       | 0                        | 0                       | 0                       | 0                     | 0                      | 0                      | 0                        |
|     |                                   | 0  | 0                       | $\frac{\sqrt{42}}{21}$  | 0                        | 0                       | 0                       | 0                     | 0                      | 0                      | 0                        |
|     |                                   | 0  | 0                       | 0                       | $\frac{\sqrt{7}}{14}$    | 0                       | 0                       | 0                     | 0                      | 0                      | 0                        |
|     |                                   | $\frac{\sqrt{7}}{14}$  | 0                       | 0                       | 0                        | 0                       | 0                       | 0                     | 0                      | 0                      | 0                        |
|     |                                   | 0  | $\frac{\sqrt{42}}{21}$  | 0                       | 0                        | 0                       | 0                       | 0                     | 0                      | 0                      | 0                        |
|     |                                   | 0  | 0                       | $\frac{\sqrt{210}}{42}$ | 0                        | 0                       | 0                       | 0                     | 0                      | 0                      | 0                        |
| 499 | symmetry                          | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$     |                         |                         |                          |                         |                         |                       |                        |                        |                          |
|     | $\mathbb{T}_4^{(1,0;a)}(A_1)$     | 0  | 0                       | 0                       | 0                        | 0                       | $-\frac{\sqrt{3}i}{12}$ | 0                     | 0                      | 0                      | $-\frac{\sqrt{15}i}{12}$ |
|     |                                   | 0  | 0                       | 0                       | 0                        | 0                       | 0                       | $\frac{\sqrt{2}i}{4}$ | 0                      | 0                      | 0                        |
|     |                                   | 0  | 0                       | 0                       | 0                        | 0                       | 0                       | 0                     | $-\frac{\sqrt{2}i}{4}$ | 0                      | 0                        |
|     |                                   | 0  | 0                       | 0                       | 0                        | $\frac{\sqrt{15}i}{12}$ | 0                       | 0                     | 0                      | $\frac{\sqrt{3}i}{12}$ | 0                        |
|     |                                   | 0  | 0                       | 0                       | $-\frac{\sqrt{15}i}{12}$ | 0                       | 0                       | 0                     | 0                      | 0                      | 0                        |
|     |                                   | $\frac{\sqrt{3}i}{12}$   | 0                       | 0                       | 0                        | 0                       | 0                       | 0                     | 0                      | 0                      | 0                        |
|     |                                   | 0  | $-\frac{\sqrt{2}i}{4}$  | 0                       | 0                        | 0                       | 0                       | 0                     | 0                      | 0                      | 0                        |
|     |                                   | 0  | 0                       | $\frac{\sqrt{2}i}{4}$   | 0                        | 0                       | 0                       | 0                     | 0                      | 0                      | 0                        |
|     |                                   | 0  | 0                       | 0                       | $-\frac{\sqrt{3}i}{12}$  | 0                       | 0                       | 0                     | 0                      | 0                      | 0                        |
|     |                                   | $\frac{\sqrt{15}i}{12}$  | 0                       | 0                       | 0                        | 0                       | 0                       | 0                     | 0                      | 0                      | 0                        |
| 500 | symmetry                          | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ |                         |                         |                          |                         |                         |                       |                        |                        |                          |

continued ...

Table 8

| No. | multipole                       | matrix                                       |                          |                           |                           |                          |                           |                          |                           |                          |                         |
|-----|---------------------------------|--|--------------------------|---------------------------|---------------------------|--------------------------|---------------------------|--------------------------|---------------------------|--------------------------|-------------------------|
|     | $\mathbb{T}_{4,0}^{(1,0;a)}(E)$ | 0  | 0                        | 0                         | 0                         | 0                        | $-\frac{\sqrt{105}i}{84}$ | 0                        | 0                         | 0                        | $\frac{\sqrt{21}i}{12}$ |
|     |                                 | 0  | 0                        | 0                         | 0                         | 0                        | 0                         | $\frac{\sqrt{70}i}{28}$  | 0                         | 0                        | 0                       |
|     |                                 | 0  | 0                        | 0                         | 0                         | 0                        | 0                         | 0                        | $-\frac{\sqrt{70}i}{28}$  | 0                        | 0                       |
|     |                                 | 0  | 0                        | 0                         | 0                         | $-\frac{\sqrt{21}i}{12}$ | 0                         | 0                        | 0                         | $\frac{\sqrt{105}i}{84}$ | 0                       |
|     |                                 | 0  | 0                        | 0                         | $\frac{\sqrt{21}i}{12}$   | 0                        | 0                         | 0                        | 0                         | 0                        | 0                       |
|     |                                 | $\frac{\sqrt{105}i}{84}$                     | 0                        | 0                         | 0                         | 0                        | 0                         | 0                        | 0                         | 0                        | 0                       |
|     |                                 | 0  | $-\frac{\sqrt{70}i}{28}$ | 0                         | 0                         | 0                        | 0                         | 0                        | 0                         | 0                        | 0                       |
|     |                                 | 0  | 0                        | $\frac{\sqrt{70}i}{28}$   | 0                         | 0                        | 0                         | 0                        | 0                         | 0                        | 0                       |
|     |                                 | 0  | 0                        | 0                         | $-\frac{\sqrt{105}i}{84}$ | 0                        | 0                         | 0                        | 0                         | 0                        | 0                       |
|     |                                 | $-\frac{\sqrt{21}i}{12}$                     | 0                        | 0                         | 0                         | 0                        | 0                         | 0                        | 0                         | 0                        | 0                       |
| 501 | symmetry                        | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ |                          |                           |                           |                          |                           |                          |                           |                          |                         |
|     | $\mathbb{T}_{4,1}^{(1,0;a)}(E)$ | 0  | 0                        | 0                         | 0                         | 0                        | 0                         | $\frac{\sqrt{70}i}{28}$  | 0                         | 0                        |                         |
|     |                                 | 0  | 0                        | 0                         | 0                         | $-\frac{\sqrt{21}i}{28}$ | 0                         | 0                        | $-\frac{\sqrt{105}i}{28}$ | 0                        |                         |
|     |                                 | 0  | 0                        | 0                         | 0                         | 0                        | $\frac{\sqrt{105}i}{28}$  | 0                        | 0                         | 0                        | $\frac{\sqrt{21}i}{28}$ |
|     |                                 | 0  | 0                        | 0                         | 0                         | 0                        | 0                         | $-\frac{\sqrt{70}i}{28}$ | 0                         | 0                        | 0                       |
|     |                                 | 0  | $\frac{\sqrt{21}i}{28}$  | 0                         | 0                         | 0                        | 0                         | 0                        | 0                         | 0                        | 0                       |
|     |                                 | 0  | 0                        | $-\frac{\sqrt{105}i}{28}$ | 0                         | 0                        | 0                         | 0                        | 0                         | 0                        | 0                       |
|     |                                 | 0  | 0                        | 0                         | $\frac{\sqrt{70}i}{28}$   | 0                        | 0                         | 0                        | 0                         | 0                        | 0                       |
|     |                                 | $-\frac{\sqrt{70}i}{28}$                     | 0                        | 0                         | 0                         | 0                        | 0                         | 0                        | 0                         | 0                        | 0                       |
|     |                                 | 0  | $\frac{\sqrt{105}i}{28}$ | 0                         | 0                         | 0                        | 0                         | 0                        | 0                         | 0                        | 0                       |
|     |                                 | 0  | 0                        | $-\frac{\sqrt{21}i}{28}$  | 0                         | 0                        | 0                         | 0                        | 0                         | 0                        | 0                       |
| 502 | symmetry                        | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$            |                          |                           |                           |                          |                           |                          |                           |                          |                         |

continued ...

Table 8

| No. | multipole                         | matrix                             |                          |                          |                         |                         |                          |                          |                          |                          |                         |
|-----|-----------------------------------|------------------------------------|--------------------------|--------------------------|-------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|
|     | $\mathbb{T}_{4,0}^{(1,0;a)}(T_1)$ | 0                                  | 0                        | 0                        | 0                       | $\frac{1}{16}$          | 0                        | $\frac{\sqrt{10}}{16}$   | 0                        | $\frac{\sqrt{5}}{16}$    | 0                       |
|     |                                   | 0                                  | 0                        | 0                        | 0                       | 0                       | $-\frac{\sqrt{15}}{16}$  | 0                        | $-\frac{\sqrt{30}}{16}$  | 0                        | $-\frac{\sqrt{3}}{16}$  |
|     |                                   | 0                                  | 0                        | 0                        | 0                       | $\frac{\sqrt{3}}{16}$   | 0                        | $\frac{\sqrt{30}}{16}$   | 0                        | $\frac{\sqrt{15}}{16}$   | 0                       |
|     |                                   | 0                                  | 0                        | 0                        | 0                       | 0                       | $-\frac{\sqrt{5}}{16}$   | 0                        | $-\frac{\sqrt{10}}{16}$  | 0                        | $-\frac{1}{16}$         |
|     |                                   | $\frac{1}{16}$                     | 0                        | $\frac{\sqrt{3}}{16}$    | 0                       | 0                       | 0                        | 0                        | 0                        | 0                        | 0                       |
|     |                                   | 0                                  | $-\frac{\sqrt{15}}{16}$  | 0                        | $-\frac{\sqrt{5}}{16}$  | 0                       | 0                        | 0                        | 0                        | 0                        | 0                       |
|     |                                   | $\frac{\sqrt{10}}{16}$             | 0                        | $\frac{\sqrt{30}}{16}$   | 0                       | 0                       | 0                        | 0                        | 0                        | 0                        | 0                       |
|     |                                   | 0                                  | $-\frac{\sqrt{30}}{16}$  | 0                        | $-\frac{\sqrt{10}}{16}$ | 0                       | 0                        | 0                        | 0                        | 0                        | 0                       |
|     |                                   | $\frac{\sqrt{5}}{16}$              | 0                        | $\frac{\sqrt{15}}{16}$   | 0                       | 0                       | 0                        | 0                        | 0                        | 0                        | 0                       |
|     |                                   | 0                                  | $-\frac{\sqrt{3}}{16}$   | 0                        | $-\frac{1}{16}$         | 0                       | 0                        | 0                        | 0                        | 0                        | 0                       |
| 503 | symmetry                          | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ |                          |                          |                         |                         |                          |                          |                          |                          |                         |
|     | $\mathbb{T}_{4,1}^{(1,0;a)}(T_1)$ | 0                                  | 0                        | 0                        | 0                       | $\frac{i}{16}$          | 0                        | $-\frac{\sqrt{10}i}{16}$ | 0                        | $\frac{\sqrt{5}i}{16}$   | 0                       |
|     |                                   | 0                                  | 0                        | 0                        | 0                       | 0                       | $-\frac{\sqrt{15}i}{16}$ | 0                        | $\frac{\sqrt{30}i}{16}$  | 0                        | $-\frac{\sqrt{3}i}{16}$ |
|     |                                   | 0                                  | 0                        | 0                        | 0                       | $-\frac{\sqrt{3}i}{16}$ | 0                        | $\frac{\sqrt{30}i}{16}$  | 0                        | $-\frac{\sqrt{15}i}{16}$ | 0                       |
|     |                                   | 0                                  | 0                        | 0                        | 0                       | 0                       | $\frac{\sqrt{5}i}{16}$   | 0                        | $-\frac{\sqrt{10}i}{16}$ | 0                        | $\frac{i}{16}$          |
|     |                                   | $-\frac{i}{16}$                    | 0                        | $\frac{\sqrt{3}i}{16}$   | 0                       | 0                       | 0                        | 0                        | 0                        | 0                        | 0                       |
|     |                                   | 0                                  | $\frac{\sqrt{15}i}{16}$  | 0                        | $-\frac{\sqrt{5}i}{16}$ | 0                       | 0                        | 0                        | 0                        | 0                        | 0                       |
|     |                                   | $\frac{\sqrt{10}i}{16}$            | 0                        | $-\frac{\sqrt{30}i}{16}$ | 0                       | 0                       | 0                        | 0                        | 0                        | 0                        | 0                       |
|     |                                   | 0                                  | $-\frac{\sqrt{30}i}{16}$ | 0                        | $\frac{\sqrt{10}i}{16}$ | 0                       | 0                        | 0                        | 0                        | 0                        | 0                       |
|     |                                   | $-\frac{\sqrt{5}i}{16}$            | 0                        | $\frac{\sqrt{15}i}{16}$  | 0                       | 0                       | 0                        | 0                        | 0                        | 0                        | 0                       |
|     |                                   | 0                                  | $\frac{\sqrt{3}i}{16}$   | 0                        | $-\frac{i}{16}$         | 0                       | 0                        | 0                        | 0                        | 0                        | 0                       |
| 504 | symmetry                          | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$  |                          |                          |                         |                         |                          |                          |                          |                          |                         |

*continued ...*

Table 8

| No. | multipole                         | matrix  |
|-----|-----------------------------------|---|
|     | $\mathbb{T}_{4,2}^{(1,0;a)}(T_1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{1}{2} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{1}{2} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{1}{2} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{1}{2} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$   |
| 505 | symmetry                          | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$ $\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{112} & 0 & \frac{\sqrt{70}}{112} & 0 & -\frac{\sqrt{35}}{16} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{105}}{112} & 0 & -\frac{\sqrt{210}}{112} & 0 & \frac{\sqrt{21}}{16} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{21}}{16} & 0 & \frac{\sqrt{210}}{112} & 0 & \frac{\sqrt{105}}{112} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{35}}{16} & 0 & -\frac{\sqrt{70}}{112} & 0 & -\frac{\sqrt{7}}{112} \\ \frac{\sqrt{7}}{112} & 0 & -\frac{\sqrt{21}}{16} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{105}}{112} & 0 & \frac{\sqrt{35}}{16} & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{70}}{112} & 0 & \frac{\sqrt{210}}{112} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{210}}{112} & 0 & -\frac{\sqrt{70}}{112} & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{35}}{16} & 0 & \frac{\sqrt{105}}{112} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{21}}{16} & 0 & -\frac{\sqrt{7}}{112} & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |
| 506 | symmetry                          | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$   |

*continued ...*

Table 8

| No. | multipole                         | matrix                                |                            |                            |                           |                          |                           |                            |                            |                           |                          |
|-----|-----------------------------------|---------------------------------------|----------------------------|----------------------------|---------------------------|--------------------------|---------------------------|----------------------------|----------------------------|---------------------------|--------------------------|
|     | $\mathbb{T}_{4,1}^{(1,0;a)}(T_2)$ | 0                                     | 0                          | 0                          | 0                         | $-\frac{\sqrt{7}i}{112}$ | 0                         | $\frac{\sqrt{70}i}{112}$   | 0                          | $\frac{\sqrt{35}i}{16}$   | 0                        |
|     |                                   | 0                                     | 0                          | 0                          | 0                         | 0                        | $\frac{\sqrt{105}i}{112}$ | 0                          | $-\frac{\sqrt{210}i}{112}$ | 0                         | $-\frac{\sqrt{21}i}{16}$ |
|     |                                   | 0                                     | 0                          | 0                          | 0                         | $-\frac{\sqrt{21}i}{16}$ | 0                         | $-\frac{\sqrt{210}i}{112}$ | 0                          | $\frac{\sqrt{105}i}{112}$ | 0                        |
|     |                                   | 0                                     | 0                          | 0                          | 0                         | 0                        | $\frac{\sqrt{35}i}{16}$   | 0                          | $\frac{\sqrt{70}i}{112}$   | 0                         | $-\frac{\sqrt{7}i}{112}$ |
|     |                                   | $\frac{\sqrt{7}i}{112}$               | 0                          | $\frac{\sqrt{21}i}{16}$    | 0                         | 0                        | 0                         | 0                          | 0                          | 0                         | 0                        |
|     |                                   | 0                                     | $-\frac{\sqrt{105}i}{112}$ | 0                          | $-\frac{\sqrt{35}i}{16}$  | 0                        | 0                         | 0                          | 0                          | 0                         | 0                        |
|     |                                   | $-\frac{\sqrt{70}i}{112}$             | 0                          | $\frac{\sqrt{210}i}{112}$  | 0                         | 0                        | 0                         | 0                          | 0                          | 0                         | 0                        |
|     |                                   | 0                                     | $\frac{\sqrt{210}i}{112}$  | 0                          | $-\frac{\sqrt{70}i}{112}$ | 0                        | 0                         | 0                          | 0                          | 0                         | 0                        |
|     |                                   | $-\frac{\sqrt{35}i}{16}$              | 0                          | $-\frac{\sqrt{105}i}{112}$ | 0                         | 0                        | 0                         | 0                          | 0                          | 0                         | 0                        |
|     |                                   | 0                                     | $\frac{\sqrt{21}i}{16}$    | 0                          | $\frac{\sqrt{7}i}{112}$   | 0                        | 0                         | 0                          | 0                          | 0                         | 0                        |
| 507 | symmetry                          | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ |                            |                            |                           |                          |                           |                            |                            |                           |                          |
|     | $\mathbb{T}_{4,2}^{(1,0;a)}(T_2)$ | 0                                     | 0                          | 0                          | 0                         | 0                        | 0                         | 0                          | $-\frac{\sqrt{70}}{28}$    | 0                         | 0                        |
|     |                                   | 0                                     | 0                          | 0                          | 0                         | $-\frac{\sqrt{21}}{28}$  | 0                         | 0                          | 0                          | $\frac{\sqrt{105}}{28}$   | 0                        |
|     |                                   | 0                                     | 0                          | 0                          | 0                         | 0                        | $\frac{\sqrt{105}}{28}$   | 0                          | 0                          | 0                         | $-\frac{\sqrt{21}}{28}$  |
|     |                                   | 0                                     | 0                          | 0                          | 0                         | 0                        | 0                         | $-\frac{\sqrt{70}}{28}$    | 0                          | 0                         | 0                        |
|     |                                   | 0                                     | $-\frac{\sqrt{21}}{28}$    | 0                          | 0                         | 0                        | 0                         | 0                          | 0                          | 0                         | 0                        |
|     |                                   | 0                                     | 0                          | $\frac{\sqrt{105}}{28}$    | 0                         | 0                        | 0                         | 0                          | 0                          | 0                         | 0                        |
|     |                                   | 0                                     | 0                          | 0                          | $-\frac{\sqrt{70}}{28}$   | 0                        | 0                         | 0                          | 0                          | 0                         | 0                        |
|     |                                   | $-\frac{\sqrt{70}}{28}$               | 0                          | 0                          | 0                         | 0                        | 0                         | 0                          | 0                          | 0                         | 0                        |
|     |                                   | 0                                     | $\frac{\sqrt{105}}{28}$    | 0                          | 0                         | 0                        | 0                         | 0                          | 0                          | 0                         | 0                        |
|     |                                   | 0                                     | 0                          | $-\frac{\sqrt{21}}{28}$    | 0                         | 0                        | 0                         | 0                          | 0                          | 0                         | 0                        |
| 508 | symmetry                          | $x$                                   |                            |                            |                           |                          |                           |                            |                            |                           |                          |

continued ...

Table 8

| No. | multipole                     | matrix                   |                           |                          |                           |                 |                          |                           |                           |                           |                 |
|-----|-------------------------------|--------------------------|---------------------------|--------------------------|---------------------------|-----------------|--------------------------|---------------------------|---------------------------|---------------------------|-----------------|
|     | $\mathbb{M}_{1,0}^{(a)}(T_1)$ | 0                        | $\frac{3\sqrt{15}}{50}$   | 0                        | 0                         | $-\frac{1}{10}$ | 0                        | $\frac{\sqrt{10}}{100}$   | 0                         | 0                         | 0               |
|     |                               | $\frac{3\sqrt{15}}{50}$  | 0                         | $\frac{3\sqrt{5}}{25}$   | 0                         | 0               | $-\frac{\sqrt{15}}{50}$  | 0                         | $\frac{\sqrt{30}}{100}$   | 0                         | 0               |
|     |                               | 0                        | $\frac{3\sqrt{5}}{25}$    | 0                        | $\frac{3\sqrt{15}}{50}$   | 0               | 0                        | $-\frac{\sqrt{30}}{100}$  | 0                         | $\frac{\sqrt{15}}{50}$    | 0               |
|     |                               | 0                        | 0                         | $\frac{3\sqrt{15}}{50}$  | 0                         | 0               | 0                        | 0                         | $-\frac{\sqrt{10}}{100}$  | 0                         | $\frac{1}{10}$  |
|     |                               | $-\frac{1}{10}$          | 0                         | 0                        | 0                         | 0               | $\frac{1}{5}$            | 0                         | 0                         | 0                         | 0               |
|     |                               | 0                        | $-\frac{\sqrt{15}}{50}$   | 0                        | 0                         | $\frac{1}{5}$   | 0                        | $\frac{2\sqrt{10}}{25}$   | 0                         | 0                         | 0               |
|     |                               | $\frac{\sqrt{10}}{100}$  | 0                         | $-\frac{\sqrt{30}}{100}$ | 0                         | 0               | $\frac{2\sqrt{10}}{25}$  | 0                         | $\frac{3\sqrt{5}}{25}$    | 0                         | 0               |
|     |                               | 0                        | $\frac{\sqrt{30}}{100}$   | 0                        | $-\frac{\sqrt{10}}{100}$  | 0               | 0                        | $\frac{3\sqrt{5}}{25}$    | 0                         | $\frac{2\sqrt{10}}{25}$   | 0               |
|     |                               | 0                        | 0                         | $\frac{\sqrt{15}}{50}$   | 0                         | 0               | 0                        | 0                         | $\frac{2\sqrt{10}}{25}$   | 0                         | $\frac{1}{5}$   |
|     |                               | 0                        | 0                         | 0                        | $\frac{1}{10}$            | 0               | 0                        | 0                         | 0                         | $\frac{1}{5}$             | 0               |
| 509 | symmetry                      | $y$                      |                           |                          |                           |                 |                          |                           |                           |                           |                 |
|     | $\mathbb{M}_{1,1}^{(a)}(T_1)$ | 0                        | $-\frac{3\sqrt{15}i}{50}$ | 0                        | 0                         | $-\frac{i}{10}$ | 0                        | $-\frac{\sqrt{10}i}{100}$ | 0                         | 0                         | 0               |
|     |                               | $\frac{3\sqrt{15}i}{50}$ | 0                         | $-\frac{3\sqrt{5}i}{25}$ | 0                         | 0               | $-\frac{\sqrt{15}i}{50}$ | 0                         | $-\frac{\sqrt{30}i}{100}$ | 0                         | 0               |
|     |                               | 0                        | $\frac{3\sqrt{5}i}{25}$   | 0                        | $-\frac{3\sqrt{15}i}{50}$ | 0               | 0                        | $-\frac{\sqrt{30}i}{100}$ | 0                         | $-\frac{\sqrt{15}i}{50}$  | 0               |
|     |                               | 0                        | 0                         | $\frac{3\sqrt{15}i}{50}$ | 0                         | 0               | 0                        | 0                         | $-\frac{\sqrt{10}i}{100}$ | 0                         | $-\frac{i}{10}$ |
|     |                               | $\frac{i}{10}$           | 0                         | 0                        | 0                         | 0               | $-\frac{i}{5}$           | 0                         | 0                         | 0                         | 0               |
|     |                               | 0                        | $\frac{\sqrt{15}i}{50}$   | 0                        | 0                         | $\frac{i}{5}$   | 0                        | $-\frac{2\sqrt{10}i}{25}$ | 0                         | 0                         | 0               |
|     |                               | $\frac{\sqrt{10}i}{100}$ | 0                         | $\frac{\sqrt{30}i}{100}$ | 0                         | 0               | $\frac{2\sqrt{10}i}{25}$ | 0                         | $-\frac{3\sqrt{5}i}{25}$  | 0                         | 0               |
|     |                               | 0                        | $\frac{\sqrt{30}i}{100}$  | 0                        | $\frac{\sqrt{10}i}{100}$  | 0               | 0                        | $\frac{3\sqrt{5}i}{25}$   | 0                         | $-\frac{2\sqrt{10}i}{25}$ | 0               |
|     |                               | 0                        | 0                         | $\frac{\sqrt{15}i}{50}$  | 0                         | 0               | 0                        | 0                         | $\frac{2\sqrt{10}i}{25}$  | 0                         | $-\frac{i}{5}$  |
|     |                               | 0                        | 0                         | 0                        | $\frac{i}{10}$            | 0               | 0                        | 0                         | 0                         | $\frac{i}{5}$             | 0               |
| 510 | symmetry                      | $z$                      |                           |                          |                           |                 |                          |                           |                           |                           |                 |

*continued ...*

Table 8

| No. | multipole            | matrix   |  |  |  |  |  |  |  |  |  |
|-----|----------------------|--|--|--|--|--|--|--|--|--|--|
|     | $M_{1,2}^{(a)}(T_1)$ | $ \begin{bmatrix} \frac{9\sqrt{5}}{50} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{25} & 0 & 0 & 0 & 0 \\ 0 & \frac{3\sqrt{5}}{50} & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{50} & 0 & 0 & 0 \\ 0 & 0 & -\frac{3\sqrt{5}}{50} & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{50} & 0 & 0 \\ 0 & 0 & 0 & -\frac{9\sqrt{5}}{50} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{25} & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{5} & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{5}}{25} & 0 & 0 & 0 & 0 & \frac{3\sqrt{5}}{25} & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{30}}{50} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{25} & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{30}}{50} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{25} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{5}}{25} & 0 & 0 & 0 & 0 & -\frac{3\sqrt{5}}{25} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{5} \end{bmatrix} $  |  |  |  |  |  |  |  |  |  |
| 511 | symmetry             | $ \begin{matrix} \sqrt{15}xyz \\ \begin{bmatrix} 0 & 0 & \frac{i}{5} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{10} & 0 & 0 \\ 0 & 0 & 0 & -\frac{i}{5} & \frac{\sqrt{5}i}{10} & 0 & 0 & 0 & \frac{i}{10} & 0 \\ -\frac{i}{5} & 0 & 0 & 0 & 0 & -\frac{i}{10} & 0 & 0 & 0 & -\frac{\sqrt{5}i}{10} \\ 0 & \frac{i}{5} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{10} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{20} & 0 & 0 & 0 \\ 0 & 0 & \frac{i}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{20} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{6}i}{10} & -\frac{\sqrt{30}i}{20} & 0 & 0 & 0 & -\frac{\sqrt{6}i}{20} & 0 \\ -\frac{\sqrt{6}i}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{20} & 0 & 0 & 0 & -\frac{\sqrt{30}i}{20} \\ 0 & -\frac{i}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{20} & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{20} & 0 & 0 \end{bmatrix} \end{matrix} $ |  |  |  |  |  |  |  |  |  |
| 512 | symmetry             | $ \frac{x(2x^2-3y^2-3z^2)}{2} $  |  |  |  |  |  |  |  |  |  |

continued ...



Table 8

| No. | multipole                     | matrix  |  |  |  |  |  |  |  |  |  |
|-----|-------------------------------|---|--|--|--|--|--|--|--|--|--|
|     | $\mathbb{M}_{3,0}^{(a)}(T_1)$ | $\begin{bmatrix} 0 & \frac{\sqrt{15}}{50} & 0 & -\frac{\sqrt{5}}{10} & -\frac{3}{40} & 0 & \frac{9\sqrt{10}}{200} & 0 & -\frac{3\sqrt{5}}{40} & 0 \\ \frac{\sqrt{15}}{50} & 0 & -\frac{3\sqrt{5}}{50} & 0 & 0 & \frac{7\sqrt{15}}{200} & 0 & -\frac{\sqrt{30}}{200} & 0 & -\frac{\sqrt{3}}{8} \\ 0 & -\frac{3\sqrt{5}}{50} & 0 & \frac{\sqrt{15}}{50} & \frac{\sqrt{3}}{8} & 0 & \frac{\sqrt{30}}{200} & 0 & -\frac{7\sqrt{15}}{200} & 0 \\ -\frac{\sqrt{5}}{10} & 0 & \frac{\sqrt{15}}{50} & 0 & 0 & \frac{3\sqrt{5}}{40} & 0 & -\frac{9\sqrt{10}}{200} & 0 & \frac{3}{40} \\ -\frac{3}{40} & 0 & \frac{\sqrt{3}}{8} & 0 & 0 & \frac{3}{20} & 0 & -\frac{\sqrt{2}}{8} & 0 & 0 \\ 0 & \frac{7\sqrt{15}}{200} & 0 & \frac{3\sqrt{5}}{40} & \frac{3}{20} & 0 & -\frac{3\sqrt{10}}{200} & 0 & -\frac{\sqrt{5}}{10} & 0 \\ \frac{9\sqrt{10}}{200} & 0 & \frac{\sqrt{30}}{200} & 0 & 0 & -\frac{3\sqrt{10}}{200} & 0 & -\frac{3\sqrt{5}}{50} & 0 & -\frac{\sqrt{2}}{8} \\ 0 & -\frac{\sqrt{30}}{200} & 0 & -\frac{9\sqrt{10}}{200} & -\frac{\sqrt{2}}{8} & 0 & -\frac{3\sqrt{5}}{50} & 0 & -\frac{3\sqrt{10}}{200} & 0 \\ -\frac{3\sqrt{5}}{40} & 0 & -\frac{7\sqrt{15}}{200} & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & -\frac{3\sqrt{10}}{200} & 0 & \frac{3}{20} \\ 0 & -\frac{\sqrt{3}}{8} & 0 & \frac{3}{40} & 0 & 0 & -\frac{\sqrt{2}}{8} & 0 & \frac{3}{20} & 0 \end{bmatrix}$  |  |  |  |  |  |  |  |  |  |
| 513 | symmetry                      | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ $\begin{bmatrix} 0 & -\frac{\sqrt{15}i}{50} & 0 & -\frac{\sqrt{5}i}{10} & -\frac{3i}{40} & 0 & -\frac{9\sqrt{10}i}{200} & 0 & -\frac{3\sqrt{5}i}{40} & 0 \\ \frac{\sqrt{15}i}{50} & 0 & \frac{3\sqrt{5}i}{50} & 0 & 0 & \frac{7\sqrt{15}i}{200} & 0 & \frac{\sqrt{30}i}{200} & 0 & -\frac{\sqrt{3}i}{8} \\ 0 & -\frac{3\sqrt{5}i}{50} & 0 & -\frac{\sqrt{15}i}{50} & -\frac{\sqrt{3}i}{8} & 0 & \frac{\sqrt{30}i}{200} & 0 & \frac{7\sqrt{15}i}{200} & 0 \\ \frac{\sqrt{5}i}{10} & 0 & \frac{\sqrt{15}i}{50} & 0 & 0 & -\frac{3\sqrt{5}i}{40} & 0 & -\frac{9\sqrt{10}i}{200} & 0 & -\frac{3i}{40} \\ \frac{3i}{40} & 0 & \frac{\sqrt{3}i}{8} & 0 & 0 & -\frac{3i}{20} & 0 & -\frac{\sqrt{2}i}{8} & 0 & 0 \\ 0 & -\frac{7\sqrt{15}i}{200} & 0 & \frac{3\sqrt{5}i}{40} & \frac{3i}{20} & 0 & \frac{3\sqrt{10}i}{200} & 0 & -\frac{\sqrt{5}i}{10} & 0 \\ \frac{9\sqrt{10}i}{200} & 0 & -\frac{\sqrt{30}i}{200} & 0 & 0 & -\frac{3\sqrt{10}i}{200} & 0 & \frac{3\sqrt{5}i}{50} & 0 & -\frac{\sqrt{2}i}{8} \\ 0 & -\frac{\sqrt{30}i}{200} & 0 & \frac{9\sqrt{10}i}{200} & \frac{\sqrt{2}i}{8} & 0 & -\frac{3\sqrt{5}i}{50} & 0 & \frac{3\sqrt{10}i}{200} & 0 \\ \frac{3\sqrt{5}i}{40} & 0 & -\frac{7\sqrt{15}i}{200} & 0 & 0 & \frac{\sqrt{5}i}{10} & 0 & -\frac{3\sqrt{10}i}{200} & 0 & -\frac{3i}{20} \\ 0 & \frac{\sqrt{3}i}{8} & 0 & \frac{3i}{40} & 0 & 0 & \frac{\sqrt{2}i}{8} & 0 & \frac{3i}{20} & 0 \end{bmatrix}$ |  |  |  |  |  |  |  |  |  |
| 514 | symmetry                      | $-\frac{z(3x^2+3y^2-2z^2)}{2}$  |  |  |  |  |  |  |  |  |  |

continued ...

Table 8

| No. | multipole                     | matrix                            |                        |                         |                         |                         |                         |                        |                         |                         |                        |
|-----|-------------------------------|-----------------------------------|------------------------|-------------------------|-------------------------|-------------------------|-------------------------|------------------------|-------------------------|-------------------------|------------------------|
|     | $\mathbb{M}_{3,2}^{(a)}(T_1)$ | $-\frac{\sqrt{5}}{25}$            | 0                      | 0                       | 0                       | 0                       | $-\frac{3\sqrt{5}}{25}$ | 0                      | 0                       | 0                       | 0                      |
|     |                               | 0                                 | $\frac{3\sqrt{5}}{25}$ | 0                       | 0                       | 0                       | 0                       | $\frac{\sqrt{30}}{25}$ | 0                       | 0                       | 0                      |
|     |                               | 0                                 | 0                      | $-\frac{3\sqrt{5}}{25}$ | 0                       | 0                       | 0                       | 0                      | $\frac{\sqrt{30}}{25}$  | 0                       | 0                      |
|     |                               | 0                                 | 0                      | 0                       | $\frac{\sqrt{5}}{25}$   | 0                       | 0                       | 0                      | 0                       | $-\frac{3\sqrt{5}}{25}$ | 0                      |
|     |                               | 0                                 | 0                      | 0                       | 0                       | $-\frac{\sqrt{5}}{10}$  | 0                       | 0                      | 0                       | 0                       | 0                      |
|     |                               | $-\frac{3\sqrt{5}}{25}$           | 0                      | 0                       | 0                       | 0                       | $\frac{7\sqrt{5}}{50}$  | 0                      | 0                       | 0                       | 0                      |
|     |                               | 0                                 | $\frac{\sqrt{30}}{25}$ | 0                       | 0                       | 0                       | 0                       | $\frac{2\sqrt{5}}{25}$ | 0                       | 0                       | 0                      |
|     |                               | 0                                 | 0                      | $\frac{\sqrt{30}}{25}$  | 0                       | 0                       | 0                       | 0                      | $-\frac{2\sqrt{5}}{25}$ | 0                       | 0                      |
|     |                               | 0                                 | 0                      | 0                       | $-\frac{3\sqrt{5}}{25}$ | 0                       | 0                       | 0                      | 0                       | $-\frac{7\sqrt{5}}{50}$ | 0                      |
|     |                               | 0                                 | 0                      | 0                       | 0                       | 0                       | 0                       | 0                      | 0                       | 0                       | $\frac{\sqrt{5}}{10}$  |
| 515 | symmetry                      | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$  |                        |                         |                         |                         |                         |                        |                         |                         |                        |
|     | $\mathbb{M}_{3,0}^{(a)}(T_2)$ | 0                                 | $\frac{1}{10}$         | 0                       | $\frac{\sqrt{3}}{10}$   | $-\frac{\sqrt{15}}{40}$ | 0                       | $\frac{3\sqrt{6}}{40}$ | 0                       | $\frac{3\sqrt{3}}{40}$  | 0                      |
|     |                               | $\frac{1}{10}$                    | 0                      | $-\frac{\sqrt{3}}{10}$  | 0                       | 0                       | $\frac{7}{40}$          | 0                      | $-\frac{\sqrt{2}}{40}$  | 0                       | $\frac{3\sqrt{5}}{40}$ |
|     |                               | 0                                 | $-\frac{\sqrt{3}}{10}$ | 0                       | $\frac{1}{10}$          | $-\frac{3\sqrt{5}}{40}$ | 0                       | $\frac{\sqrt{2}}{40}$  | 0                       | $-\frac{7}{40}$         | 0                      |
|     |                               | $\frac{\sqrt{3}}{10}$             | 0                      | $\frac{1}{10}$          | 0                       | 0                       | $-\frac{3\sqrt{3}}{40}$ | 0                      | $-\frac{3\sqrt{6}}{40}$ | 0                       | $\frac{\sqrt{15}}{40}$ |
|     |                               | $-\frac{\sqrt{15}}{40}$           | 0                      | $-\frac{3\sqrt{5}}{40}$ | 0                       | 0                       | $\frac{\sqrt{15}}{20}$  | 0                      | $\frac{\sqrt{30}}{40}$  | 0                       | 0                      |
|     |                               | 0                                 | $\frac{7}{40}$         | 0                       | $-\frac{3\sqrt{3}}{40}$ | $\frac{\sqrt{15}}{20}$  | 0                       | $-\frac{\sqrt{6}}{40}$ | 0                       | $\frac{\sqrt{3}}{10}$   | 0                      |
|     |                               | $\frac{3\sqrt{6}}{40}$            | 0                      | $\frac{\sqrt{2}}{40}$   | 0                       | 0                       | $-\frac{\sqrt{6}}{40}$  | 0                      | $-\frac{\sqrt{3}}{10}$  | 0                       | $\frac{\sqrt{30}}{40}$ |
|     |                               | 0                                 | $-\frac{\sqrt{2}}{40}$ | 0                       | $-\frac{3\sqrt{6}}{40}$ | $\frac{\sqrt{30}}{40}$  | 0                       | $-\frac{\sqrt{3}}{10}$ | 0                       | $-\frac{\sqrt{6}}{40}$  | 0                      |
|     |                               | $\frac{3\sqrt{3}}{40}$            | 0                      | $-\frac{7}{40}$         | 0                       | 0                       | $\frac{\sqrt{3}}{10}$   | 0                      | $-\frac{\sqrt{6}}{40}$  | 0                       | $\frac{\sqrt{15}}{20}$ |
|     |                               | 0                                 | $\frac{3\sqrt{5}}{40}$ | 0                       | $\frac{\sqrt{15}}{40}$  | 0                       | 0                       | $\frac{\sqrt{30}}{40}$ | 0                       | $\frac{\sqrt{15}}{20}$  | 0                      |
| 516 | symmetry                      | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |                        |                         |                         |                         |                         |                        |                         |                         |                        |

continued ...

Table 8

| No. | multipole                     | matrix                           |                         |                         |                          |                          |                          |                         |                          |                          |                          |
|-----|-------------------------------|----------------------------------|-------------------------|-------------------------|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|--------------------------|--------------------------|
|     | $\mathbb{M}_{3,1}^{(a)}(T_2)$ | 0                                | $\frac{i}{10}$          | 0                       | $-\frac{\sqrt{3}i}{10}$  | $\frac{\sqrt{15}i}{40}$  | 0                        | $\frac{3\sqrt{6}i}{40}$ | 0                        | $-\frac{3\sqrt{3}i}{40}$ | 0                        |
|     |                               | $-\frac{i}{10}$                  | 0                       | $-\frac{\sqrt{3}i}{10}$ | 0                        | 0                        | $-\frac{7i}{40}$         | 0                       | $-\frac{\sqrt{2}i}{40}$  | 0                        | $-\frac{3\sqrt{5}i}{40}$ |
|     |                               | 0                                | $\frac{\sqrt{3}i}{10}$  | 0                       | $\frac{i}{10}$           | $-\frac{3\sqrt{5}i}{40}$ | 0                        | $-\frac{\sqrt{2}i}{40}$ | 0                        | $-\frac{7i}{40}$         | 0                        |
|     |                               | $\frac{\sqrt{3}i}{10}$           | 0                       | $-\frac{i}{10}$         | 0                        | 0                        | $-\frac{3\sqrt{3}i}{40}$ | 0                       | $\frac{3\sqrt{6}i}{40}$  | 0                        | $\frac{\sqrt{15}i}{40}$  |
|     |                               | $-\frac{\sqrt{15}i}{40}$         | 0                       | $\frac{3\sqrt{5}i}{40}$ | 0                        | 0                        | $\frac{\sqrt{15}i}{20}$  | 0                       | $-\frac{\sqrt{30}i}{40}$ | 0                        | 0                        |
|     |                               | 0                                | $\frac{7i}{40}$         | 0                       | $\frac{3\sqrt{3}i}{40}$  | $-\frac{\sqrt{15}i}{20}$ | 0                        | $-\frac{\sqrt{6}i}{40}$ | 0                        | $-\frac{\sqrt{3}i}{10}$  | 0                        |
|     |                               | $-\frac{3\sqrt{6}i}{40}$         | 0                       | $\frac{\sqrt{2}i}{40}$  | 0                        | 0                        | $\frac{\sqrt{6}i}{40}$   | 0                       | $-\frac{\sqrt{3}i}{10}$  | 0                        | $-\frac{\sqrt{30}i}{40}$ |
|     |                               | 0                                | $\frac{\sqrt{2}i}{40}$  | 0                       | $-\frac{3\sqrt{6}i}{40}$ | $\frac{\sqrt{30}i}{40}$  | 0                        | $\frac{\sqrt{3}i}{10}$  | 0                        | $-\frac{\sqrt{6}i}{40}$  | 0                        |
|     |                               | $\frac{3\sqrt{3}i}{40}$          | 0                       | $\frac{7i}{40}$         | 0                        | 0                        | $\frac{\sqrt{3}i}{10}$   | 0                       | $\frac{\sqrt{6}i}{40}$   | 0                        | $\frac{\sqrt{15}i}{20}$  |
|     |                               | 0                                | $\frac{3\sqrt{5}i}{40}$ | 0                       | $-\frac{\sqrt{15}i}{40}$ | 0                        | 0                        | $\frac{\sqrt{30}i}{40}$ | 0                        | $-\frac{\sqrt{15}i}{20}$ | 0                        |
| 517 | symmetry                      | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ |                         |                         |                          |                          |                          |                         |                          |                          |                          |
|     | $\mathbb{M}_{3,2}^{(a)}(T_2)$ | 0                                | 0                       | $-\frac{1}{5}$          | 0                        | 0                        | 0                        | 0                       | $-\frac{\sqrt{6}}{10}$   | 0                        | 0                        |
|     |                               | 0                                | 0                       | 0                       | $\frac{1}{5}$            | $\frac{\sqrt{5}}{10}$    | 0                        | 0                       | 0                        | $-\frac{1}{10}$          | 0                        |
|     |                               | $-\frac{1}{5}$                   | 0                       | 0                       | 0                        | 0                        | $-\frac{1}{10}$          | 0                       | 0                        | 0                        | $\frac{\sqrt{5}}{10}$    |
|     |                               | 0                                | $\frac{1}{5}$           | 0                       | 0                        | 0                        | 0                        | $-\frac{\sqrt{6}}{10}$  | 0                        | 0                        | 0                        |
|     |                               | 0                                | $\frac{\sqrt{5}}{10}$   | 0                       | 0                        | 0                        | 0                        | $-\frac{\sqrt{30}}{20}$ | 0                        | 0                        | 0                        |
|     |                               | 0                                | 0                       | $-\frac{1}{10}$         | 0                        | 0                        | 0                        | 0                       | $-\frac{\sqrt{6}}{20}$   | 0                        | 0                        |
|     |                               | 0                                | 0                       | 0                       | $-\frac{\sqrt{6}}{10}$   | $-\frac{\sqrt{30}}{20}$  | 0                        | 0                       | 0                        | $\frac{\sqrt{6}}{20}$    | 0                        |
|     |                               | $-\frac{\sqrt{6}}{10}$           | 0                       | 0                       | 0                        | 0                        | $-\frac{\sqrt{6}}{20}$   | 0                       | 0                        | 0                        | $\frac{\sqrt{30}}{20}$   |
|     |                               | 0                                | $-\frac{1}{10}$         | 0                       | 0                        | 0                        | 0                        | $\frac{\sqrt{6}}{20}$   | 0                        | 0                        | 0                        |
|     |                               | 0                                | 0                       | $\frac{\sqrt{5}}{10}$   | 0                        | 0                        | 0                        | 0                       | $\frac{\sqrt{30}}{20}$   | 0                        | 0                        |
| 518 | symmetry                      | $x$                              |                         |                         |                          |                          |                          |                         |                          |                          |                          |

*continued ...*

Table 8

| No. | multipole                          | matrix                   |                          |                          |                         |                        |                         |                          |                           |                          |                         |
|-----|------------------------------------|--------------------------|--------------------------|--------------------------|-------------------------|------------------------|-------------------------|--------------------------|---------------------------|--------------------------|-------------------------|
|     | $\mathbb{M}_{1,0}^{(1,-1;a)}(T_1)$ | 0                        | $-\frac{\sqrt{30}}{50}$  | 0                        | 0                       | $\frac{\sqrt{2}}{5}$   | 0                       | $-\frac{\sqrt{5}}{25}$   | 0                         | 0                        | 0                       |
|     |                                    | $-\frac{\sqrt{30}}{50}$  | 0                        | $-\frac{\sqrt{10}}{25}$  | 0                       | 0                      | $\frac{\sqrt{30}}{25}$  | 0                        | $-\frac{\sqrt{15}}{25}$   | 0                        | 0                       |
|     |                                    | 0                        | $-\frac{\sqrt{10}}{25}$  | 0                        | $-\frac{\sqrt{30}}{50}$ | 0                      | 0                       | $\frac{\sqrt{15}}{25}$   | 0                         | $-\frac{\sqrt{30}}{25}$  | 0                       |
|     |                                    | 0                        | 0                        | $-\frac{\sqrt{30}}{50}$  | 0                       | 0                      | 0                       | 0                        | $\frac{\sqrt{5}}{25}$     | 0                        | $-\frac{\sqrt{2}}{5}$   |
|     |                                    | $\frac{\sqrt{2}}{5}$     | 0                        | 0                        | 0                       | 0                      | $\frac{\sqrt{2}}{10}$   | 0                        | 0                         | 0                        | 0                       |
|     |                                    | 0                        | $\frac{\sqrt{30}}{25}$   | 0                        | 0                       | $\frac{\sqrt{2}}{10}$  | 0                       | $\frac{2\sqrt{5}}{25}$   | 0                         | 0                        | 0                       |
|     |                                    | $-\frac{\sqrt{5}}{25}$   | 0                        | $\frac{\sqrt{15}}{25}$   | 0                       | 0                      | $\frac{2\sqrt{5}}{25}$  | 0                        | $\frac{3\sqrt{10}}{50}$   | 0                        | 0                       |
|     |                                    | 0                        | $-\frac{\sqrt{15}}{25}$  | 0                        | $\frac{\sqrt{5}}{25}$   | 0                      | 0                       | $\frac{3\sqrt{10}}{50}$  | 0                         | $\frac{2\sqrt{5}}{25}$   | 0                       |
|     |                                    | 0                        | 0                        | $-\frac{\sqrt{30}}{25}$  | 0                       | 0                      | 0                       | 0                        | $\frac{2\sqrt{5}}{25}$    | 0                        | $\frac{\sqrt{2}}{10}$   |
|     |                                    | 0                        | 0                        | 0                        | $-\frac{\sqrt{2}}{5}$   | 0                      | 0                       | 0                        | 0                         | $\frac{\sqrt{2}}{10}$    | 0                       |
| 519 | symmetry                           | $y$                      |                          |                          |                         |                        |                         |                          |                           |                          |                         |
|     | $\mathbb{M}_{1,1}^{(1,-1;a)}(T_1)$ | 0                        | $\frac{\sqrt{30}i}{50}$  | 0                        | 0                       | $\frac{\sqrt{2}i}{5}$  | 0                       | $\frac{\sqrt{5}i}{25}$   | 0                         | 0                        | 0                       |
|     |                                    | $-\frac{\sqrt{30}i}{50}$ | 0                        | $\frac{\sqrt{10}i}{25}$  | 0                       | 0                      | $\frac{\sqrt{30}i}{25}$ | 0                        | $\frac{\sqrt{15}i}{25}$   | 0                        | 0                       |
|     |                                    | 0                        | $-\frac{\sqrt{10}i}{25}$ | 0                        | $\frac{\sqrt{30}i}{50}$ | 0                      | 0                       | $\frac{\sqrt{15}i}{25}$  | 0                         | $\frac{\sqrt{30}i}{25}$  | 0                       |
|     |                                    | 0                        | 0                        | $-\frac{\sqrt{30}i}{50}$ | 0                       | 0                      | 0                       | 0                        | $\frac{\sqrt{5}i}{25}$    | 0                        | $\frac{\sqrt{2}i}{5}$   |
|     |                                    | $-\frac{\sqrt{2}i}{5}$   | 0                        | 0                        | 0                       | 0                      | $-\frac{\sqrt{2}i}{10}$ | 0                        | 0                         | 0                        | 0                       |
|     |                                    | 0                        | $-\frac{\sqrt{30}i}{25}$ | 0                        | 0                       | $\frac{\sqrt{2}i}{10}$ | 0                       | $-\frac{2\sqrt{5}i}{25}$ | 0                         | 0                        | 0                       |
|     |                                    | $-\frac{\sqrt{5}i}{25}$  | 0                        | $-\frac{\sqrt{15}i}{25}$ | 0                       | 0                      | $\frac{2\sqrt{5}i}{25}$ | 0                        | $-\frac{3\sqrt{10}i}{50}$ | 0                        | 0                       |
|     |                                    | 0                        | $-\frac{\sqrt{15}i}{25}$ | 0                        | $-\frac{\sqrt{5}i}{25}$ | 0                      | 0                       | $\frac{3\sqrt{10}i}{50}$ | 0                         | $-\frac{2\sqrt{5}i}{25}$ | 0                       |
|     |                                    | 0                        | 0                        | $-\frac{\sqrt{30}i}{25}$ | 0                       | 0                      | 0                       | 0                        | $\frac{2\sqrt{5}i}{25}$   | 0                        | $-\frac{\sqrt{2}i}{10}$ |
|     |                                    | 0                        | 0                        | 0                        | $-\frac{\sqrt{2}i}{5}$  | 0                      | 0                       | 0                        | 0                         | $\frac{\sqrt{2}i}{10}$   | 0                       |
| 520 | symmetry                           | $z$                      |                          |                          |                         |                        |                         |                          |                           |                          |                         |

*continued ...*

Table 8

| No. | multipole                          | matrix   |  |  |  |  |  |  |  |  |  |
|-----|------------------------------------|--|--|--|--|--|--|--|--|--|--|
|     | $\mathbb{M}_{1,2}^{(1,-1;a)}(T_1)$ | $ \begin{bmatrix} -\frac{3\sqrt{10}}{50} & 0 & 0 & 0 & 0 & -\frac{2\sqrt{10}}{25} & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{10}}{50} & 0 & 0 & 0 & 0 & -\frac{2\sqrt{15}}{25} & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{10}}{50} & 0 & 0 & 0 & 0 & -\frac{2\sqrt{15}}{25} & 0 & 0 \\ 0 & 0 & 0 & \frac{3\sqrt{10}}{50} & 0 & 0 & 0 & 0 & -\frac{2\sqrt{10}}{25} & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{10} & 0 & 0 & 0 & 0 & 0 \\ -\frac{2\sqrt{10}}{25} & 0 & 0 & 0 & 0 & \frac{3\sqrt{10}}{50} & 0 & 0 & 0 & 0 \\ 0 & -\frac{2\sqrt{15}}{25} & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{50} & 0 & 0 & 0 \\ 0 & 0 & -\frac{2\sqrt{15}}{25} & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{50} & 0 & 0 \\ 0 & 0 & 0 & -\frac{2\sqrt{10}}{25} & 0 & 0 & 0 & 0 & -\frac{3\sqrt{10}}{50} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{10} \end{bmatrix} $  |  |  |  |  |  |  |  |  |  |
| 521 | symmetry                           | $ \begin{matrix} \sqrt{15}xyz \\ \begin{bmatrix} 0 & 0 & -\frac{\sqrt{21}i}{70} & 0 & 0 & 0 & 0 & -\frac{2\sqrt{14}i}{35} & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{21}i}{70} & -\frac{2\sqrt{105}i}{105} & 0 & 0 & 0 & -\frac{2\sqrt{21}i}{105} & 0 \\ \frac{\sqrt{21}i}{70} & 0 & 0 & 0 & 0 & \frac{2\sqrt{21}i}{105} & 0 & 0 & 0 & \frac{2\sqrt{105}i}{105} \\ 0 & -\frac{\sqrt{21}i}{70} & 0 & 0 & 0 & 0 & \frac{2\sqrt{14}i}{35} & 0 & 0 & 0 \\ 0 & \frac{2\sqrt{105}i}{105} & 0 & 0 & 0 & 0 & \frac{3\sqrt{70}i}{70} & 0 & 0 & 0 \\ 0 & 0 & -\frac{2\sqrt{21}i}{105} & 0 & 0 & 0 & 0 & \frac{3\sqrt{14}i}{70} & 0 & 0 \\ 0 & 0 & 0 & -\frac{2\sqrt{14}i}{35} & -\frac{3\sqrt{70}i}{70} & 0 & 0 & 0 & -\frac{3\sqrt{14}i}{70} & 0 \\ \frac{2\sqrt{14}i}{35} & 0 & 0 & 0 & 0 & -\frac{3\sqrt{14}i}{70} & 0 & 0 & 0 & -\frac{3\sqrt{70}i}{70} \\ 0 & \frac{2\sqrt{21}i}{105} & 0 & 0 & 0 & 0 & \frac{3\sqrt{14}i}{70} & 0 & 0 & 0 \\ 0 & 0 & -\frac{2\sqrt{105}i}{105} & 0 & 0 & 0 & 0 & \frac{3\sqrt{70}i}{70} & 0 & 0 \end{bmatrix} \end{matrix} $ |  |  |  |  |  |  |  |  |  |
| 522 | symmetry                           | $ \frac{x(2x^2-3y^2-3z^2)}{2} $  |  |  |  |  |  |  |  |  |  |

continued ...

Table 8

| No. | multipole                          | matrix                         |                            |                             |                             |                          |                             |                             |                             |                            |                           |
|-----|------------------------------------|--------------------------------|----------------------------|-----------------------------|-----------------------------|--------------------------|-----------------------------|-----------------------------|-----------------------------|----------------------------|---------------------------|
|     | $\mathbb{M}_{3,0}^{(1,-1;a)}(T_1)$ | 0                              | $-\frac{3\sqrt{35}}{700}$  | 0                           | $\frac{\sqrt{105}}{140}$    | $\frac{\sqrt{21}}{70}$   | 0                           | $-\frac{3\sqrt{210}}{350}$  | 0                           | $\frac{\sqrt{105}}{70}$    | 0                         |
|     |                                    | $-\frac{3\sqrt{35}}{700}$      | 0                          | $\frac{3\sqrt{105}}{700}$   | 0                           | 0                        | $-\frac{\sqrt{35}}{50}$     | 0                           | $\frac{\sqrt{70}}{350}$     | 0                          | $\frac{\sqrt{7}}{14}$     |
|     |                                    | 0                              | $\frac{3\sqrt{105}}{700}$  | 0                           | $-\frac{3\sqrt{35}}{700}$   | $-\frac{\sqrt{7}}{14}$   | 0                           | $-\frac{\sqrt{70}}{350}$    | 0                           | $\frac{\sqrt{35}}{50}$     | 0                         |
|     |                                    | $\frac{\sqrt{105}}{140}$       | 0                          | $-\frac{3\sqrt{35}}{700}$   | 0                           | 0                        | $-\frac{\sqrt{105}}{70}$    | 0                           | $\frac{3\sqrt{210}}{350}$   | 0                          | $-\frac{\sqrt{21}}{70}$   |
|     |                                    | $\frac{\sqrt{21}}{70}$         | 0                          | $-\frac{\sqrt{7}}{14}$      | 0                           | 0                        | $\frac{3\sqrt{21}}{70}$     | 0                           | $-\frac{\sqrt{42}}{28}$     | 0                          | 0                         |
|     |                                    | 0                              | $-\frac{\sqrt{35}}{50}$    | 0                           | $-\frac{\sqrt{105}}{70}$    | $\frac{3\sqrt{21}}{70}$  | 0                           | $-\frac{3\sqrt{210}}{700}$  | 0                           | $-\frac{\sqrt{105}}{35}$   | 0                         |
|     |                                    | $-\frac{3\sqrt{210}}{350}$     | 0                          | $-\frac{\sqrt{70}}{350}$    | 0                           | 0                        | $-\frac{3\sqrt{210}}{700}$  | 0                           | $-\frac{3\sqrt{105}}{175}$  | 0                          | $-\frac{\sqrt{42}}{28}$   |
|     |                                    | 0                              | $\frac{\sqrt{70}}{350}$    | 0                           | $\frac{3\sqrt{210}}{350}$   | $-\frac{\sqrt{42}}{28}$  | 0                           | $-\frac{3\sqrt{105}}{175}$  | 0                           | $-\frac{3\sqrt{210}}{700}$ | 0                         |
|     |                                    | $\frac{\sqrt{105}}{70}$        | 0                          | $\frac{\sqrt{35}}{50}$      | 0                           | 0                        | $-\frac{\sqrt{105}}{35}$    | 0                           | $-\frac{3\sqrt{210}}{700}$  | 0                          | $\frac{3\sqrt{21}}{70}$   |
|     |                                    | 0                              | $\frac{\sqrt{7}}{14}$      | 0                           | $-\frac{\sqrt{21}}{70}$     | 0                        | 0                           | $-\frac{\sqrt{42}}{28}$     | 0                           | $\frac{3\sqrt{21}}{70}$    | 0                         |
| 523 | symmetry                           | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ |                            |                             |                             |                          |                             |                             |                             |                            |                           |
|     | $\mathbb{M}_{3,1}^{(1,-1;a)}(T_1)$ | 0                              | $\frac{3\sqrt{35}i}{700}$  | 0                           | $\frac{\sqrt{105}i}{140}$   | $\frac{\sqrt{21}i}{70}$  | 0                           | $\frac{3\sqrt{210}i}{350}$  | 0                           | $\frac{\sqrt{105}i}{70}$   | 0                         |
|     |                                    | $-\frac{3\sqrt{35}i}{700}$     | 0                          | $-\frac{3\sqrt{105}i}{700}$ | 0                           | 0                        | $-\frac{\sqrt{35}i}{50}$    | 0                           | $-\frac{\sqrt{70}i}{350}$   | 0                          | $\frac{\sqrt{7}i}{14}$    |
|     |                                    | 0                              | $\frac{3\sqrt{105}i}{700}$ | 0                           | $\frac{3\sqrt{35}i}{700}$   | $\frac{\sqrt{7}i}{14}$   | 0                           | $-\frac{\sqrt{70}i}{350}$   | 0                           | $-\frac{\sqrt{35}i}{50}$   | 0                         |
|     |                                    | $-\frac{\sqrt{105}i}{140}$     | 0                          | $-\frac{3\sqrt{35}i}{700}$  | 0                           | 0                        | $\frac{\sqrt{105}i}{70}$    | 0                           | $\frac{3\sqrt{210}i}{350}$  | 0                          | $\frac{\sqrt{21}i}{70}$   |
|     |                                    | $-\frac{\sqrt{21}i}{70}$       | 0                          | $-\frac{\sqrt{7}i}{14}$     | 0                           | 0                        | $-\frac{3\sqrt{21}i}{70}$   | 0                           | $-\frac{\sqrt{42}i}{28}$    | 0                          | 0                         |
|     |                                    | 0                              | $\frac{\sqrt{35}i}{50}$    | 0                           | $-\frac{\sqrt{105}i}{70}$   | $\frac{3\sqrt{21}i}{70}$ | 0                           | $\frac{3\sqrt{210}i}{700}$  | 0                           | $-\frac{\sqrt{105}i}{35}$  | 0                         |
|     |                                    | $-\frac{3\sqrt{210}i}{350}$    | 0                          | $\frac{\sqrt{70}i}{350}$    | 0                           | 0                        | $-\frac{3\sqrt{210}i}{700}$ | 0                           | $\frac{3\sqrt{105}i}{175}$  | 0                          | $-\frac{\sqrt{42}i}{28}$  |
|     |                                    | 0                              | $\frac{\sqrt{70}i}{350}$   | 0                           | $-\frac{3\sqrt{210}i}{350}$ | $\frac{\sqrt{42}i}{28}$  | 0                           | $-\frac{3\sqrt{105}i}{175}$ | 0                           | $\frac{3\sqrt{210}i}{700}$ | 0                         |
|     |                                    | $-\frac{\sqrt{105}i}{70}$      | 0                          | $\frac{\sqrt{35}i}{50}$     | 0                           | 0                        | $\frac{\sqrt{105}i}{35}$    | 0                           | $-\frac{3\sqrt{210}i}{700}$ | 0                          | $-\frac{3\sqrt{21}i}{70}$ |
|     |                                    | 0                              | $-\frac{\sqrt{7}i}{14}$    | 0                           | $-\frac{\sqrt{21}i}{70}$    | 0                        | 0                           | $\frac{\sqrt{42}i}{28}$     | 0                           | $\frac{3\sqrt{21}i}{70}$   | 0                         |
| 524 | symmetry                           | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ |                            |                             |                             |                          |                             |                             |                             |                            |                           |

*continued ...*

Table 8

| No. | multipole                          | matrix                            |                            |                           |                           |                          |                           |                           |                            |                           |                          |
|-----|------------------------------------|-----------------------------------|----------------------------|---------------------------|---------------------------|--------------------------|---------------------------|---------------------------|----------------------------|---------------------------|--------------------------|
|     | $\mathbb{M}_{3,2}^{(1,-1;a)}(T_1)$ | $\frac{\sqrt{105}}{350}$          | 0                          | 0                         | 0                         | 0                        | $\frac{4\sqrt{105}}{175}$ | 0                         | 0                          | 0                         | 0                        |
|     |                                    | 0                                 | $-\frac{3\sqrt{105}}{350}$ | 0                         | 0                         | 0                        | 0                         | $-\frac{4\sqrt{70}}{175}$ | 0                          | 0                         | 0                        |
|     |                                    | 0                                 | 0                          | $\frac{3\sqrt{105}}{350}$ | 0                         | 0                        | 0                         | 0                         | $-\frac{4\sqrt{70}}{175}$  | 0                         | 0                        |
|     |                                    | 0                                 | 0                          | 0                         | $-\frac{\sqrt{105}}{350}$ | 0                        | 0                         | 0                         | 0                          | $\frac{4\sqrt{105}}{175}$ | 0                        |
|     |                                    | 0                                 | 0                          | 0                         | 0                         | $-\frac{\sqrt{105}}{35}$ | 0                         | 0                         | 0                          | 0                         | 0                        |
|     |                                    | $\frac{4\sqrt{105}}{175}$         | 0                          | 0                         | 0                         | 0                        | $\frac{\sqrt{105}}{25}$   | 0                         | 0                          | 0                         | 0                        |
|     |                                    | 0                                 | $-\frac{4\sqrt{70}}{175}$  | 0                         | 0                         | 0                        | 0                         | $\frac{4\sqrt{105}}{175}$ | 0                          | 0                         | 0                        |
|     |                                    | 0                                 | 0                          | $-\frac{4\sqrt{70}}{175}$ | 0                         | 0                        | 0                         | 0                         | $-\frac{4\sqrt{105}}{175}$ | 0                         | 0                        |
|     |                                    | 0                                 | 0                          | 0                         | $\frac{4\sqrt{105}}{175}$ | 0                        | 0                         | 0                         | 0                          | $-\frac{\sqrt{105}}{25}$  | 0                        |
|     |                                    | 0                                 | 0                          | 0                         | 0                         | 0                        | 0                         | 0                         | 0                          | 0                         | $\frac{\sqrt{105}}{35}$  |
| 525 | symmetry                           | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$  |                            |                           |                           |                          |                           |                           |                            |                           |                          |
|     | $\mathbb{M}_{3,0}^{(1,-1;a)}(T_2)$ | 0                                 | $-\frac{\sqrt{21}}{140}$   | 0                         | $-\frac{3\sqrt{7}}{140}$  | $\frac{\sqrt{35}}{70}$   | 0                         | $-\frac{3\sqrt{14}}{70}$  | 0                          | $-\frac{3\sqrt{7}}{70}$   | 0                        |
|     |                                    | $-\frac{\sqrt{21}}{140}$          | 0                          | $\frac{3\sqrt{7}}{140}$   | 0                         | 0                        | $-\frac{\sqrt{21}}{30}$   | 0                         | $\frac{\sqrt{42}}{210}$    | 0                         | $-\frac{\sqrt{105}}{70}$ |
|     |                                    | 0                                 | $\frac{3\sqrt{7}}{140}$    | 0                         | $-\frac{\sqrt{21}}{140}$  | $\frac{\sqrt{105}}{70}$  | 0                         | $-\frac{\sqrt{42}}{210}$  | 0                          | $\frac{\sqrt{21}}{30}$    | 0                        |
|     |                                    | $-\frac{3\sqrt{7}}{140}$          | 0                          | $-\frac{\sqrt{21}}{140}$  | 0                         | 0                        | $\frac{3\sqrt{7}}{70}$    | 0                         | $\frac{3\sqrt{14}}{70}$    | 0                         | $-\frac{\sqrt{35}}{70}$  |
|     |                                    | $\frac{\sqrt{35}}{70}$            | 0                          | $\frac{\sqrt{105}}{70}$   | 0                         | 0                        | $\frac{3\sqrt{35}}{70}$   | 0                         | $\frac{3\sqrt{70}}{140}$   | 0                         | 0                        |
|     |                                    | 0                                 | $-\frac{\sqrt{21}}{30}$    | 0                         | $\frac{3\sqrt{7}}{70}$    | $\frac{3\sqrt{35}}{70}$  | 0                         | $-\frac{3\sqrt{14}}{140}$ | 0                          | $\frac{3\sqrt{7}}{35}$    | 0                        |
|     |                                    | $-\frac{3\sqrt{14}}{70}$          | 0                          | $-\frac{\sqrt{42}}{210}$  | 0                         | 0                        | $-\frac{3\sqrt{14}}{140}$ | 0                         | $-\frac{3\sqrt{7}}{35}$    | 0                         | $\frac{3\sqrt{70}}{140}$ |
|     |                                    | 0                                 | $\frac{\sqrt{42}}{210}$    | 0                         | $\frac{3\sqrt{14}}{70}$   | $\frac{3\sqrt{70}}{140}$ | 0                         | $-\frac{3\sqrt{7}}{35}$   | 0                          | $-\frac{3\sqrt{14}}{140}$ | 0                        |
|     |                                    | $-\frac{3\sqrt{7}}{70}$           | 0                          | $\frac{\sqrt{21}}{30}$    | 0                         | 0                        | $\frac{3\sqrt{7}}{35}$    | 0                         | $-\frac{3\sqrt{14}}{140}$  | 0                         | $\frac{3\sqrt{35}}{70}$  |
|     |                                    | 0                                 | $-\frac{\sqrt{105}}{70}$   | 0                         | $-\frac{\sqrt{35}}{70}$   | 0                        | 0                         | $\frac{3\sqrt{70}}{140}$  | 0                          | $\frac{3\sqrt{35}}{70}$   | 0                        |
| 526 | symmetry                           | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |                            |                           |                           |                          |                           |                           |                            |                           |                          |

*continued ...*

Table 8

| No. | multipole                          | matrix                              |                            |                            |                           |                            |                           |                            |                            |                            |                            |
|-----|------------------------------------|-------------------------------------|----------------------------|----------------------------|---------------------------|----------------------------|---------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
|     | $\mathbb{M}_{3,1}^{(1,-1;a)}(T_2)$ | 0                                   | $-\frac{\sqrt{21}i}{140}$  | 0                          | $\frac{3\sqrt{7}i}{140}$  | $-\frac{\sqrt{35}i}{70}$   | 0                         | $-\frac{3\sqrt{14}i}{70}$  | 0                          | $\frac{3\sqrt{7}i}{70}$    | 0                          |
|     |                                    | $\frac{\sqrt{21}i}{140}$            | 0                          | $\frac{3\sqrt{7}i}{140}$   | 0                         | 0                          | $\frac{\sqrt{21}i}{30}$   | 0                          | $\frac{\sqrt{42}i}{210}$   | 0                          | $\frac{\sqrt{105}i}{70}$   |
|     |                                    | 0                                   | $-\frac{3\sqrt{7}i}{140}$  | 0                          | $-\frac{\sqrt{21}i}{140}$ | $\frac{\sqrt{105}i}{70}$   | 0                         | $\frac{\sqrt{42}i}{210}$   | 0                          | $\frac{\sqrt{21}i}{30}$    | 0                          |
|     |                                    | $-\frac{3\sqrt{7}i}{140}$           | 0                          | $\frac{\sqrt{21}i}{140}$   | 0                         | 0                          | $\frac{3\sqrt{7}i}{70}$   | 0                          | $-\frac{3\sqrt{14}i}{70}$  | 0                          | $-\frac{\sqrt{35}i}{70}$   |
|     |                                    | $\frac{\sqrt{35}i}{70}$             | 0                          | $-\frac{\sqrt{105}i}{70}$  | 0                         | 0                          | $\frac{3\sqrt{35}i}{70}$  | 0                          | $-\frac{3\sqrt{70}i}{140}$ | 0                          | 0                          |
|     |                                    | 0                                   | $-\frac{\sqrt{21}i}{30}$   | 0                          | $-\frac{3\sqrt{7}i}{70}$  | $-\frac{3\sqrt{35}i}{70}$  | 0                         | $-\frac{3\sqrt{14}i}{140}$ | 0                          | $-\frac{3\sqrt{7}i}{35}$   | 0                          |
|     |                                    | $\frac{3\sqrt{14}i}{70}$            | 0                          | $-\frac{\sqrt{42}i}{210}$  | 0                         | 0                          | $\frac{3\sqrt{14}i}{140}$ | 0                          | $-\frac{3\sqrt{7}i}{35}$   | 0                          | $-\frac{3\sqrt{70}i}{140}$ |
|     |                                    | 0                                   | $-\frac{\sqrt{42}i}{210}$  | 0                          | $\frac{3\sqrt{14}i}{70}$  | $\frac{3\sqrt{70}i}{140}$  | 0                         | $\frac{3\sqrt{7}i}{35}$    | 0                          | $-\frac{3\sqrt{14}i}{140}$ | 0                          |
|     |                                    | $-\frac{3\sqrt{7}i}{70}$            | 0                          | $-\frac{\sqrt{21}i}{30}$   | 0                         | 0                          | $\frac{3\sqrt{7}i}{35}$   | 0                          | $\frac{3\sqrt{14}i}{140}$  | 0                          | $\frac{3\sqrt{35}i}{70}$   |
|     |                                    | 0                                   | $-\frac{\sqrt{105}i}{70}$  | 0                          | $\frac{\sqrt{35}i}{70}$   | 0                          | 0                         | $\frac{3\sqrt{70}i}{140}$  | 0                          | $-\frac{3\sqrt{35}i}{70}$  | 0                          |
| 527 | symmetry                           | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$    |                            |                            |                           |                            |                           |                            |                            |                            |                            |
|     | $\mathbb{M}_{3,2}^{(1,-1;a)}(T_2)$ | 0                                   | 0                          | $\frac{\sqrt{21}}{70}$     | 0                         | 0                          | 0                         | 0                          | $\frac{2\sqrt{14}}{35}$    | 0                          | 0                          |
|     |                                    | 0                                   | 0                          | 0                          | $-\frac{\sqrt{21}}{70}$   | $-\frac{2\sqrt{105}}{105}$ | 0                         | 0                          | 0                          | $\frac{2\sqrt{21}}{105}$   | 0                          |
|     |                                    | $\frac{\sqrt{21}}{70}$              | 0                          | 0                          | 0                         | 0                          | $\frac{2\sqrt{21}}{105}$  | 0                          | 0                          | 0                          | $-\frac{2\sqrt{105}}{105}$ |
|     |                                    | 0                                   | $-\frac{\sqrt{21}}{70}$    | 0                          | 0                         | 0                          | 0                         | $\frac{2\sqrt{14}}{35}$    | 0                          | 0                          | 0                          |
|     |                                    | 0                                   | $-\frac{2\sqrt{105}}{105}$ | 0                          | 0                         | 0                          | 0                         | $-\frac{3\sqrt{70}}{70}$   | 0                          | 0                          | 0                          |
|     |                                    | 0                                   | 0                          | $\frac{2\sqrt{21}}{105}$   | 0                         | 0                          | 0                         | 0                          | $-\frac{3\sqrt{14}}{70}$   | 0                          | 0                          |
|     |                                    | 0                                   | 0                          | 0                          | $\frac{2\sqrt{14}}{35}$   | $-\frac{3\sqrt{70}}{70}$   | 0                         | 0                          | 0                          | $\frac{3\sqrt{14}}{70}$    | 0                          |
|     |                                    | $\frac{2\sqrt{14}}{35}$             | 0                          | 0                          | 0                         | 0                          | $-\frac{3\sqrt{14}}{70}$  | 0                          | 0                          | 0                          | $\frac{3\sqrt{70}}{70}$    |
|     |                                    | 0                                   | $\frac{2\sqrt{21}}{105}$   | 0                          | 0                         | 0                          | 0                         | $\frac{3\sqrt{14}}{70}$    | 0                          | 0                          | 0                          |
|     |                                    | 0                                   | 0                          | $-\frac{2\sqrt{105}}{105}$ | 0                         | 0                          | 0                         | 0                          | $\frac{3\sqrt{70}}{70}$    | 0                          | 0                          |
| 528 | symmetry                           | $\frac{3\sqrt{35}xyz(x-y)(x+y)}{2}$ |                            |                            |                           |                            |                           |                            |                            |                            |                            |

continued ...



Table 8

| No. | multipole                        | matrix   |
|-----|----------------------------------|--|
|     | $\mathbb{M}_{5,0}^{(1,-1;a)}(E)$ | $ \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{i}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{i}{2} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{i}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{i}{2} & 0 & 0 & 0 & 0 & 0 \end{bmatrix} $   |
| 529 | symmetry                         | $ \frac{\sqrt{105}xyz(x^2+y^2-2z^2)}{2} $ $ \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{12} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{12} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & 0 & \frac{\sqrt{30}i}{12} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}i}{12} & 0 & 0 & 0 & -\frac{\sqrt{6}i}{12} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{12} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{12} & 0 & 0 & 0 \end{bmatrix} $ |
| 530 | symmetry                         | $ \frac{x(8x^4-40x^2y^2-40x^2z^2+15y^4+30y^2z^2+15z^4)}{8} $   |

continued ...

Table 8

| No. | multipole                             | matrix   |   |   |   |                          |                            |                           |                            |                           |                           |
|-----|---------------------------------------|--|---|---|---|--------------------------|----------------------------|---------------------------|----------------------------|---------------------------|---------------------------|
|     | $\mathbb{M}_{5,0}^{(1,-1;a)}(T_1, 1)$ | 0  | 0 | 0 | 0 | 0                        | 0                          | 0                         | 0                          | 0                         | 0                         |
|     |                                       | 0  | 0 | 0 | 0 | 0                        | 0                          | 0                         | 0                          | 0                         | 0                         |
|     |                                       | 0  | 0 | 0 | 0 | 0                        | 0                          | 0                         | 0                          | 0                         | 0                         |
|     |                                       | 0  | 0 | 0 | 0 | 0                        | 0                          | 0                         | 0                          | 0                         | 0                         |
|     |                                       | 0  | 0 | 0 | 0 | 0                        | $\frac{\sqrt{35}}{112}$    | 0                         | $-\frac{\sqrt{70}}{48}$    | 0                         | $\frac{3\sqrt{7}}{16}$    |
|     |                                       | 0  | 0 | 0 | 0 | $\frac{\sqrt{35}}{112}$  | 0                          | $-\frac{5\sqrt{14}}{112}$ | 0                          | $\frac{5\sqrt{7}}{48}$    | 0                         |
|     |                                       | 0  | 0 | 0 | 0 | 0                        | $-\frac{5\sqrt{14}}{112}$  | 0                         | $\frac{5\sqrt{7}}{56}$     | 0                         | $-\frac{\sqrt{70}}{48}$   |
|     |                                       | 0  | 0 | 0 | 0 | $-\frac{\sqrt{70}}{48}$  | 0                          | $\frac{5\sqrt{7}}{56}$    | 0                          | $-\frac{5\sqrt{14}}{112}$ | 0                         |
|     |                                       | 0  | 0 | 0 | 0 | 0                        | $\frac{5\sqrt{7}}{48}$     | 0                         | $-\frac{5\sqrt{14}}{112}$  | 0                         | $\frac{\sqrt{35}}{112}$   |
|     |                                       | 0  | 0 | 0 | 0 | $\frac{3\sqrt{7}}{16}$   | 0                          | $-\frac{\sqrt{70}}{48}$   | 0                          | $\frac{\sqrt{35}}{112}$   | 0                         |
| 531 | symmetry                              | $\frac{y(15x^4 - 40x^2y^2 + 30x^2z^2 + 8y^4 - 40y^2z^2 + 15z^4)}{8}$ |   |   |   |                          |                            |                           |                            |                           |                           |
|     | $\mathbb{M}_{5,1}^{(1,-1;a)}(T_1, 1)$ | 0  | 0 | 0 | 0 | 0                        | 0                          | 0                         | 0                          | 0                         | 0                         |
|     |                                       | 0  | 0 | 0 | 0 | 0                        | 0                          | 0                         | 0                          | 0                         | 0                         |
|     |                                       | 0  | 0 | 0 | 0 | 0                        | 0                          | 0                         | 0                          | 0                         | 0                         |
|     |                                       | 0  | 0 | 0 | 0 | 0                        | 0                          | 0                         | 0                          | 0                         | 0                         |
|     |                                       | 0  | 0 | 0 | 0 | 0                        | $-\frac{\sqrt{35}i}{112}$  | 0                         | $-\frac{\sqrt{70}i}{48}$   | 0                         | $-\frac{3\sqrt{7}i}{16}$  |
|     |                                       | 0  | 0 | 0 | 0 | $\frac{\sqrt{35}i}{112}$ | 0                          | $\frac{5\sqrt{14}i}{112}$ | 0                          | $\frac{5\sqrt{7}i}{48}$   | 0                         |
|     |                                       | 0  | 0 | 0 | 0 | 0                        | $-\frac{5\sqrt{14}i}{112}$ | 0                         | $-\frac{5\sqrt{7}i}{56}$   | 0                         | $-\frac{\sqrt{70}i}{48}$  |
|     |                                       | 0  | 0 | 0 | 0 | $\frac{\sqrt{70}i}{48}$  | 0                          | $\frac{5\sqrt{7}i}{56}$   | 0                          | $\frac{5\sqrt{14}i}{112}$ | 0                         |
|     |                                       | 0  | 0 | 0 | 0 | 0                        | $-\frac{5\sqrt{7}i}{48}$   | 0                         | $-\frac{5\sqrt{14}i}{112}$ | 0                         | $-\frac{\sqrt{35}i}{112}$ |
|     |                                       | 0  | 0 | 0 | 0 | $\frac{3\sqrt{7}i}{16}$  | 0                          | $\frac{\sqrt{70}i}{48}$   | 0                          | $\frac{\sqrt{35}i}{112}$  | 0                         |
| 532 | symmetry                              | $\frac{z(15x^4 + 30x^2y^2 - 40x^2z^2 + 15y^4 - 40y^2z^2 + 8z^4)}{8}$ |   |   |   |                          |                            |                           |                            |                           |                           |

*continued ...*

Table 8

| No. | multipole                             | matrix   |
|-----|---------------------------------------|--|
|     | $\mathbb{M}_{5,2}^{(1,-1;a)}(T_1, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{42} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{5\sqrt{7}}{42} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{5\sqrt{7}}{21} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{5\sqrt{7}}{21} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{5\sqrt{7}}{42} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{42} & 0 \end{bmatrix}$  |
| 533 | symmetry                              | $\frac{3\sqrt{35}x(y^2-2yz-z^2)(y^2+2yz-z^2)}{8}$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{1}{16} & 0 & \frac{3\sqrt{2}}{16} & 0 & \frac{\sqrt{5}}{16} & 0 \\ 0 & 0 & 0 & 0 & \frac{1}{16} & 0 & -\frac{\sqrt{10}}{16} & 0 & -\frac{3\sqrt{5}}{16} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{16} & 0 & \frac{\sqrt{5}}{8} & 0 & \frac{3\sqrt{2}}{16} & 0 \\ 0 & 0 & 0 & 0 & \frac{3\sqrt{2}}{16} & 0 & \frac{\sqrt{5}}{8} & 0 & -\frac{\sqrt{10}}{16} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{5}}{16} & 0 & -\frac{\sqrt{10}}{16} & 0 & \frac{1}{16} & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{16} & 0 & \frac{3\sqrt{2}}{16} & 0 & \frac{1}{16} & 0 & 0 \end{bmatrix}$ |
| 534 | symmetry                              | $\frac{3\sqrt{35}y(x^2-2xz-z^2)(x^2+2xz-z^2)}{8}$  |

continued ...

Table 8

| No. | multipole                             | matrix  |
|-----|---------------------------------------|---|
|     | $\mathbb{M}_{5,1}^{(1,-1;a)}(T_1, 2)$ | $ \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{i}{16} & 0 & \frac{3\sqrt{2}i}{16} & 0 & -\frac{\sqrt{5}i}{16} & 0 \\ 0 & 0 & 0 & 0 & \frac{i}{16} & 0 & \frac{\sqrt{10}i}{16} & 0 & -\frac{3\sqrt{5}i}{16} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}i}{16} & 0 & -\frac{\sqrt{5}i}{8} & 0 & \frac{3\sqrt{2}i}{16} & 0 \\ 0 & 0 & 0 & 0 & -\frac{3\sqrt{2}i}{16} & 0 & \frac{\sqrt{5}i}{8} & 0 & \frac{\sqrt{10}i}{16} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{3\sqrt{5}i}{16} & 0 & -\frac{\sqrt{10}i}{16} & 0 & -\frac{i}{16} & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{5}i}{16} & 0 & -\frac{3\sqrt{2}i}{16} & 0 & \frac{i}{16} & 0 & 0 \end{bmatrix} $ |
| 535 | symmetry                              | $ \frac{3\sqrt{35}z(x^2-2xy-y^2)(x^2+2xy-y^2)}{8} $ $ \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{1}{2} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{1}{2} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{1}{2} & 0 & 0 & 0 & 0 & 0 \end{bmatrix} $  |
| 536 | symmetry                              | $ \frac{\sqrt{105}x(y-z)(y+z)(2x^2-y^2-z^2)}{4} $   |

continued ...

Table 8

| No. | multipole                          | matrix   |   |   |   |                         |                         |                          |                         |                          |                         |
|-----|------------------------------------|--|---|---|---|-------------------------|-------------------------|--------------------------|-------------------------|--------------------------|-------------------------|
|     |                                    | 0  | 0 | 0 | 0 | 0                       | 0                       | 0                        | 0                       | 0                        | 0                       |
|     |                                    | 0  | 0 | 0 | 0 | 0                       | 0                       | 0                        | 0                       | 0                        | 0                       |
|     |                                    | 0  | 0 | 0 | 0 | 0                       | 0                       | 0                        | 0                       | 0                        | 0                       |
|     |                                    | 0  | 0 | 0 | 0 | 0                       | 0                       | 0                        | 0                       | 0                        | 0                       |
|     | $\mathbb{M}_{5,0}^{(1,-1;a)}(T_2)$ | 0  | 0 | 0 | 0 | 0                       | $\frac{\sqrt{3}}{24}$   | 0                        | $-\frac{\sqrt{6}}{24}$  | 0                        | $-\frac{\sqrt{15}}{8}$  |
|     |                                    | 0  | 0 | 0 | 0 | $\frac{\sqrt{3}}{24}$   | 0                       | $-\frac{\sqrt{30}}{24}$  | 0                       | $\frac{\sqrt{15}}{24}$   | 0                       |
|     |                                    | 0  | 0 | 0 | 0 | 0                       | $-\frac{\sqrt{30}}{24}$ | 0                        | $\frac{\sqrt{15}}{12}$  | 0                        | $-\frac{\sqrt{6}}{24}$  |
|     |                                    | 0  | 0 | 0 | 0 | $-\frac{\sqrt{6}}{24}$  | 0                       | $\frac{\sqrt{15}}{12}$   | 0                       | $-\frac{\sqrt{30}}{24}$  | 0                       |
|     |                                    | 0  | 0 | 0 | 0 | 0                       | $\frac{\sqrt{15}}{24}$  | 0                        | $-\frac{\sqrt{30}}{24}$ | 0                        | $\frac{\sqrt{3}}{24}$   |
|     |                                    | 0  | 0 | 0 | 0 | $-\frac{\sqrt{15}}{8}$  | 0                       | $-\frac{\sqrt{6}}{24}$   | 0                       | $\frac{\sqrt{3}}{24}$    | 0                       |
| 537 | symmetry                           | $\frac{\sqrt{105}y(x-z)(x+z)(x^2-2y^2+z^2)}{4}$  |   |   |   |                         |                         |                          |                         |                          |                         |
|     |                                    | 0  | 0 | 0 | 0 | 0                       | 0                       | 0                        | 0                       | 0                        | 0                       |
|     |                                    | 0  | 0 | 0 | 0 | 0                       | 0                       | 0                        | 0                       | 0                        | 0                       |
|     |                                    | 0  | 0 | 0 | 0 | 0                       | 0                       | 0                        | 0                       | 0                        | 0                       |
|     |                                    | 0  | 0 | 0 | 0 | 0                       | 0                       | 0                        | 0                       | 0                        | 0                       |
|     | $\mathbb{M}_{5,1}^{(1,-1;a)}(T_2)$ | 0  | 0 | 0 | 0 | 0                       | $\frac{\sqrt{3}i}{24}$  | 0                        | $\frac{\sqrt{6}i}{24}$  | 0                        | $-\frac{\sqrt{15}i}{8}$ |
|     |                                    | 0  | 0 | 0 | 0 | $-\frac{\sqrt{3}i}{24}$ | 0                       | $-\frac{\sqrt{30}i}{24}$ | 0                       | $-\frac{\sqrt{15}i}{24}$ | 0                       |
|     |                                    | 0  | 0 | 0 | 0 | 0                       | $\frac{\sqrt{30}i}{24}$ | 0                        | $\frac{\sqrt{15}i}{12}$ | 0                        | $\frac{\sqrt{6}i}{24}$  |
|     |                                    | 0  | 0 | 0 | 0 | $-\frac{\sqrt{6}i}{24}$ | 0                       | $-\frac{\sqrt{15}i}{12}$ | 0                       | $-\frac{\sqrt{30}i}{24}$ | 0                       |
|     |                                    | 0  | 0 | 0 | 0 | 0                       | $\frac{\sqrt{15}i}{24}$ | 0                        | $\frac{\sqrt{30}i}{24}$ | 0                        | $\frac{\sqrt{3}i}{24}$  |
|     |                                    | 0  | 0 | 0 | 0 | $\frac{\sqrt{15}i}{8}$  | 0                       | $-\frac{\sqrt{6}i}{24}$  | 0                       | $-\frac{\sqrt{3}i}{24}$  | 0                       |
| 538 | symmetry                           | $-\frac{\sqrt{105}z(x-y)(x+y)(x^2+y^2-2z^2)}{4}$ |   |   |   |                         |                         |                          |                         |                          |                         |

*continued ...*

Table 8

| No. | multipole | matrix   |  |  |  |  |  |  |  |  |  |
|-----|-----------|--|--|--|--|--|--|--|--|--|--|
|     |           | $ \begin{array}{cccccccccc} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{12} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{12} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{12} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{12} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{12} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{12} & 0 & 0 \end{array} $   |  |  |  |  |  |  |  |  |  |
| 539 | symmetry  | $ \begin{array}{cccccccccc} & & & & & x & & & & & \\ \left[ \begin{array}{cccccccccc} 0 & \frac{\sqrt{210}}{50} & 0 & 0 & \frac{\sqrt{14}}{20} & 0 & -\frac{\sqrt{35}}{100} & 0 & 0 & 0 \\ \frac{\sqrt{210}}{50} & 0 & \frac{\sqrt{70}}{25} & 0 & 0 & \frac{\sqrt{210}}{100} & 0 & -\frac{\sqrt{105}}{100} & 0 & 0 \\ 0 & \frac{\sqrt{70}}{25} & 0 & \frac{\sqrt{210}}{50} & 0 & 0 & \frac{\sqrt{105}}{100} & 0 & -\frac{\sqrt{210}}{100} & 0 \\ 0 & 0 & \frac{\sqrt{210}}{50} & 0 & 0 & 0 & 0 & \frac{\sqrt{35}}{100} & 0 & -\frac{\sqrt{14}}{20} \\ \frac{\sqrt{14}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{14}}{35} & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{210}}{100} & 0 & 0 & -\frac{\sqrt{14}}{35} & 0 & -\frac{4\sqrt{35}}{175} & 0 & 0 & 0 \\ -\frac{\sqrt{35}}{100} & 0 & \frac{\sqrt{105}}{100} & 0 & 0 & -\frac{4\sqrt{35}}{175} & 0 & -\frac{3\sqrt{70}}{175} & 0 & 0 \\ 0 & -\frac{\sqrt{105}}{100} & 0 & \frac{\sqrt{35}}{100} & 0 & 0 & -\frac{3\sqrt{70}}{175} & 0 & -\frac{4\sqrt{35}}{175} & 0 \\ 0 & 0 & -\frac{\sqrt{210}}{100} & 0 & 0 & 0 & 0 & -\frac{4\sqrt{35}}{175} & 0 & -\frac{\sqrt{14}}{35} \\ 0 & 0 & 0 & -\frac{\sqrt{14}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{14}}{35} & 0 \end{array} \right] \end{array} $ |  |  |  |  |  |  |  |  |  |
| 540 | symmetry  | $ \begin{array}{cccccccccc} & & & & & y & & & & & \\ \end{array} $   |  |  |  |  |  |  |  |  |  |

continued ...

Table 8

| No. | multipole                         | matrix                    |                            |                            |                           |                          |                            |                            |                            |                           |                         |
|-----|-----------------------------------|---------------------------|----------------------------|----------------------------|---------------------------|--------------------------|----------------------------|----------------------------|----------------------------|---------------------------|-------------------------|
|     | $\mathbb{M}_{1,1}^{(1,1;a)}(T_1)$ | 0                         | $-\frac{\sqrt{210}i}{50}$  | 0                          | 0                         | $\frac{\sqrt{14}i}{20}$  | 0                          | $\frac{\sqrt{35}i}{100}$   | 0                          | 0                         | 0                       |
|     |                                   | $\frac{\sqrt{210}i}{50}$  | 0                          | $-\frac{\sqrt{70}i}{25}$   | 0                         | 0                        | $\frac{\sqrt{210}i}{100}$  | 0                          | $\frac{\sqrt{105}i}{100}$  | 0                         | 0                       |
|     |                                   | 0                         | $\frac{\sqrt{70}i}{25}$    | 0                          | $-\frac{\sqrt{210}i}{50}$ | 0                        | 0                          | $\frac{\sqrt{105}i}{100}$  | 0                          | $\frac{\sqrt{210}i}{100}$ | 0                       |
|     |                                   | 0                         | 0                          | $\frac{\sqrt{210}i}{50}$   | 0                         | 0                        | 0                          | 0                          | $\frac{\sqrt{35}i}{100}$   | 0                         | $\frac{\sqrt{14}i}{20}$ |
|     |                                   | $-\frac{\sqrt{14}i}{20}$  | 0                          | 0                          | 0                         | 0                        | $\frac{\sqrt{14}i}{35}$    | 0                          | 0                          | 0                         | 0                       |
|     |                                   | 0                         | $-\frac{\sqrt{210}i}{100}$ | 0                          | 0                         | $-\frac{\sqrt{14}i}{35}$ | 0                          | $\frac{4\sqrt{35}i}{175}$  | 0                          | 0                         | 0                       |
|     |                                   | $-\frac{\sqrt{35}i}{100}$ | 0                          | $-\frac{\sqrt{105}i}{100}$ | 0                         | 0                        | $-\frac{4\sqrt{35}i}{175}$ | 0                          | $\frac{3\sqrt{70}i}{175}$  | 0                         | 0                       |
|     |                                   | 0                         | $-\frac{\sqrt{105}i}{100}$ | 0                          | $-\frac{\sqrt{35}i}{100}$ | 0                        | 0                          | $-\frac{3\sqrt{70}i}{175}$ | 0                          | $\frac{4\sqrt{35}i}{175}$ | 0                       |
|     |                                   | 0                         | 0                          | $-\frac{\sqrt{210}i}{100}$ | 0                         | 0                        | 0                          | 0                          | $-\frac{4\sqrt{35}i}{175}$ | 0                         | $\frac{\sqrt{14}i}{35}$ |
|     |                                   | 0                         | 0                          | 0                          | $-\frac{\sqrt{14}i}{20}$  | 0                        | 0                          | 0                          | 0                          | $-\frac{\sqrt{14}i}{35}$  | 0                       |
| 541 | symmetry                          | $z$                       |                            |                            |                           |                          |                            |                            |                            |                           |                         |
|     | $\mathbb{M}_{1,2}^{(1,1;a)}(T_1)$ | $\frac{3\sqrt{70}}{50}$   | 0                          | 0                          | 0                         | 0                        | $-\frac{\sqrt{70}}{50}$    | 0                          | 0                          | 0                         | 0                       |
|     |                                   | 0                         | $\frac{\sqrt{70}}{50}$     | 0                          | 0                         | 0                        | 0                          | $-\frac{\sqrt{105}}{50}$   | 0                          | 0                         | 0                       |
|     |                                   | 0                         | 0                          | $-\frac{\sqrt{70}}{50}$    | 0                         | 0                        | 0                          | 0                          | $-\frac{\sqrt{105}}{50}$   | 0                         | 0                       |
|     |                                   | 0                         | 0                          | 0                          | $-\frac{3\sqrt{70}}{50}$  | 0                        | 0                          | 0                          | 0                          | $-\frac{\sqrt{70}}{50}$   | 0                       |
|     |                                   | 0                         | 0                          | 0                          | 0                         | $-\frac{\sqrt{70}}{35}$  | 0                          | 0                          | 0                          | 0                         | 0                       |
|     |                                   | $-\frac{\sqrt{70}}{50}$   | 0                          | 0                          | 0                         | 0                        | $-\frac{3\sqrt{70}}{175}$  | 0                          | 0                          | 0                         | 0                       |
|     |                                   | 0                         | $-\frac{\sqrt{105}}{50}$   | 0                          | 0                         | 0                        | 0                          | $-\frac{\sqrt{70}}{175}$   | 0                          | 0                         | 0                       |
|     |                                   | 0                         | 0                          | $-\frac{\sqrt{105}}{50}$   | 0                         | 0                        | 0                          | 0                          | $\frac{\sqrt{70}}{175}$    | 0                         | 0                       |
|     |                                   | 0                         | 0                          | 0                          | $-\frac{\sqrt{70}}{50}$   | 0                        | 0                          | 0                          | 0                          | $\frac{3\sqrt{70}}{175}$  | 0                       |
|     |                                   | 0                         | 0                          | 0                          | 0                         | 0                        | 0                          | 0                          | 0                          | 0                         | $\frac{\sqrt{70}}{35}$  |
| 542 | symmetry                          | $\sqrt{15}xyz$            |                            |                            |                           |                          |                            |                            |                            |                           |                         |

*continued ...*

Table 8

| No. | multipole                         | matrix                         |                            |                             |                            |                            |                            |                             |                            |                           |                           |
|-----|-----------------------------------|--------------------------------|----------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|----------------------------|---------------------------|---------------------------|
|     | $\mathbb{M}_3^{(1,1;a)}(A_2)$     | 0                              | 0                          | $\frac{6\sqrt{7}i}{35}$     | 0                          | 0                          | 0                          | 0                           | $-\frac{3\sqrt{42}i}{140}$ | 0                         | 0                         |
|     |                                   | 0                              | 0                          | 0                           | $-\frac{6\sqrt{7}i}{35}$   | $-\frac{3\sqrt{35}i}{140}$ | 0                          | 0                           | 0                          | $-\frac{3\sqrt{7}i}{140}$ | 0                         |
|     |                                   | $-\frac{6\sqrt{7}i}{35}$       | 0                          | 0                           | 0                          | 0                          | $\frac{3\sqrt{7}i}{140}$   | 0                           | 0                          | 0                         | $\frac{3\sqrt{35}i}{140}$ |
|     |                                   | 0                              | $\frac{6\sqrt{7}i}{35}$    | 0                           | 0                          | 0                          | 0                          | $\frac{3\sqrt{42}i}{140}$   | 0                          | 0                         | 0                         |
|     |                                   | 0                              | $\frac{3\sqrt{35}i}{140}$  | 0                           | 0                          | 0                          | 0                          | $-\frac{\sqrt{210}i}{210}$  | 0                          | 0                         | 0                         |
|     |                                   | 0                              | 0                          | $-\frac{3\sqrt{7}i}{140}$   | 0                          | 0                          | 0                          | 0                           | $-\frac{\sqrt{42}i}{210}$  | 0                         | 0                         |
|     |                                   | 0                              | 0                          | 0                           | $-\frac{3\sqrt{42}i}{140}$ | $\frac{\sqrt{210}i}{210}$  | 0                          | 0                           | 0                          | $\frac{\sqrt{42}i}{210}$  | 0                         |
|     |                                   | $\frac{3\sqrt{42}i}{140}$      | 0                          | 0                           | 0                          | 0                          | $\frac{\sqrt{42}i}{210}$   | 0                           | 0                          | 0                         | $\frac{\sqrt{210}i}{210}$ |
|     |                                   | 0                              | $\frac{3\sqrt{7}i}{140}$   | 0                           | 0                          | 0                          | 0                          | $-\frac{\sqrt{42}i}{210}$   | 0                          | 0                         | 0                         |
|     |                                   | 0                              | 0                          | $-\frac{3\sqrt{35}i}{140}$  | 0                          | 0                          | 0                          | 0                           | $-\frac{\sqrt{210}i}{210}$ | 0                         | 0                         |
| 543 | symmetry                          | $\frac{x(2x^2-3y^2-3z^2)}{2}$  |                            |                             |                            |                            |                            |                             |                            |                           |                           |
|     | $\mathbb{M}_{3,0}^{(1,1;a)}(T_1)$ | 0                              | $\frac{3\sqrt{105}}{175}$  | 0                           | $-\frac{3\sqrt{35}}{35}$   | $\frac{9\sqrt{7}}{560}$    | 0                          | $-\frac{27\sqrt{70}}{2800}$ | 0                          | $\frac{9\sqrt{35}}{560}$  | 0                         |
|     |                                   | $\frac{3\sqrt{105}}{175}$      | 0                          | $-\frac{9\sqrt{35}}{175}$   | 0                          | 0                          | $-\frac{3\sqrt{105}}{400}$ | 0                           | $\frac{3\sqrt{210}}{2800}$ | 0                         | $\frac{3\sqrt{21}}{112}$  |
|     |                                   | 0                              | $-\frac{9\sqrt{35}}{175}$  | 0                           | $\frac{3\sqrt{105}}{175}$  | $-\frac{3\sqrt{21}}{112}$  | 0                          | $-\frac{3\sqrt{210}}{2800}$ | 0                          | $\frac{3\sqrt{105}}{400}$ | 0                         |
|     |                                   | $-\frac{3\sqrt{35}}{35}$       | 0                          | $\frac{3\sqrt{105}}{175}$   | 0                          | 0                          | $-\frac{9\sqrt{35}}{560}$  | 0                           | $\frac{27\sqrt{70}}{2800}$ | 0                         | $-\frac{9\sqrt{7}}{560}$  |
|     |                                   | $\frac{9\sqrt{7}}{560}$        | 0                          | $-\frac{3\sqrt{21}}{112}$   | 0                          | 0                          | $-\frac{\sqrt{7}}{70}$     | 0                           | $\frac{\sqrt{14}}{84}$     | 0                         | 0                         |
|     |                                   | 0                              | $-\frac{3\sqrt{105}}{400}$ | 0                           | $-\frac{9\sqrt{35}}{560}$  | $-\frac{\sqrt{7}}{70}$     | 0                          | $\frac{\sqrt{70}}{700}$     | 0                          | $\frac{\sqrt{35}}{105}$   | 0                         |
|     |                                   | $-\frac{27\sqrt{70}}{2800}$    | 0                          | $-\frac{3\sqrt{210}}{2800}$ | 0                          | 0                          | $\frac{\sqrt{70}}{700}$    | 0                           | $\frac{\sqrt{35}}{175}$    | 0                         | $\frac{\sqrt{14}}{84}$    |
|     |                                   | 0                              | $\frac{3\sqrt{210}}{2800}$ | 0                           | $\frac{27\sqrt{70}}{2800}$ | $\frac{\sqrt{14}}{84}$     | 0                          | $\frac{\sqrt{35}}{175}$     | 0                          | $\frac{\sqrt{70}}{700}$   | 0                         |
|     |                                   | $\frac{9\sqrt{35}}{560}$       | 0                          | $\frac{3\sqrt{105}}{400}$   | 0                          | 0                          | $\frac{\sqrt{35}}{105}$    | 0                           | $\frac{\sqrt{70}}{700}$    | 0                         | $-\frac{\sqrt{7}}{70}$    |
|     |                                   | 0                              | $\frac{3\sqrt{21}}{112}$   | 0                           | $-\frac{9\sqrt{7}}{560}$   | 0                          | 0                          | $\frac{\sqrt{14}}{84}$      | 0                          | $-\frac{\sqrt{7}}{70}$    | 0                         |
| 544 | symmetry                          | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ |                            |                             |                            |                            |                            |                             |                            |                           |                           |

continued ...



Table 8

| No. | multipole                         | matrix                           |                             |                             |                              |                           |                             |                              |                              |                             |                           |
|-----|-----------------------------------|----------------------------------|-----------------------------|-----------------------------|------------------------------|---------------------------|-----------------------------|------------------------------|------------------------------|-----------------------------|---------------------------|
|     | $\mathbb{M}_{3,1}^{(1,1;a)}(T_1)$ | 0                                | $-\frac{3\sqrt{105}i}{175}$ | 0                           | $-\frac{3\sqrt{35}i}{35}$    | $\frac{9\sqrt{7}i}{560}$  | 0                           | $\frac{27\sqrt{70}i}{2800}$  | 0                            | $\frac{9\sqrt{35}i}{560}$   | 0                         |
|     |                                   | $\frac{3\sqrt{105}i}{175}$       | 0                           | $\frac{9\sqrt{35}i}{175}$   | 0                            | 0                         | $-\frac{3\sqrt{105}i}{400}$ | 0                            | $-\frac{3\sqrt{210}i}{2800}$ | 0                           | $\frac{3\sqrt{21}i}{112}$ |
|     |                                   | 0                                | $-\frac{9\sqrt{35}i}{175}$  | 0                           | $-\frac{3\sqrt{105}i}{175}$  | $\frac{3\sqrt{21}i}{112}$ | 0                           | $-\frac{3\sqrt{210}i}{2800}$ | 0                            | $-\frac{3\sqrt{105}i}{400}$ | 0                         |
|     |                                   | $\frac{3\sqrt{35}i}{35}$         | 0                           | $\frac{3\sqrt{105}i}{175}$  | 0                            | 0                         | $\frac{9\sqrt{35}i}{560}$   | 0                            | $\frac{27\sqrt{70}i}{2800}$  | 0                           | $\frac{9\sqrt{7}i}{560}$  |
|     |                                   | $-\frac{9\sqrt{7}i}{560}$        | 0                           | $-\frac{3\sqrt{21}i}{112}$  | 0                            | 0                         | $\frac{\sqrt{7}i}{70}$      | 0                            | $\frac{\sqrt{14}i}{84}$      | 0                           | 0                         |
|     |                                   | 0                                | $\frac{3\sqrt{105}i}{400}$  | 0                           | $-\frac{9\sqrt{35}i}{560}$   | $-\frac{\sqrt{7}i}{70}$   | 0                           | $-\frac{\sqrt{70}i}{700}$    | 0                            | $\frac{\sqrt{35}i}{105}$    | 0                         |
|     |                                   | $-\frac{27\sqrt{70}i}{2800}$     | 0                           | $\frac{3\sqrt{210}i}{2800}$ | 0                            | 0                         | $\frac{\sqrt{70}i}{700}$    | 0                            | $-\frac{\sqrt{35}i}{175}$    | 0                           | $\frac{\sqrt{14}i}{84}$   |
|     |                                   | 0                                | $\frac{3\sqrt{210}i}{2800}$ | 0                           | $-\frac{27\sqrt{70}i}{2800}$ | $-\frac{\sqrt{14}i}{84}$  | 0                           | $\frac{\sqrt{35}i}{175}$     | 0                            | $-\frac{\sqrt{70}i}{700}$   | 0                         |
|     |                                   | $-\frac{9\sqrt{35}i}{560}$       | 0                           | $\frac{3\sqrt{105}i}{400}$  | 0                            | 0                         | $-\frac{\sqrt{35}i}{105}$   | 0                            | $\frac{\sqrt{70}i}{700}$     | 0                           | $\frac{\sqrt{7}i}{70}$    |
|     |                                   | 0                                | $-\frac{3\sqrt{21}i}{112}$  | 0                           | $-\frac{9\sqrt{7}i}{560}$    | 0                         | 0                           | $-\frac{\sqrt{14}i}{84}$     | 0                            | $-\frac{\sqrt{7}i}{70}$     | 0                         |
| 545 | symmetry                          | $-\frac{z(3x^2+3y^2-2z^2)}{2}$   |                             |                             |                              |                           |                             |                              |                              |                             |                           |
|     | $\mathbb{M}_{3,2}^{(1,1;a)}(T_1)$ | $-\frac{6\sqrt{35}}{175}$        | 0                           | 0                           | 0                            | 0                         | $\frac{9\sqrt{35}}{350}$    | 0                            | 0                            | 0                           | 0                         |
|     |                                   | 0                                | $\frac{18\sqrt{35}}{175}$   | 0                           | 0                            | 0                         | 0                           | $-\frac{3\sqrt{210}}{350}$   | 0                            | 0                           | 0                         |
|     |                                   | 0                                | 0                           | $-\frac{18\sqrt{35}}{175}$  | 0                            | 0                         | 0                           | 0                            | $-\frac{3\sqrt{210}}{350}$   | 0                           | 0                         |
|     |                                   | 0                                | 0                           | 0                           | $\frac{6\sqrt{35}}{175}$     | 0                         | 0                           | 0                            | 0                            | $\frac{9\sqrt{35}}{350}$    | 0                         |
|     |                                   | 0                                | 0                           | 0                           | 0                            | $\frac{\sqrt{35}}{105}$   | 0                           | 0                            | 0                            | 0                           | 0                         |
|     |                                   | $\frac{9\sqrt{35}}{350}$         | 0                           | 0                           | 0                            | 0                         | $-\frac{\sqrt{35}}{75}$     | 0                            | 0                            | 0                           | 0                         |
|     |                                   | 0                                | $-\frac{3\sqrt{210}}{350}$  | 0                           | 0                            | 0                         | 0                           | $-\frac{4\sqrt{35}}{525}$    | 0                            | 0                           | 0                         |
|     |                                   | 0                                | 0                           | $-\frac{3\sqrt{210}}{350}$  | 0                            | 0                         | 0                           | 0                            | $\frac{4\sqrt{35}}{525}$     | 0                           | 0                         |
|     |                                   | 0                                | 0                           | 0                           | $\frac{9\sqrt{35}}{350}$     | 0                         | 0                           | 0                            | 0                            | $\frac{\sqrt{35}}{75}$      | 0                         |
|     |                                   | 0                                | 0                           | 0                           | 0                            | 0                         | 0                           | 0                            | 0                            | 0                           | $-\frac{\sqrt{35}}{105}$  |
| 546 | symmetry                          | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ |                             |                             |                              |                           |                             |                              |                              |                             |                           |

continued ...

Table 8

| No. | multipole                         | matrix                            |                            |                            |                            |                             |                            |                            |                            |                           |                             |
|-----|-----------------------------------|-----------------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|-----------------------------|
|     | $\mathbb{M}_{3,0}^{(1,1;a)}(T_2)$ | 0                                 | $\frac{3\sqrt{7}}{35}$     | 0                          | $\frac{3\sqrt{21}}{35}$    | $\frac{3\sqrt{105}}{560}$   | 0                          | $-\frac{9\sqrt{42}}{560}$  | 0                          | $-\frac{9\sqrt{21}}{560}$ | 0                           |
|     |                                   | $\frac{3\sqrt{7}}{35}$            | 0                          | $-\frac{3\sqrt{21}}{35}$   | 0                          | 0                           | $-\frac{3\sqrt{7}}{80}$    | 0                          | $\frac{3\sqrt{14}}{560}$   | 0                         | $-\frac{9\sqrt{35}}{560}$   |
|     |                                   | 0                                 | $-\frac{3\sqrt{21}}{35}$   | 0                          | $\frac{3\sqrt{7}}{35}$     | $\frac{9\sqrt{35}}{560}$    | 0                          | $-\frac{3\sqrt{14}}{560}$  | 0                          | $\frac{3\sqrt{7}}{80}$    | 0                           |
|     |                                   | $\frac{3\sqrt{21}}{35}$           | 0                          | $\frac{3\sqrt{7}}{35}$     | 0                          | 0                           | $\frac{9\sqrt{21}}{560}$   | 0                          | $\frac{9\sqrt{42}}{560}$   | 0                         | $-\frac{3\sqrt{105}}{560}$  |
|     |                                   | $\frac{3\sqrt{105}}{560}$         | 0                          | $\frac{9\sqrt{35}}{560}$   | 0                          | 0                           | $-\frac{\sqrt{105}}{210}$  | 0                          | $-\frac{\sqrt{210}}{420}$  | 0                         | 0                           |
|     |                                   | 0                                 | $-\frac{3\sqrt{7}}{80}$    | 0                          | $\frac{9\sqrt{21}}{560}$   | $-\frac{\sqrt{105}}{210}$   | 0                          | $\frac{\sqrt{42}}{420}$    | 0                          | $-\frac{\sqrt{21}}{105}$  | 0                           |
|     |                                   | $-\frac{9\sqrt{42}}{560}$         | 0                          | $-\frac{3\sqrt{14}}{560}$  | 0                          | 0                           | $\frac{\sqrt{42}}{420}$    | 0                          | $\frac{\sqrt{21}}{105}$    | 0                         | $-\frac{\sqrt{210}}{420}$   |
|     |                                   | 0                                 | $\frac{3\sqrt{14}}{560}$   | 0                          | $\frac{9\sqrt{42}}{560}$   | $-\frac{\sqrt{210}}{420}$   | 0                          | $\frac{\sqrt{21}}{105}$    | 0                          | $\frac{\sqrt{42}}{420}$   | 0                           |
|     |                                   | $-\frac{9\sqrt{21}}{560}$         | 0                          | $\frac{3\sqrt{7}}{80}$     | 0                          | 0                           | $-\frac{\sqrt{21}}{105}$   | 0                          | $\frac{\sqrt{42}}{420}$    | 0                         | $-\frac{\sqrt{105}}{210}$   |
|     |                                   | 0                                 | $-\frac{9\sqrt{35}}{560}$  | 0                          | $-\frac{3\sqrt{105}}{560}$ | 0                           | 0                          | $-\frac{\sqrt{210}}{420}$  | 0                          | $-\frac{\sqrt{105}}{210}$ | 0                           |
| 547 | symmetry                          | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |                            |                            |                            |                             |                            |                            |                            |                           |                             |
|     | $\mathbb{M}_{3,1}^{(1,1;a)}(T_2)$ | 0                                 | $\frac{3\sqrt{7}i}{35}$    | 0                          | $-\frac{3\sqrt{21}i}{35}$  | $-\frac{3\sqrt{105}i}{560}$ | 0                          | $-\frac{9\sqrt{42}i}{560}$ | 0                          | $\frac{9\sqrt{21}i}{560}$ | 0                           |
|     |                                   | $-\frac{3\sqrt{7}i}{35}$          | 0                          | $-\frac{3\sqrt{21}i}{35}$  | 0                          | 0                           | $\frac{3\sqrt{7}i}{80}$    | 0                          | $\frac{3\sqrt{14}i}{560}$  | 0                         | $\frac{9\sqrt{35}i}{560}$   |
|     |                                   | 0                                 | $\frac{3\sqrt{21}i}{35}$   | 0                          | $\frac{3\sqrt{7}i}{35}$    | $\frac{9\sqrt{35}i}{560}$   | 0                          | $\frac{3\sqrt{14}i}{560}$  | 0                          | $\frac{3\sqrt{7}i}{80}$   | 0                           |
|     |                                   | $\frac{3\sqrt{21}i}{35}$          | 0                          | $-\frac{3\sqrt{7}i}{35}$   | 0                          | 0                           | $\frac{9\sqrt{21}i}{560}$  | 0                          | $-\frac{9\sqrt{42}i}{560}$ | 0                         | $-\frac{3\sqrt{105}i}{560}$ |
|     |                                   | $\frac{3\sqrt{105}i}{560}$        | 0                          | $-\frac{9\sqrt{35}i}{560}$ | 0                          | 0                           | $-\frac{\sqrt{105}i}{210}$ | 0                          | $\frac{\sqrt{210}i}{420}$  | 0                         | 0                           |
|     |                                   | 0                                 | $-\frac{3\sqrt{7}i}{80}$   | 0                          | $-\frac{9\sqrt{21}i}{560}$ | $\frac{\sqrt{105}i}{210}$   | 0                          | $\frac{\sqrt{42}i}{420}$   | 0                          | $\frac{\sqrt{21}i}{105}$  | 0                           |
|     |                                   | $\frac{9\sqrt{42}i}{560}$         | 0                          | $-\frac{3\sqrt{14}i}{560}$ | 0                          | 0                           | $-\frac{\sqrt{42}i}{420}$  | 0                          | $\frac{\sqrt{21}i}{105}$   | 0                         | $\frac{\sqrt{210}i}{420}$   |
|     |                                   | 0                                 | $-\frac{3\sqrt{14}i}{560}$ | 0                          | $\frac{9\sqrt{42}i}{560}$  | $-\frac{\sqrt{210}i}{420}$  | 0                          | $-\frac{\sqrt{21}i}{105}$  | 0                          | $\frac{\sqrt{42}i}{420}$  | 0                           |
|     |                                   | $-\frac{9\sqrt{21}i}{560}$        | 0                          | $-\frac{3\sqrt{7}i}{80}$   | 0                          | 0                           | $-\frac{\sqrt{21}i}{105}$  | 0                          | $-\frac{\sqrt{42}i}{420}$  | 0                         | $-\frac{\sqrt{105}i}{210}$  |
|     |                                   | 0                                 | $-\frac{9\sqrt{35}i}{560}$ | 0                          | $\frac{3\sqrt{105}i}{560}$ | 0                           | 0                          | $-\frac{\sqrt{210}i}{420}$ | 0                          | $\frac{\sqrt{105}i}{210}$ | 0                           |
| 548 | symmetry                          | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$  |                            |                            |                            |                             |                            |                            |                            |                           |                             |

continued ...

Table 8

| No.                               | multipole | matrix                   |                           |                           |                          |                           |                         |                          |                           |                          |                           |
|-----------------------------------|-----------|--------------------------|---------------------------|---------------------------|--------------------------|---------------------------|-------------------------|--------------------------|---------------------------|--------------------------|---------------------------|
| $\mathbb{M}_{3,2}^{(1,1;a)}(T_2)$ |           | 0                        | 0                         | $-\frac{6\sqrt{7}}{35}$   | 0                        | 0                         | 0                       | 0                        | $\frac{3\sqrt{42}}{140}$  | 0                        | 0                         |
|                                   |           | 0                        | 0                         | 0                         | $\frac{6\sqrt{7}}{35}$   | $-\frac{3\sqrt{35}}{140}$ | 0                       | 0                        | 0                         | $\frac{3\sqrt{7}}{140}$  | 0                         |
|                                   |           | $-\frac{6\sqrt{7}}{35}$  | 0                         | 0                         | 0                        | 0                         | $\frac{3\sqrt{7}}{140}$ | 0                        | 0                         | 0                        | $-\frac{3\sqrt{35}}{140}$ |
|                                   |           | 0                        | $\frac{6\sqrt{7}}{35}$    | 0                         | 0                        | 0                         | 0                       | $\frac{3\sqrt{42}}{140}$ | 0                         | 0                        | 0                         |
|                                   |           | 0                        | $-\frac{3\sqrt{35}}{140}$ | 0                         | 0                        | 0                         | 0                       | $\frac{\sqrt{210}}{210}$ | 0                         | 0                        | 0                         |
|                                   |           | 0                        | 0                         | $\frac{3\sqrt{7}}{140}$   | 0                        | 0                         | 0                       | 0                        | $\frac{\sqrt{42}}{210}$   | 0                        | 0                         |
|                                   |           | 0                        | 0                         | 0                         | $\frac{3\sqrt{42}}{140}$ | $\frac{\sqrt{210}}{210}$  | 0                       | 0                        | 0                         | $-\frac{\sqrt{42}}{210}$ | 0                         |
|                                   |           | $\frac{3\sqrt{42}}{140}$ | 0                         | 0                         | 0                        | 0                         | $\frac{\sqrt{42}}{210}$ | 0                        | 0                         | 0                        | $-\frac{\sqrt{210}}{210}$ |
|                                   |           | 0                        | $\frac{3\sqrt{7}}{140}$   | 0                         | 0                        | 0                         | 0                       | $-\frac{\sqrt{42}}{210}$ | 0                         | 0                        | 0                         |
|                                   |           | 0                        | 0                         | $-\frac{3\sqrt{35}}{140}$ | 0                        | 0                         | 0                       | 0                        | $-\frac{\sqrt{210}}{210}$ | 0                        | 0                         |

$$\begin{aligned} \text{bra:} &= \langle \frac{3}{2}, \frac{3}{2}; d |, \langle \frac{3}{2}, \frac{1}{2}; d |, \langle \frac{3}{2}, -\frac{1}{2}; d |, \langle \frac{3}{2}, -\frac{3}{2}; d |, \langle \frac{5}{2}, \frac{5}{2}; d |, \langle \frac{5}{2}, \frac{3}{2}; d |, \langle \frac{5}{2}, \frac{1}{2}; d |, \langle \frac{5}{2}, -\frac{1}{2}; d |, \langle \frac{5}{2}, -\frac{3}{2}; d |, \langle \frac{5}{2}, -\frac{5}{2}; d | \\ \text{ket:} &= | \frac{5}{2}, \frac{5}{2}; f \rangle, | \frac{5}{2}, \frac{3}{2}; f \rangle, | \frac{5}{2}, \frac{1}{2}; f \rangle, | \frac{5}{2}, -\frac{1}{2}; f \rangle, | \frac{5}{2}, -\frac{3}{2}; f \rangle, | \frac{5}{2}, -\frac{5}{2}; f \rangle, | \frac{7}{2}, \frac{7}{2}; f \rangle, | \frac{7}{2}, \frac{5}{2}; f \rangle, | \frac{7}{2}, \frac{3}{2}; f \rangle, | \frac{7}{2}, \frac{1}{2}; f \rangle, | \frac{7}{2}, -\frac{1}{2}; f \rangle, | \frac{7}{2}, -\frac{3}{2}; f \rangle, | \frac{7}{2}, -\frac{5}{2}; f \rangle, | \frac{7}{2}, -\frac{7}{2}; f \rangle \end{aligned}$$

Table 9: (d,f) block.

| No.                           | multipole | matrix                 |                        |                        |                        |                        |                        |                         |                         |                        |                        |                        |                        |                        |                        |
|-------------------------------|-----------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|-------------------------|-------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| 549                           | symmetry  | $x$                    |                        |                        |                        |                        |                        |                         |                         |                        |                        |                        |                        |                        |                        |
| $\mathbb{Q}_{1,0}^{(a)}(T_1)$ |           | $-\frac{\sqrt{5}}{10}$ | 0                      | $\frac{\sqrt{2}}{20}$  | 0                      | 0                      | 0                      | 0                       | 0                       | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      |
|                               |           | 0                      | $-\frac{\sqrt{3}}{10}$ | 0                      | $\frac{\sqrt{6}}{20}$  | 0                      | 0                      | 0                       | 0                       | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      |
|                               |           | 0                      | 0                      | $-\frac{\sqrt{6}}{20}$ | 0                      | $\frac{\sqrt{3}}{10}$  | 0                      | 0                       | 0                       | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      |
|                               |           | 0                      | 0                      | 0                      | $-\frac{\sqrt{2}}{20}$ | 0                      | $\frac{\sqrt{5}}{10}$  | 0                       | 0                       | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      |
|                               |           | 0                      | $-\frac{\sqrt{5}}{70}$ | 0                      | 0                      | 0                      | 0                      | $-\frac{\sqrt{42}}{28}$ | 0                       | $\frac{\sqrt{2}}{28}$  | 0                      | 0                      | 0                      | 0                      | 0                      |
|                               |           | $-\frac{\sqrt{5}}{70}$ | 0                      | $-\frac{\sqrt{2}}{35}$ | 0                      | 0                      | 0                      | 0                       | $-\frac{\sqrt{30}}{28}$ | 0                      | $\frac{\sqrt{6}}{28}$  | 0                      | 0                      | 0                      | 0                      |
|                               |           | 0                      | $-\frac{\sqrt{2}}{35}$ | 0                      | $-\frac{3}{70}$        | 0                      | 0                      | 0                       | 0                       | $-\frac{\sqrt{5}}{14}$ | 0                      | $\frac{\sqrt{3}}{14}$  | 0                      | 0                      | 0                      |
|                               |           | 0                      | 0                      | $-\frac{3}{70}$        | 0                      | $-\frac{\sqrt{2}}{35}$ | 0                      | 0                       | 0                       | 0                      | $-\frac{\sqrt{3}}{14}$ | 0                      | $\frac{\sqrt{5}}{14}$  | 0                      | 0                      |
|                               |           | 0                      | 0                      | 0                      | $-\frac{\sqrt{2}}{35}$ | 0                      | $-\frac{\sqrt{5}}{70}$ | 0                       | 0                       | 0                      | 0                      | $-\frac{\sqrt{6}}{28}$ | 0                      | $\frac{\sqrt{30}}{28}$ | 0                      |
|                               |           | 0                      | 0                      | 0                      | 0                      | $-\frac{\sqrt{5}}{70}$ | 0                      | 0                       | 0                       | 0                      | 0                      | 0                      | $-\frac{\sqrt{2}}{28}$ | 0                      | $\frac{\sqrt{42}}{28}$ |

continued ...

Table 9

| No. | multipole | matrix  |
|-----|-----------|---|
| 550 | symmetry  | $y$ $\begin{bmatrix} -\frac{\sqrt{5}i}{10} & 0 & -\frac{\sqrt{2}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{3}i}{10} & 0 & -\frac{\sqrt{6}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{6}i}{20} & 0 & -\frac{\sqrt{3}i}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{2}i}{20} & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{5}i}{70} & 0 & 0 & 0 & 0 & -\frac{\sqrt{42}i}{28} & 0 & -\frac{\sqrt{2}i}{28} & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{5}i}{70} & 0 & \frac{\sqrt{2}i}{35} & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}i}{28} & 0 & -\frac{\sqrt{6}i}{28} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}i}{35} & 0 & \frac{3i}{70} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{14} & 0 & -\frac{\sqrt{3}i}{14} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{3i}{70} & 0 & \frac{\sqrt{2}i}{35} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{14} & 0 & -\frac{\sqrt{5}i}{14} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{2}i}{35} & 0 & \frac{\sqrt{5}i}{70} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{28} & 0 & -\frac{\sqrt{30}i}{28} & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{70} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{28} & 0 & -\frac{\sqrt{42}i}{28} & 0 \end{bmatrix}$ |
| 551 | symmetry  | $z$ $\begin{bmatrix} 0 & \frac{1}{5} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{6}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{1}{5} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{1}{14} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{14} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{3}{70} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{14} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{1}{70} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{7} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{1}{70} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{7} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{3}{70} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{14} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{1}{14} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{14} & 0 & 0 \end{bmatrix}$   |
| 552 | symmetry  | $\sqrt{15}xyz$  |

*continued ...*

Table 9

| No. | multipole                     | matrix                         |                            |                            |                           |                           |                           |                         |                           |                           |                           |                           |                           |                           |                         |
|-----|-------------------------------|--------------------------------|----------------------------|----------------------------|---------------------------|---------------------------|---------------------------|-------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|-------------------------|
|     | $\mathbb{Q}_3^{(a)}(A_2)$     | 0                              | 0                          | 0                          | $\frac{3\sqrt{70}i}{140}$ | 0                         | 0                         | $-\frac{\sqrt{6}i}{24}$ | 0                         | 0                         | 0                         | $\frac{\sqrt{210}i}{168}$ | 0                         | 0                         | 0                       |
|     |                               | $\frac{\sqrt{21}i}{28}$        | 0                          | 0                          | 0                         | $\frac{\sqrt{105}i}{140}$ | 0                         | 0                       | $\frac{\sqrt{14}i}{56}$   | 0                         | 0                         | 0                         | $\frac{\sqrt{42}i}{56}$   | 0                         | 0                       |
|     |                               | 0                              | $-\frac{\sqrt{105}i}{140}$ | 0                          | 0                         | 0                         | $-\frac{\sqrt{21}i}{28}$  | 0                       | 0                         | $\frac{\sqrt{42}i}{56}$   | 0                         | 0                         | 0                         | $\frac{\sqrt{14}i}{56}$   | 0                       |
|     |                               | 0                              | 0                          | $-\frac{3\sqrt{70}i}{140}$ | 0                         | 0                         | 0                         | 0                       | 0                         | 0                         | $\frac{\sqrt{210}i}{168}$ | 0                         | 0                         | 0                         | $-\frac{\sqrt{6}i}{24}$ |
|     |                               | 0                              | 0                          | $-\frac{\sqrt{14}i}{28}$   | 0                         | 0                         | 0                         | 0                       | 0                         | 0                         | $\frac{\sqrt{42}i}{42}$   | 0                         | 0                         | 0                         | 0                       |
|     |                               | 0                              | 0                          | 0                          | $-\frac{\sqrt{70}i}{140}$ | 0                         | 0                         | $\frac{\sqrt{6}i}{12}$  | 0                         | 0                         | 0                         | $\frac{\sqrt{210}i}{84}$  | 0                         | 0                         | 0                       |
|     |                               | $\frac{\sqrt{14}i}{28}$        | 0                          | 0                          | 0                         | $\frac{\sqrt{70}i}{140}$  | 0                         | 0                       | $\frac{\sqrt{21}i}{84}$   | 0                         | 0                         | 0                         | $\frac{\sqrt{7}i}{28}$    | 0                         | 0                       |
|     |                               | 0                              | $\frac{\sqrt{70}i}{140}$   | 0                          | 0                         | 0                         | $\frac{\sqrt{14}i}{28}$   | 0                       | 0                         | $-\frac{\sqrt{7}i}{28}$   | 0                         | 0                         | 0                         | $-\frac{\sqrt{21}i}{84}$  | 0                       |
|     |                               | 0                              | 0                          | $-\frac{\sqrt{70}i}{140}$  | 0                         | 0                         | 0                         | 0                       | 0                         | 0                         | $-\frac{\sqrt{210}i}{84}$ | 0                         | 0                         | 0                         | $-\frac{\sqrt{6}i}{12}$ |
|     |                               | 0                              | 0                          | 0                          | $-\frac{\sqrt{14}i}{28}$  | 0                         | 0                         | 0                       | 0                         | 0                         | $-\frac{\sqrt{42}i}{42}$  | 0                         | 0                         | 0                         | 0                       |
| 553 | symmetry                      | $\frac{x(2x^2-3y^2-3z^2)}{2}$  |                            |                            |                           |                           |                           |                         |                           |                           |                           |                           |                           |                           |                         |
|     | $\mathbb{Q}_{3,0}^{(a)}(T_1)$ | $-\frac{3\sqrt{105}}{560}$     | 0                          | $\frac{9\sqrt{42}}{560}$   | 0                         | $-\frac{3\sqrt{21}}{112}$ | 0                         | 0                       | $-\frac{\sqrt{70}}{112}$  | 0                         | $\frac{\sqrt{14}}{56}$    | 0                         | $-\frac{\sqrt{210}}{336}$ | 0                         | 0                       |
|     |                               | 0                              | $\frac{3\sqrt{7}}{80}$     | 0                          | $-\frac{3\sqrt{14}}{560}$ | 0                         | $-\frac{3\sqrt{35}}{112}$ | $-\frac{\sqrt{30}}{48}$ | 0                         | 0                         | 0                         | $\frac{\sqrt{42}}{112}$   | 0                         | $-\frac{\sqrt{210}}{168}$ | 0                       |
|     |                               | $\frac{3\sqrt{35}}{112}$       | 0                          | $\frac{3\sqrt{14}}{560}$   | 0                         | $-\frac{3\sqrt{7}}{80}$   | 0                         | 0                       | $-\frac{\sqrt{210}}{168}$ | 0                         | $\frac{\sqrt{42}}{112}$   | 0                         | 0                         | 0                         | $-\frac{\sqrt{30}}{48}$ |
|     |                               | 0                              | $\frac{3\sqrt{21}}{112}$   | 0                          | $-\frac{9\sqrt{42}}{560}$ | 0                         | $\frac{3\sqrt{105}}{560}$ | 0                       | 0                         | $-\frac{\sqrt{210}}{336}$ | 0                         | $\frac{\sqrt{14}}{56}$    | 0                         | $-\frac{\sqrt{70}}{112}$  | 0                       |
|     |                               | 0                              | $-\frac{\sqrt{105}}{140}$  | 0                          | $\frac{\sqrt{210}}{168}$  | 0                         | 0                         | $-\frac{\sqrt{2}}{16}$  | 0                         | $\frac{\sqrt{42}}{56}$    | 0                         | $-\frac{\sqrt{70}}{112}$  | 0                         | 0                         | 0                       |
|     |                               | $-\frac{\sqrt{105}}{140}$      | 0                          | $\frac{\sqrt{42}}{280}$    | 0                         | $\frac{\sqrt{21}}{42}$    | 0                         | 0                       | $\frac{\sqrt{70}}{112}$   | 0                         | $\frac{\sqrt{14}}{56}$    | 0                         | $-\frac{\sqrt{210}}{112}$ | 0                         | 0                       |
|     |                               | 0                              | $\frac{\sqrt{42}}{280}$    | 0                          | $\frac{\sqrt{21}}{70}$    | 0                         | $\frac{\sqrt{210}}{168}$  | $\frac{\sqrt{5}}{16}$   | 0                         | $\frac{\sqrt{105}}{112}$  | 0                         | $-\frac{\sqrt{7}}{112}$   | 0                         | $-\frac{3\sqrt{35}}{112}$ | 0                       |
|     |                               | $\frac{\sqrt{210}}{168}$       | 0                          | $\frac{\sqrt{21}}{70}$     | 0                         | $\frac{\sqrt{42}}{280}$   | 0                         | 0                       | $\frac{3\sqrt{35}}{112}$  | 0                         | $\frac{\sqrt{7}}{112}$    | 0                         | $-\frac{\sqrt{105}}{112}$ | 0                         | $-\frac{\sqrt{5}}{16}$  |
|     |                               | 0                              | $\frac{\sqrt{21}}{42}$     | 0                          | $\frac{\sqrt{42}}{280}$   | 0                         | $-\frac{\sqrt{105}}{140}$ | 0                       | 0                         | $\frac{\sqrt{210}}{112}$  | 0                         | $-\frac{\sqrt{14}}{56}$   | 0                         | $-\frac{\sqrt{70}}{112}$  | 0                       |
|     |                               | 0                              | 0                          | $\frac{\sqrt{210}}{168}$   | 0                         | $-\frac{\sqrt{105}}{140}$ | 0                         | 0                       | 0                         | 0                         | $\frac{\sqrt{70}}{112}$   | 0                         | $-\frac{\sqrt{42}}{56}$   | 0                         | $\frac{\sqrt{2}}{16}$   |
| 554 | symmetry                      | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ |                            |                            |                           |                           |                           |                         |                           |                           |                           |                           |                           |                           |                         |

continued ...

Table 9

| No. | multipole                     | matrix                           |                            |                            |                            |                            |                             |                         |                            |                            |                          |                           |                            |                            |                          |
|-----|-------------------------------|----------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|-------------------------|----------------------------|----------------------------|--------------------------|---------------------------|----------------------------|----------------------------|--------------------------|
|     | $\mathbb{Q}_{3,1}^{(a)}(T_1)$ | $-\frac{3\sqrt{105}i}{560}$      | 0                          | $-\frac{9\sqrt{42}i}{560}$ | 0                          | $-\frac{3\sqrt{21}i}{112}$ | 0                           | 0                       | $-\frac{\sqrt{70}i}{112}$  | 0                          | $-\frac{\sqrt{14}i}{56}$ | 0                         | $-\frac{\sqrt{210}i}{336}$ | 0                          | 0                        |
|     |                               | 0                                | $\frac{3\sqrt{7}i}{80}$    | 0                          | $\frac{3\sqrt{14}i}{560}$  | 0                          | $-\frac{3\sqrt{35}i}{112}$  | $\frac{\sqrt{30}i}{48}$ | 0                          | 0                          | 0                        | $-\frac{\sqrt{42}i}{112}$ | 0                          | $-\frac{\sqrt{210}i}{168}$ | 0                        |
|     |                               | $-\frac{3\sqrt{35}i}{112}$       | 0                          | $\frac{3\sqrt{14}i}{560}$  | 0                          | $\frac{3\sqrt{7}i}{80}$    | 0                           | 0                       | $\frac{\sqrt{210}i}{168}$  | 0                          | $\frac{\sqrt{42}i}{112}$ | 0                         | 0                          | 0                          | $-\frac{\sqrt{30}i}{48}$ |
|     |                               | 0                                | $-\frac{3\sqrt{21}i}{112}$ | 0                          | $-\frac{9\sqrt{42}i}{560}$ | 0                          | $-\frac{3\sqrt{105}i}{560}$ | 0                       | 0                          | $\frac{\sqrt{210}i}{336}$  | 0                        | $\frac{\sqrt{14}i}{56}$   | 0                          | $\frac{\sqrt{70}i}{112}$   | 0                        |
|     |                               | 0                                | $\frac{\sqrt{105}i}{140}$  | 0                          | $\frac{\sqrt{210}i}{168}$  | 0                          | 0                           | $-\frac{\sqrt{2}i}{16}$ | 0                          | $-\frac{\sqrt{42}i}{56}$   | 0                        | $-\frac{\sqrt{70}i}{112}$ | 0                          | 0                          | 0                        |
|     |                               | $-\frac{\sqrt{105}i}{140}$       | 0                          | $-\frac{\sqrt{42}i}{280}$  | 0                          | $\frac{\sqrt{21}i}{42}$    | 0                           | 0                       | $\frac{\sqrt{70}i}{112}$   | 0                          | $-\frac{\sqrt{14}i}{56}$ | 0                         | $-\frac{\sqrt{210}i}{112}$ | 0                          | 0                        |
|     |                               | 0                                | $\frac{\sqrt{42}i}{280}$   | 0                          | $-\frac{\sqrt{21}i}{70}$   | 0                          | $\frac{\sqrt{210}i}{168}$   | $-\frac{\sqrt{5}i}{16}$ | 0                          | $\frac{\sqrt{105}i}{112}$  | 0                        | $\frac{\sqrt{7}i}{112}$   | 0                          | $-\frac{3\sqrt{35}i}{112}$ | 0                        |
|     |                               | $-\frac{\sqrt{210}i}{168}$       | 0                          | $\frac{\sqrt{21}i}{70}$    | 0                          | $-\frac{\sqrt{42}i}{280}$  | 0                           | 0                       | $-\frac{3\sqrt{35}i}{112}$ | 0                          | $\frac{\sqrt{7}i}{112}$  | 0                         | $\frac{\sqrt{105}i}{112}$  | 0                          | $-\frac{\sqrt{5}i}{16}$  |
|     |                               | 0                                | $-\frac{\sqrt{21}i}{42}$   | 0                          | $\frac{\sqrt{42}i}{280}$   | 0                          | $\frac{\sqrt{105}i}{140}$   | 0                       | 0                          | $-\frac{\sqrt{210}i}{112}$ | 0                        | $-\frac{\sqrt{14}i}{56}$  | 0                          | $\frac{\sqrt{70}i}{112}$   | 0                        |
|     |                               | 0                                | 0                          | $-\frac{\sqrt{210}i}{168}$ | 0                          | $-\frac{\sqrt{105}i}{140}$ | 0                           | 0                       | 0                          | $-\frac{\sqrt{70}i}{112}$  | 0                        | $-\frac{\sqrt{42}i}{56}$  | 0                          | $-\frac{\sqrt{2}i}{16}$    |                          |
| 555 | symmetry                      | $-\frac{z(3x^2+3y^2-2z^2)}{2}$   |                            |                            |                            |                            |                             |                         |                            |                            |                          |                           |                            |                            |                          |
|     | $\mathbb{Q}_{3,2}^{(a)}(T_1)$ | 0                                | $-\frac{3\sqrt{21}}{70}$   | 0                          | 0                          | 0                          | 0                           | 0                       | $-\frac{\sqrt{210}}{84}$   | 0                          | 0                        | 0                         | 0                          | 0                          | 0                        |
|     |                               | 0                                | 0                          | $\frac{3\sqrt{14}}{70}$    | 0                          | 0                          | 0                           | 0                       | 0                          | $-\frac{\sqrt{42}}{84}$    | 0                        | 0                         | 0                          | 0                          | 0                        |
|     |                               | 0                                | 0                          | 0                          | $\frac{3\sqrt{14}}{70}$    | 0                          | 0                           | 0                       | 0                          | 0                          | $\frac{\sqrt{42}}{84}$   | 0                         | 0                          | 0                          | 0                        |
|     |                               | 0                                | 0                          | 0                          | 0                          | $-\frac{3\sqrt{21}}{70}$   | 0                           | 0                       | 0                          | 0                          | 0                        | $\frac{\sqrt{210}}{84}$   | 0                          | 0                          | 0                        |
|     |                               | $\frac{\sqrt{21}}{42}$           | 0                          | 0                          | 0                          | 0                          | 0                           | 0                       | $-\frac{\sqrt{14}}{14}$    | 0                          | 0                        | 0                         | 0                          | 0                          | 0                        |
|     |                               | 0                                | $-\frac{\sqrt{21}}{30}$    | 0                          | 0                          | 0                          | 0                           | 0                       | 0                          | 0                          | 0                        | 0                         | 0                          | 0                          | 0                        |
|     |                               | 0                                | 0                          | $-\frac{2\sqrt{21}}{105}$  | 0                          | 0                          | 0                           | 0                       | 0                          | $\frac{\sqrt{7}}{14}$      | 0                        | 0                         | 0                          | 0                          | 0                        |
|     |                               | 0                                | 0                          | 0                          | $\frac{2\sqrt{21}}{105}$   | 0                          | 0                           | 0                       | 0                          | 0                          | $\frac{\sqrt{7}}{14}$    | 0                         | 0                          | 0                          | 0                        |
|     |                               | 0                                | 0                          | 0                          | 0                          | $\frac{\sqrt{21}}{30}$     | 0                           | 0                       | 0                          | 0                          | 0                        | 0                         | 0                          | 0                          | 0                        |
|     |                               | 0                                | 0                          | 0                          | 0                          | 0                          | $-\frac{\sqrt{21}}{42}$     | 0                       | 0                          | 0                          | 0                        | 0                         | 0                          | $-\frac{\sqrt{14}}{14}$    | 0                        |
| 556 | symmetry                      | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ |                            |                            |                            |                            |                             |                         |                            |                            |                          |                           |                            |                            |                          |

continued ...

Table 9

| No. | multipole                     | matrix                            |                            |                            |                            |                            |                            |                         |                            |                            |                            |                            |                            |                            |                         |
|-----|-------------------------------|-----------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|-------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|-------------------------|
|     | $\mathbb{Q}_{3,0}^{(a)}(T_2)$ | $-\frac{3\sqrt{7}}{112}$          | 0                          | $\frac{9\sqrt{70}}{560}$   | 0                          | $\frac{9\sqrt{35}}{560}$   | 0                          | 0                       | $-\frac{5\sqrt{42}}{336}$  | 0                          | $\frac{\sqrt{210}}{168}$   | 0                          | $\frac{\sqrt{14}}{112}$    | 0                          | 0                       |
|     |                               | 0                                 | $\frac{\sqrt{105}}{80}$    | 0                          | $-\frac{\sqrt{210}}{560}$  | 0                          | $\frac{3\sqrt{21}}{112}$   | $\frac{\sqrt{2}}{16}$   | 0                          | 0                          | 0                          | $\frac{\sqrt{70}}{112}$    | 0                          | $\frac{\sqrt{14}}{56}$     | 0                       |
|     |                               | $-\frac{3\sqrt{21}}{112}$         | 0                          | $\frac{\sqrt{210}}{560}$   | 0                          | $-\frac{\sqrt{105}}{80}$   | 0                          | 0                       | $\frac{\sqrt{14}}{56}$     | 0                          | $\frac{\sqrt{70}}{112}$    | 0                          | 0                          | 0                          | $\frac{\sqrt{2}}{16}$   |
|     |                               | 0                                 | $-\frac{9\sqrt{35}}{560}$  | 0                          | $-\frac{9\sqrt{70}}{560}$  | 0                          | $\frac{3\sqrt{7}}{112}$    | 0                       | 0                          | $\frac{\sqrt{14}}{112}$    | 0                          | $\frac{\sqrt{210}}{168}$   | 0                          | $-\frac{5\sqrt{42}}{336}$  | 0                       |
|     |                               | 0                                 | $-\frac{\sqrt{7}}{28}$     | 0                          | $-\frac{\sqrt{14}}{56}$    | 0                          | 0                          | $-\frac{\sqrt{30}}{48}$ | 0                          | $\frac{\sqrt{70}}{56}$     | 0                          | $\frac{\sqrt{42}}{112}$    | 0                          | 0                          | 0                       |
|     |                               | $-\frac{\sqrt{7}}{28}$            | 0                          | $\frac{\sqrt{70}}{280}$    | 0                          | $-\frac{\sqrt{35}}{70}$    | 0                          | 0                       | $\frac{5\sqrt{42}}{336}$   | 0                          | $\frac{\sqrt{210}}{168}$   | 0                          | $\frac{3\sqrt{14}}{112}$   | 0                          | 0                       |
|     |                               | 0                                 | $\frac{\sqrt{70}}{280}$    | 0                          | $\frac{\sqrt{35}}{70}$     | 0                          | $-\frac{\sqrt{14}}{56}$    | $-\frac{\sqrt{3}}{16}$  | 0                          | $\frac{5\sqrt{7}}{112}$    | 0                          | $-\frac{\sqrt{105}}{336}$  | 0                          | $\frac{3\sqrt{21}}{112}$   | 0                       |
|     |                               | $-\frac{\sqrt{14}}{56}$           | 0                          | $\frac{\sqrt{35}}{70}$     | 0                          | $\frac{\sqrt{70}}{280}$    | 0                          | 0                       | $-\frac{3\sqrt{21}}{112}$  | 0                          | $\frac{\sqrt{105}}{336}$   | 0                          | $-\frac{5\sqrt{7}}{112}$   | 0                          | $\frac{\sqrt{3}}{16}$   |
|     |                               | 0                                 | $-\frac{\sqrt{35}}{70}$    | 0                          | $\frac{\sqrt{70}}{280}$    | 0                          | $-\frac{\sqrt{7}}{28}$     | 0                       | 0                          | $-\frac{3\sqrt{14}}{112}$  | 0                          | $-\frac{\sqrt{210}}{168}$  | 0                          | $-\frac{5\sqrt{42}}{336}$  | 0                       |
|     |                               | 0                                 | 0                          | $-\frac{\sqrt{14}}{56}$    | 0                          | $-\frac{\sqrt{7}}{28}$     | 0                          | 0                       | 0                          | 0                          | $-\frac{\sqrt{42}}{112}$   | 0                          | $-\frac{\sqrt{70}}{56}$    | 0                          | $\frac{\sqrt{30}}{48}$  |
| 557 | symmetry                      | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |                            |                            |                            |                            |                            |                         |                            |                            |                            |                            |                            |                            |                         |
|     | $\mathbb{Q}_{3,1}^{(a)}(T_2)$ | $\frac{3\sqrt{7}i}{112}$          | 0                          | $\frac{9\sqrt{70}i}{560}$  | 0                          | $-\frac{9\sqrt{35}i}{560}$ | 0                          | 0                       | $\frac{5\sqrt{42}i}{336}$  | 0                          | $\frac{\sqrt{210}i}{168}$  | 0                          | $-\frac{\sqrt{14}i}{112}$  | 0                          | 0                       |
|     |                               | 0                                 | $-\frac{\sqrt{105}i}{80}$  | 0                          | $-\frac{\sqrt{210}i}{560}$ | 0                          | $-\frac{3\sqrt{21}i}{112}$ | $\frac{\sqrt{2}i}{16}$  | 0                          | 0                          | 0                          | $\frac{\sqrt{70}i}{112}$   | 0                          | $-\frac{\sqrt{14}i}{56}$   | 0                       |
|     |                               | $-\frac{3\sqrt{21}i}{112}$        | 0                          | $-\frac{\sqrt{210}i}{560}$ | 0                          | $-\frac{\sqrt{105}i}{80}$  | 0                          | 0                       | $\frac{\sqrt{14}i}{56}$    | 0                          | $-\frac{\sqrt{70}i}{112}$  | 0                          | 0                          | 0                          | $-\frac{\sqrt{2}i}{16}$ |
|     |                               | 0                                 | $-\frac{9\sqrt{35}i}{560}$ | 0                          | $\frac{9\sqrt{70}i}{560}$  | 0                          | $\frac{3\sqrt{7}i}{112}$   | 0                       | 0                          | $\frac{\sqrt{14}i}{112}$   | 0                          | $-\frac{\sqrt{210}i}{168}$ | 0                          | $-\frac{5\sqrt{42}i}{336}$ | 0                       |
|     |                               | 0                                 | $-\frac{\sqrt{7}i}{28}$    | 0                          | $\frac{\sqrt{14}i}{56}$    | 0                          | 0                          | $\frac{\sqrt{30}i}{48}$ | 0                          | $\frac{\sqrt{70}i}{56}$    | 0                          | $-\frac{\sqrt{42}i}{112}$  | 0                          | 0                          | 0                       |
|     |                               | $\frac{\sqrt{7}i}{28}$            | 0                          | $\frac{\sqrt{70}i}{280}$   | 0                          | $\frac{\sqrt{35}i}{70}$    | 0                          | 0                       | $-\frac{5\sqrt{42}i}{336}$ | 0                          | $\frac{\sqrt{210}i}{168}$  | 0                          | $-\frac{3\sqrt{14}i}{112}$ | 0                          | 0                       |
|     |                               | 0                                 | $-\frac{\sqrt{70}i}{280}$  | 0                          | $\frac{\sqrt{35}i}{70}$    | 0                          | $\frac{\sqrt{14}i}{56}$    | $-\frac{\sqrt{3}i}{16}$ | 0                          | $-\frac{5\sqrt{7}i}{112}$  | 0                          | $-\frac{\sqrt{105}i}{336}$ | 0                          | $-\frac{3\sqrt{21}i}{112}$ | 0                       |
|     |                               | $-\frac{\sqrt{14}i}{56}$          | 0                          | $-\frac{\sqrt{35}i}{70}$   | 0                          | $\frac{\sqrt{70}i}{280}$   | 0                          | 0                       | $-\frac{3\sqrt{21}i}{112}$ | 0                          | $-\frac{\sqrt{105}i}{336}$ | 0                          | $-\frac{5\sqrt{7}i}{112}$  | 0                          | $-\frac{\sqrt{3}i}{16}$ |
|     |                               | 0                                 | $-\frac{\sqrt{35}i}{70}$   | 0                          | $-\frac{\sqrt{70}i}{280}$  | 0                          | $-\frac{\sqrt{7}i}{28}$    | 0                       | 0                          | $-\frac{3\sqrt{14}i}{112}$ | 0                          | $\frac{\sqrt{210}i}{168}$  | 0                          | $-\frac{5\sqrt{42}i}{336}$ | 0                       |
|     |                               | 0                                 | 0                          | $-\frac{\sqrt{14}i}{56}$   | 0                          | $\frac{\sqrt{7}i}{28}$     | 0                          | 0                       | 0                          | 0                          | $-\frac{\sqrt{42}i}{112}$  | 0                          | $\frac{\sqrt{70}i}{56}$    | 0                          | $\frac{\sqrt{30}i}{48}$ |
| 558 | symmetry                      | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$  |                            |                            |                            |                            |                            |                         |                            |                            |                            |                            |                            |                            |                         |

continued ...

Table 9

| No. | multipole                     | matrix                                  |                           |                           |                           |                           |                          |                         |                         |                          |                          |                           |                         |                         |                       |
|-----|-------------------------------|---|---------------------------|---------------------------|---------------------------|---------------------------|--------------------------|-------------------------|-------------------------|--------------------------|--------------------------|---------------------------|-------------------------|-------------------------|-----------------------|
|     | $\mathbb{Q}_{3,2}^{(a)}(T_2)$ | 0                                       | 0                         | 0                         | $-\frac{3\sqrt{70}}{140}$ | 0                         | 0                        | $-\frac{\sqrt{6}}{24}$  | 0                       | 0                        | 0                        | $-\frac{\sqrt{210}}{168}$ | 0                       | 0                       | 0                     |
|     |                               | $\frac{\sqrt{21}}{28}$                  | 0                         | 0                         | 0                         | $-\frac{\sqrt{105}}{140}$ | 0                        | 0                       | $\frac{\sqrt{14}}{56}$  | 0                        | 0                        | 0                         | $-\frac{\sqrt{42}}{56}$ | 0                       | 0                     |
|     |                               | 0                                       | $-\frac{\sqrt{105}}{140}$ | 0                         | 0                         | 0                         | $\frac{\sqrt{21}}{28}$   | 0                       | 0                       | $\frac{\sqrt{42}}{56}$   | 0                        | 0                         | 0                       | $-\frac{\sqrt{14}}{56}$ | 0                     |
|     |                               | 0                                       | 0                         | $-\frac{3\sqrt{70}}{140}$ | 0                         | 0                         | 0                        | 0                       | 0                       | 0                        | $\frac{\sqrt{210}}{168}$ | 0                         | 0                       | 0                       | $\frac{\sqrt{6}}{24}$ |
|     |                               | 0                                       | 0                         | $\frac{\sqrt{14}}{28}$    | 0                         | 0                         | 0                        | 0                       | 0                       | 0                        | $-\frac{\sqrt{42}}{42}$  | 0                         | 0                       | 0                       | 0                     |
|     |                               | 0                                       | 0                         | 0                         | $\frac{\sqrt{70}}{140}$   | 0                         | 0                        | $\frac{\sqrt{6}}{12}$   | 0                       | 0                        | 0                        | $-\frac{\sqrt{210}}{84}$  | 0                       | 0                       | 0                     |
|     |                               | $\frac{\sqrt{14}}{28}$                  | 0                         | 0                         | 0                         | $-\frac{\sqrt{70}}{140}$  | 0                        | 0                       | $\frac{\sqrt{21}}{84}$  | 0                        | 0                        | 0                         | $-\frac{\sqrt{7}}{28}$  | 0                       | 0                     |
|     |                               | 0                                       | $\frac{\sqrt{70}}{140}$   | 0                         | 0                         | 0                         | $-\frac{\sqrt{14}}{28}$  | 0                       | 0                       | $-\frac{\sqrt{7}}{28}$   | 0                        | 0                         | 0                       | $\frac{\sqrt{21}}{84}$  | 0                     |
|     |                               | 0                                       | 0                         | $-\frac{\sqrt{70}}{140}$  | 0                         | 0                         | 0                        | 0                       | 0                       | 0                        | $-\frac{\sqrt{210}}{84}$ | 0                         | 0                       | 0                       | $\frac{\sqrt{6}}{12}$ |
|     |                               | 0                                       | 0                         | 0                         | $-\frac{\sqrt{14}}{28}$   | 0                         | 0                        | 0                       | 0                       | 0                        | 0                        | $-\frac{\sqrt{42}}{42}$   | 0                       | 0                       | 0                     |
| 559 | symmetry                      | $\frac{3\sqrt{35}xyz(x-y)(x+y)}{2}$     |                           |                           |                           |                           |                          |                         |                         |                          |                          |                           |                         |                         |                       |
|     | $\mathbb{Q}_{5,6}^{(a)}(E)$   | 0                                       | 0                         | 0                         | 0                         | 0                         | 0                        | 0                       | 0                       | 0                        | 0                        | 0                         | $-\frac{\sqrt{7}i}{10}$ | 0                       | 0                     |
|     |                               | 0                                       | 0                         | 0                         | 0                         | 0                         | 0                        | 0                       | 0                       | 0                        | 0                        | 0                         | 0                       | $\frac{\sqrt{3}i}{10}$  | 0                     |
|     |                               | 0                                       | 0                         | 0                         | 0                         | 0                         | 0                        | $\frac{\sqrt{3}i}{10}$  | 0                       | 0                        | 0                        | 0                         | 0                       | 0                       | 0                     |
|     |                               | 0                                       | 0                         | 0                         | 0                         | 0                         | 0                        | 0                       | $-\frac{\sqrt{7}i}{10}$ | 0                        | 0                        | 0                         | 0                       | 0                       | 0                     |
|     |                               | 0                                       | 0                         | 0                         | 0                         | $\frac{\sqrt{42}i}{28}$   | 0                        | 0                       | 0                       | 0                        | 0                        | $-\frac{\sqrt{105}i}{70}$ | 0                       | 0                       | 0                     |
|     |                               | 0                                       | 0                         | 0                         | 0                         | 0                         | $-\frac{\sqrt{42}i}{28}$ | 0                       | 0                       | 0                        | 0                        | 0                         | $-\frac{\sqrt{7}i}{70}$ | 0                       | 0                     |
|     |                               | 0                                       | 0                         | 0                         | 0                         | 0                         | 0                        | 0                       | 0                       | 0                        | 0                        | 0                         | 0                       | $\frac{\sqrt{2}i}{10}$  | 0                     |
|     |                               | 0                                       | 0                         | 0                         | 0                         | 0                         | 0                        | $-\frac{\sqrt{2}i}{10}$ | 0                       | 0                        | 0                        | 0                         | 0                       | 0                       | 0                     |
|     |                               | $-\frac{\sqrt{42}i}{28}$                | 0                         | 0                         | 0                         | 0                         | 0                        | 0                       | $\frac{\sqrt{7}i}{70}$  | 0                        | 0                        | 0                         | 0                       | 0                       | 0                     |
|     |                               | 0                                       | $\frac{\sqrt{42}i}{28}$   | 0                         | 0                         | 0                         | 0                        | 0                       | 0                       | $\frac{\sqrt{105}i}{70}$ | 0                        | 0                         | 0                       | 0                       | 0                     |
| 560 | symmetry                      | $\frac{\sqrt{105}xyz(x^2+y^2-2z^2)}{2}$ |                           |                           |                           |                           |                          |                         |                         |                          |                          |                           |                         |                         |                       |

continued ...



Table 9

| No. | multipole                         | matrix   |                          |                          |                          |                          |                          |                           |                            |                             |                           |                            |                            |                            |                           |
|-----|-----------------------------------|--|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------|----------------------------|-----------------------------|---------------------------|----------------------------|----------------------------|----------------------------|---------------------------|
|     | $\mathbb{Q}_{5,1}^{(a)}(E)$       | 0  | 0                        | 0                        | 0                        | 0                        | 0                        | $-\frac{\sqrt{3}i}{60}$   | 0                          | 0                           | 0                         | $\frac{\sqrt{105}i}{60}$   | 0                          | 0                          | 0                         |
|     |                                   | 0  | 0                        | 0                        | 0                        | 0                        | 0                        | 0                         | $\frac{\sqrt{7}i}{20}$     | 0                           | 0                         | 0                          | $-\frac{\sqrt{21}i}{20}$   | 0                          | 0                         |
|     |                                   | 0  | 0                        | 0                        | 0                        | 0                        | 0                        | 0                         | 0                          | $-\frac{\sqrt{21}i}{20}$    | 0                         | 0                          | 0                          | $\frac{\sqrt{7}i}{20}$     | 0                         |
|     |                                   | 0  | 0                        | 0                        | 0                        | 0                        | 0                        | 0                         | 0                          | 0                           | $\frac{\sqrt{105}i}{60}$  | 0                          | 0                          | 0                          | $-\frac{\sqrt{3}i}{60}$   |
|     |                                   | 0  | 0                        | $-\frac{\sqrt{7}i}{28}$  | 0                        | 0                        | 0                        | 0                         | 0                          | 0                           | $\frac{\sqrt{21}i}{42}$   | 0                          | 0                          | 0                          | 0                         |
|     |                                   | 0  | 0                        | 0                        | $\frac{\sqrt{35}i}{28}$  | 0                        | 0                        | $\frac{\sqrt{3}i}{30}$    | 0                          | 0                           | 0                         | $-\frac{\sqrt{105}i}{105}$ | 0                          | 0                          | 0                         |
|     |                                   | $\frac{\sqrt{7}i}{28}$                                     | 0                        | 0                        | 0                        | $-\frac{\sqrt{35}i}{28}$ | 0                        | 0                         | $-\frac{2\sqrt{42}i}{105}$ | 0                           | 0                         | 0                          | $-\frac{\sqrt{14}i}{70}$   | 0                          | 0                         |
|     |                                   | 0  | $-\frac{\sqrt{35}i}{28}$ | 0                        | 0                        | 0                        | $\frac{\sqrt{7}i}{28}$   | 0                         | 0                          | $\frac{\sqrt{14}i}{70}$     | 0                         | 0                          | 0                          | $\frac{2\sqrt{42}i}{105}$  | 0                         |
|     |                                   | 0  | 0                        | $\frac{\sqrt{35}i}{28}$  | 0                        | 0                        | 0                        | 0                         | 0                          | 0                           | $\frac{\sqrt{105}i}{105}$ | 0                          | 0                          | 0                          | $-\frac{\sqrt{3}i}{30}$   |
|     |                                   | 0  | 0                        | 0                        | $-\frac{\sqrt{7}i}{28}$  | 0                        | 0                        | 0                         | 0                          | 0                           | 0                         | $-\frac{\sqrt{21}i}{42}$   | 0                          | 0                          | 0                         |
| 561 | symmetry                          | $\frac{x(8x^4-40x^2y^2-40x^2z^2+15y^4+30y^2z^2+15z^4)}{8}$ |                          |                          |                          |                          |                          |                           |                            |                             |                           |                            |                            |                            |                           |
|     | $\mathbb{Q}_{5,0}^{(a)}(T_{1,1})$ | 0  | 0                        | 0                        | 0                        | 0                        | 0                        | 0                         | $-\frac{\sqrt{5}}{80}$     | 0                           | $\frac{1}{16}$            | 0                          | $-\frac{7\sqrt{15}}{240}$  | 0                          | $\frac{3\sqrt{35}}{80}$   |
|     |                                   | 0  | 0                        | 0                        | 0                        | 0                        | 0                        | $-\frac{\sqrt{105}}{240}$ | 0                          | $\frac{3\sqrt{5}}{80}$      | 0                         | $-\frac{\sqrt{3}}{16}$     | 0                          | $\frac{7\sqrt{15}}{240}$   | 0                         |
|     |                                   | 0  | 0                        | 0                        | 0                        | 0                        | 0                        | 0                         | $\frac{7\sqrt{15}}{240}$   | 0                           | $-\frac{\sqrt{3}}{16}$    | 0                          | $\frac{3\sqrt{5}}{80}$     | 0                          | $-\frac{\sqrt{105}}{240}$ |
|     |                                   | 0  | 0                        | 0                        | 0                        | 0                        | 0                        | $\frac{3\sqrt{35}}{80}$   | 0                          | $-\frac{7\sqrt{15}}{240}$   | 0                         | $\frac{1}{16}$             | 0                          | $-\frac{\sqrt{5}}{80}$     | 0                         |
|     |                                   | 0  | $-\frac{\sqrt{30}}{224}$ | 0                        | $\frac{\sqrt{15}}{48}$   | 0                        | $-\frac{3\sqrt{6}}{32}$  | $-\frac{\sqrt{7}}{224}$   | 0                          | $\frac{5\sqrt{3}}{224}$     | 0                         | $-\frac{\sqrt{5}}{32}$     | 0                          | $\frac{3}{32}$             | 0                         |
|     |                                   | $-\frac{\sqrt{30}}{224}$                                   | 0                        | $\frac{5\sqrt{3}}{112}$  | 0                        | $-\frac{5\sqrt{6}}{96}$  | 0                        | 0                         | $\frac{23\sqrt{5}}{1120}$  | 0                           | $-\frac{13}{224}$         | 0                          | $\frac{\sqrt{15}}{160}$    | 0                          | $\frac{3\sqrt{35}}{160}$  |
|     |                                   | 0  | $\frac{5\sqrt{3}}{112}$  | 0                        | $-\frac{5\sqrt{6}}{112}$ | 0                        | $\frac{\sqrt{15}}{48}$   | $\frac{\sqrt{70}}{160}$   | 0                          | $-\frac{11\sqrt{30}}{1120}$ | 0                         | $\frac{\sqrt{2}}{224}$     | 0                          | $\frac{3\sqrt{10}}{160}$   | 0                         |
|     |                                   | $\frac{\sqrt{15}}{48}$                                     | 0                        | $-\frac{5\sqrt{6}}{112}$ | 0                        | $\frac{5\sqrt{3}}{112}$  | 0                        | 0                         | $-\frac{3\sqrt{10}}{160}$  | 0                           | $-\frac{\sqrt{2}}{224}$   | 0                          | $\frac{11\sqrt{30}}{1120}$ | 0                          | $-\frac{\sqrt{70}}{160}$  |
|     |                                   | 0  | $-\frac{5\sqrt{6}}{96}$  | 0                        | $\frac{5\sqrt{3}}{112}$  | 0                        | $-\frac{\sqrt{30}}{224}$ | $-\frac{3\sqrt{35}}{160}$ | 0                          | $-\frac{\sqrt{15}}{160}$    | 0                         | $\frac{13}{224}$           | 0                          | $-\frac{23\sqrt{5}}{1120}$ | 0                         |
|     |                                   | $-\frac{3\sqrt{6}}{32}$                                    | 0                        | $\frac{\sqrt{15}}{48}$   | 0                        | $-\frac{\sqrt{30}}{224}$ | 0                        | 0                         | $-\frac{3}{32}$            | 0                           | $\frac{\sqrt{5}}{32}$     | 0                          | $-\frac{5\sqrt{3}}{224}$   | 0                          | $\frac{\sqrt{7}}{224}$    |
| 562 | symmetry                          | $\frac{y(15x^4-40x^2y^2+30x^2z^2+8y^4-40y^2z^2+15z^4)}{8}$ |                          |                          |                          |                          |                          |                           |                            |                             |                           |                            |                            |                            |                           |

continued ...

Table 9

| No. | multipole                        | matrix  |                          |                           |                          |                           |                          |                            |                            |                              |                          |                          |                              |                            |                            |
|-----|----------------------------------|---|--------------------------|---------------------------|--------------------------|---------------------------|--------------------------|----------------------------|----------------------------|------------------------------|--------------------------|--------------------------|------------------------------|----------------------------|----------------------------|
|     | $\mathbb{Q}_{5,1}^{(a)}(T_1, 1)$ | 0   | 0                        | 0                         | 0                        | 0                         | 0                        | 0                          | $-\frac{\sqrt{5}i}{80}$    | 0                            | $-\frac{i}{16}$          | 0                        | $-\frac{7\sqrt{15}i}{240}$   | 0                          | $-\frac{3\sqrt{35}i}{80}$  |
|     |                                  | 0   | 0                        | 0                         | 0                        | 0                         | 0                        | $\frac{\sqrt{105}i}{240}$  | 0                          | $\frac{3\sqrt{5}i}{80}$      | 0                        | $\frac{\sqrt{3}i}{16}$   | 0                            | $\frac{7\sqrt{15}i}{240}$  | 0                          |
|     |                                  | 0   | 0                        | 0                         | 0                        | 0                         | 0                        | 0                          | $-\frac{7\sqrt{15}i}{240}$ | 0                            | $-\frac{\sqrt{3}i}{16}$  | 0                        | $-\frac{3\sqrt{5}i}{80}$     | 0                          | $-\frac{\sqrt{105}i}{240}$ |
|     |                                  | 0   | 0                        | 0                         | 0                        | 0                         | 0                        | $\frac{3\sqrt{35}i}{80}$   | 0                          | $\frac{7\sqrt{15}i}{240}$    | 0                        | $\frac{i}{16}$           | 0                            | $\frac{\sqrt{5}i}{80}$     | 0                          |
|     |                                  | 0   | $\frac{\sqrt{30}i}{224}$ | 0                         | $\frac{\sqrt{15}i}{48}$  | 0                         | $\frac{3\sqrt{6}i}{32}$  | $-\frac{\sqrt{7}i}{224}$   | 0                          | $-\frac{5\sqrt{3}i}{224}$    | 0                        | $-\frac{\sqrt{5}i}{32}$  | 0                            | $-\frac{3i}{32}$           | 0                          |
|     |                                  | $-\frac{\sqrt{30}i}{224}$   | 0                        | $-\frac{5\sqrt{3}i}{112}$ | 0                        | $-\frac{5\sqrt{6}i}{96}$  | 0                        | 0                          | $\frac{23\sqrt{5}i}{1120}$ | 0                            | $\frac{13i}{224}$        | 0                        | $\frac{\sqrt{15}i}{160}$     | 0                          | $-\frac{3\sqrt{35}i}{160}$ |
|     |                                  | 0   | $\frac{5\sqrt{3}i}{112}$ | 0                         | $\frac{5\sqrt{6}i}{112}$ | 0                         | $\frac{\sqrt{15}i}{48}$  | $-\frac{\sqrt{70}i}{160}$  | 0                          | $-\frac{11\sqrt{30}i}{1120}$ | 0                        | $-\frac{\sqrt{2}i}{224}$ | 0                            | $\frac{3\sqrt{10}i}{160}$  | 0                          |
|     |                                  | $-\frac{\sqrt{15}i}{48}$  | 0                        | $-\frac{5\sqrt{6}i}{112}$ | 0                        | $-\frac{5\sqrt{3}i}{112}$ | 0                        | 0                          | $\frac{3\sqrt{10}i}{160}$  | 0                            | $-\frac{\sqrt{2}i}{224}$ | 0                        | $-\frac{11\sqrt{30}i}{1120}$ | 0                          | $-\frac{\sqrt{70}i}{160}$  |
|     |                                  | 0   | $\frac{5\sqrt{6}i}{96}$  | 0                         | $\frac{5\sqrt{3}i}{112}$ | 0                         | $\frac{\sqrt{30}i}{224}$ | $-\frac{3\sqrt{35}i}{160}$ | 0                          | $\frac{\sqrt{15}i}{160}$     | 0                        | $\frac{13i}{224}$        | 0                            | $\frac{23\sqrt{5}i}{1120}$ | 0                          |
|     |                                  | $-\frac{3\sqrt{6}i}{32}$  | 0                        | $-\frac{\sqrt{15}i}{48}$  | 0                        | $-\frac{\sqrt{30}i}{224}$ | 0                        | 0                          | $-\frac{3i}{32}$           | 0                            | $-\frac{\sqrt{5}i}{32}$  | 0                        | $-\frac{5\sqrt{3}i}{224}$    | 0                          | $-\frac{\sqrt{7}i}{224}$   |
| 563 | symmetry                         | $\frac{z(15x^4+30x^2y^2-40x^2z^2+15y^4-40y^2z^2+8z^4)}{8}$  |                          |                           |                          |                           |                          |                            |                            |                              |                          |                          |                              |                            |                            |
|     | $\mathbb{Q}_{5,2}^{(a)}(T_1, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}}{30} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}}{30} & 0 & 0 \\ -\frac{\sqrt{6}}{84} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{14} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{5\sqrt{6}}{84} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{15}}{70} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{5\sqrt{6}}{42} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{14} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{5\sqrt{6}}{42} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{14} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{5\sqrt{6}}{84} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{15}}{70} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{84} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{14} & 0 \end{bmatrix}$ |                          |                           |                          |                           |                          |                            |                            |                              |                          |                          |                              |                            |                            |
| 564 | symmetry                         | $\frac{3\sqrt{35}x(y^2-2yz-z^2)(y^2+2yz-z^2)}{8}$   |                          |                           |                          |                           |                          |                            |                            |                              |                          |                          |                              |                            |                            |

continued ...

Table 9

| No. | multipole                        | matrix  |                             |                            |                            |                            |                            |                          |                              |                              |                             |                             |                              |                              |                          |
|-----|----------------------------------|---|-----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|--------------------------|------------------------------|------------------------------|-----------------------------|-----------------------------|------------------------------|------------------------------|--------------------------|
|     | $\mathbb{Q}_{5,0}^{(a)}(T_1, 2)$ | 0   | 0                           | 0                          | 0                          | 0                          | 0                          | 0                        | $-\frac{\sqrt{7}}{80}$       | 0                            | $\frac{\sqrt{35}}{80}$      | 0                           | $\frac{3\sqrt{21}}{80}$      | 0                            | $\frac{1}{16}$           |
|     |                                  | 0   | 0                           | 0                          | 0                          | 0                          | 0                          | $\frac{3\sqrt{3}}{80}$   | 0                            | $\frac{3\sqrt{7}}{80}$       | 0                           | $-\frac{\sqrt{105}}{80}$    | 0                            | $-\frac{3\sqrt{21}}{80}$     | 0                        |
|     |                                  | 0   | 0                           | 0                          | 0                          | 0                          | 0                          | 0                        | $-\frac{3\sqrt{21}}{80}$     | 0                            | $-\frac{\sqrt{105}}{80}$    | 0                           | $\frac{3\sqrt{7}}{80}$       | 0                            | $\frac{3\sqrt{3}}{80}$   |
|     |                                  | 0   | 0                           | 0                          | 0                          | 0                          | 0                          | $\frac{1}{16}$           | 0                            | $\frac{3\sqrt{21}}{80}$      | 0                           | $\frac{\sqrt{35}}{80}$      | 0                            | $-\frac{\sqrt{7}}{80}$       | 0                        |
|     |                                  | 0   | $-\frac{\sqrt{42}}{224}$    | 0                          | $-\frac{3\sqrt{21}}{112}$  | 0                          | $-\frac{\sqrt{210}}{224}$  | $-\frac{\sqrt{5}}{160}$  | 0                            | $\frac{\sqrt{105}}{224}$     | 0                           | $\frac{9\sqrt{7}}{224}$     | 0                            | $\frac{\sqrt{35}}{224}$      | 0                        |
|     |                                  | $-\frac{\sqrt{42}}{224}$  | 0                           | $\frac{\sqrt{105}}{112}$   | 0                          | $\frac{3\sqrt{210}}{224}$  | 0                          | 0                        | $\frac{23\sqrt{7}}{1120}$    | 0                            | $-\frac{13\sqrt{35}}{1120}$ | 0                           | $-\frac{9\sqrt{21}}{1120}$   | 0                            | $\frac{1}{32}$           |
|     |                                  | 0   | $\frac{\sqrt{105}}{112}$    | 0                          | $-\frac{\sqrt{210}}{112}$  | 0                          | $-\frac{3\sqrt{21}}{112}$  | $-\frac{9\sqrt{2}}{160}$ | 0                            | $-\frac{11\sqrt{42}}{1120}$  | 0                           | $\frac{\sqrt{70}}{1120}$    | 0                            | $-\frac{27\sqrt{14}}{1120}$  | 0                        |
|     |                                  | $-\frac{3\sqrt{21}}{112}$   | 0                           | $-\frac{\sqrt{210}}{112}$  | 0                          | $\frac{\sqrt{105}}{112}$   | 0                          | 0                        | $\frac{27\sqrt{14}}{1120}$   | 0                            | $-\frac{\sqrt{70}}{1120}$   | 0                           | $\frac{11\sqrt{42}}{1120}$   | 0                            | $\frac{9\sqrt{2}}{160}$  |
|     |                                  | 0   | $\frac{3\sqrt{210}}{224}$   | 0                          | $\frac{\sqrt{105}}{112}$   | 0                          | $-\frac{\sqrt{42}}{224}$   | $-\frac{1}{32}$          | 0                            | $\frac{9\sqrt{21}}{1120}$    | 0                           | $\frac{13\sqrt{35}}{1120}$  | 0                            | $-\frac{23\sqrt{7}}{1120}$   | 0                        |
|     |                                  | $-\frac{\sqrt{210}}{224}$   | 0                           | $-\frac{3\sqrt{21}}{112}$  | 0                          | $-\frac{\sqrt{42}}{224}$   | 0                          | 0                        | $-\frac{\sqrt{35}}{224}$     | 0                            | $-\frac{9\sqrt{7}}{224}$    | 0                           | $-\frac{\sqrt{105}}{224}$    | 0                            | $\frac{\sqrt{5}}{160}$   |
| 565 | symmetry                         | $\frac{3\sqrt{35}y\left(x^2-2xz-z^2\right)\left(x^2+2xz-z^2\right)}{8}$ |                             |                            |                            |                            |                            |                          |                              |                              |                             |                             |                              |                              |                          |
|     | $\mathbb{Q}_{5,1}^{(a)}(T_1, 2)$ | 0   | 0                           | 0                          | 0                          | 0                          | 0                          | 0                        | $-\frac{\sqrt{7}i}{80}$      | 0                            | $-\frac{\sqrt{35}i}{80}$    | 0                           | $\frac{3\sqrt{21}i}{80}$     | 0                            | $-\frac{i}{16}$          |
|     |                                  | 0   | 0                           | 0                          | 0                          | 0                          | 0                          | $-\frac{3\sqrt{3}i}{80}$ | 0                            | $\frac{3\sqrt{7}i}{80}$      | 0                           | $\frac{\sqrt{105}i}{80}$    | 0                            | $-\frac{3\sqrt{21}i}{80}$    | 0                        |
|     |                                  | 0   | 0                           | 0                          | 0                          | 0                          | 0                          | 0                        | $\frac{3\sqrt{21}i}{80}$     | 0                            | $-\frac{\sqrt{105}i}{80}$   | 0                           | $-\frac{3\sqrt{7}i}{80}$     | 0                            | $\frac{3\sqrt{3}i}{80}$  |
|     |                                  | 0   | 0                           | 0                          | 0                          | 0                          | 0                          | $\frac{i}{16}$           | 0                            | $-\frac{3\sqrt{21}i}{80}$    | 0                           | $\frac{\sqrt{35}i}{80}$     | 0                            | $\frac{\sqrt{7}i}{80}$       | 0                        |
|     |                                  | 0   | $\frac{\sqrt{42}i}{224}$    | 0                          | $-\frac{3\sqrt{21}i}{112}$ | 0                          | $\frac{\sqrt{210}i}{224}$  | $-\frac{\sqrt{5}i}{160}$ | 0                            | $-\frac{\sqrt{105}i}{224}$   | 0                           | $\frac{9\sqrt{7}i}{224}$    | 0                            | $-\frac{\sqrt{35}i}{224}$    | 0                        |
|     |                                  | $-\frac{\sqrt{42}i}{224}$   | 0                           | $-\frac{\sqrt{105}i}{112}$ | 0                          | $\frac{3\sqrt{210}i}{224}$ | 0                          | 0                        | $\frac{23\sqrt{7}i}{1120}$   | 0                            | $\frac{13\sqrt{35}i}{1120}$ | 0                           | $-\frac{9\sqrt{21}i}{1120}$  | 0                            | $-\frac{i}{32}$          |
|     |                                  | 0   | $\frac{\sqrt{105}i}{112}$   | 0                          | $\frac{\sqrt{210}i}{112}$  | 0                          | $-\frac{3\sqrt{21}i}{112}$ | $\frac{9\sqrt{2}i}{160}$ | 0                            | $-\frac{11\sqrt{42}i}{1120}$ | 0                           | $-\frac{\sqrt{70}i}{1120}$  | 0                            | $-\frac{27\sqrt{14}i}{1120}$ | 0                        |
|     |                                  | $\frac{3\sqrt{21}i}{112}$   | 0                           | $-\frac{\sqrt{210}i}{112}$ | 0                          | $-\frac{\sqrt{105}i}{112}$ | 0                          | 0                        | $-\frac{27\sqrt{14}i}{1120}$ | 0                            | $-\frac{\sqrt{70}i}{1120}$  | 0                           | $-\frac{11\sqrt{42}i}{1120}$ | 0                            | $\frac{9\sqrt{2}i}{160}$ |
|     |                                  | 0   | $-\frac{3\sqrt{210}i}{224}$ | 0                          | $\frac{\sqrt{105}i}{112}$  | 0                          | $\frac{\sqrt{42}i}{224}$   | $-\frac{i}{32}$          | 0                            | $-\frac{9\sqrt{21}i}{1120}$  | 0                           | $\frac{13\sqrt{35}i}{1120}$ | 0                            | $\frac{23\sqrt{7}i}{1120}$   | 0                        |
|     |                                  | $-\frac{\sqrt{210}i}{224}$  | 0                           | $\frac{3\sqrt{21}i}{112}$  | 0                          | $-\frac{\sqrt{42}i}{224}$  | 0                          | 0                        | $-\frac{\sqrt{35}i}{224}$    | 0                            | $\frac{9\sqrt{7}i}{224}$    | 0                           | $-\frac{\sqrt{105}i}{224}$   | 0                            | $-\frac{\sqrt{5}i}{160}$ |
| 566 | symmetry                         | $\frac{3\sqrt{35}z\left(x^2-2xy-y^2\right)\left(x^2+2xy-y^2\right)}{8}$ |                             |                            |                            |                            |                            |                          |                              |                              |                             |                             |                              |                              |                          |

continued ...

Table 9

| No.                      | multipole                        | matrix  |                         |                          |                          |                          |                            |                            |                              |                             |                           |                             |                         |                        |  |  |   |   |   |   |   |   |   |                          |   |                          |   |                        |   |                       |   |   |   |   |   |   |                 |   |                        |   |                         |   |                       |   |   |                        |   |   |   |   |   |                       |   |                         |   |                        |   |                 |   |   |   |   |   |   |                       |   |                        |   |                          |                        |                          |   |   |                          |   |                       |   |                          |                          |   |                         |                         |                          |   |                           |   |                          |   |                         |   |                          |   |   |                            |   |                              |   |                         |   |                        |   |                        |   |                         |                       |                       |                       |   |                            |   |                           |   |                          |   |                       |   |                         |   |                        |   |                        |                           |   |                            |   |                           |   |                        |                        |                          |   |                        |   |                          |                       |   |                          |   |                             |   |                             |   |                          |   |                       |   |                          |   |   |                          |   |                         |                        |                          |   |                         |   |   |   |   |                         |   |   |   |   |   |
|--------------------------|----------------------------------|---|-------------------------|--------------------------|--------------------------|--------------------------|----------------------------|----------------------------|------------------------------|-----------------------------|---------------------------|-----------------------------|-------------------------|------------------------|--|--|---|---|---|---|---|---|---|--------------------------|---|--------------------------|---|------------------------|---|-----------------------|---|---|---|---|---|---|-----------------|---|------------------------|---|-------------------------|---|-----------------------|---|---|------------------------|---|---|---|---|---|-----------------------|---|-------------------------|---|------------------------|---|-----------------|---|---|---|---|---|---|-----------------------|---|------------------------|---|--------------------------|------------------------|--------------------------|---|---|--------------------------|---|-----------------------|---|--------------------------|--------------------------|---|-------------------------|-------------------------|--------------------------|---|---------------------------|---|--------------------------|---|-------------------------|---|--------------------------|---|---|----------------------------|---|------------------------------|---|-------------------------|---|------------------------|---|------------------------|---|-------------------------|-----------------------|-----------------------|-----------------------|---|----------------------------|---|---------------------------|---|--------------------------|---|-----------------------|---|-------------------------|---|------------------------|---|------------------------|---------------------------|---|----------------------------|---|---------------------------|---|------------------------|------------------------|--------------------------|---|------------------------|---|--------------------------|-----------------------|---|--------------------------|---|-----------------------------|---|-----------------------------|---|--------------------------|---|-----------------------|---|--------------------------|---|---|--------------------------|---|-------------------------|------------------------|--------------------------|---|-------------------------|---|---|---|---|-------------------------|---|---|---|---|---|
|                          | $\mathbb{Q}_{5,2}^{(a)}(T_1, 2)$ | <table><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td><math>\frac{\sqrt{7}}{10}</math></td><td>0</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td><math>-\frac{\sqrt{3}}{10}</math></td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td><math>\frac{\sqrt{3}}{10}</math></td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td><math>-\frac{\sqrt{7}}{10}</math></td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td><math>-\frac{\sqrt{42}}{28}</math></td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td><math>\frac{\sqrt{105}}{70}</math></td><td>0</td><td>0</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td><math>\frac{\sqrt{42}}{28}</math></td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td><math>\frac{\sqrt{7}}{70}</math></td><td>0</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td><math>-\frac{\sqrt{2}}{10}</math></td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td><math>-\frac{\sqrt{2}}{10}</math></td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td><math>-\frac{\sqrt{42}}{28}</math></td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td><math>\frac{\sqrt{7}}{70}</math></td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td><math>\frac{\sqrt{42}}{28}</math></td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td><math>\frac{\sqrt{105}}{70}</math></td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr></table>   |                         |                          |                          |                          |                            |                            |                              |                             |                           |                             |                         |                        |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0                        | 0 | 0                        | 0 | 0                      | 0 | $\frac{\sqrt{7}}{10}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0               | 0 | 0                      | 0 | 0                       | 0 | 0                     | 0 | 0 | $-\frac{\sqrt{3}}{10}$ | 0 | 0 | 0 | 0 | 0 | 0                     | 0 | $\frac{\sqrt{3}}{10}$   | 0 | 0                      | 0 | 0               | 0 | 0 | 0 | 0 | 0 | 0 | 0                     | 0 | 0                      | 0 | 0                        | $-\frac{\sqrt{7}}{10}$ | 0                        | 0 | 0 | 0                        | 0 | 0                     | 0 | 0                        | 0                        | 0 | 0                       | $-\frac{\sqrt{42}}{28}$ | 0                        | 0 | 0                         | 0 | 0                        | 0 | $\frac{\sqrt{105}}{70}$ | 0 | 0                        | 0 | 0 | 0                          | 0 | 0                            | 0 | $\frac{\sqrt{42}}{28}$  | 0 | 0                      | 0 | 0                      | 0 | 0                       | $\frac{\sqrt{7}}{70}$ | 0                     | 0                     | 0 | 0                          | 0 | 0                         | 0 | 0                        | 0 | 0                     | 0 | 0                       | 0 | 0                      | 0 | $-\frac{\sqrt{2}}{10}$ | 0                         | 0 | 0                          | 0 | 0                         | 0 | 0                      | $-\frac{\sqrt{2}}{10}$ | 0                        | 0 | 0                      | 0 | 0                        | 0                     | 0 | $-\frac{\sqrt{42}}{28}$  | 0 | 0                           | 0 | 0                           | 0 | 0                        | 0 | $\frac{\sqrt{7}}{70}$ | 0 | 0                        | 0 | 0 | 0                        | 0 | 0                       | $\frac{\sqrt{42}}{28}$ | 0                        | 0 | 0                       | 0 | 0 | 0 | 0 | $\frac{\sqrt{105}}{70}$ | 0 | 0 | 0 | 0 | 0 |
| 0                        | 0                                | 0   | 0                       | 0                        | 0                        | 0                        | 0                          | 0                          | 0                            | 0                           | 0                         | 0                           | $\frac{\sqrt{7}}{10}$   | 0                      |  |  |   |   |   |   |   |   |   |                          |   |                          |   |                        |   |                       |   |   |   |   |   |   |                 |   |                        |   |                         |   |                       |   |   |                        |   |   |   |   |   |                       |   |                         |   |                        |   |                 |   |   |   |   |   |   |                       |   |                        |   |                          |                        |                          |   |   |                          |   |                       |   |                          |                          |   |                         |                         |                          |   |                           |   |                          |   |                         |   |                          |   |   |                            |   |                              |   |                         |   |                        |   |                        |   |                         |                       |                       |                       |   |                            |   |                           |   |                          |   |                       |   |                         |   |                        |   |                        |                           |   |                            |   |                           |   |                        |                        |                          |   |                        |   |                          |                       |   |                          |   |                             |   |                             |   |                          |   |                       |   |                          |   |   |                          |   |                         |                        |                          |   |                         |   |   |   |   |                         |   |   |   |   |   |
| 0                        | 0                                | 0   | 0                       | 0                        | 0                        | 0                        | 0                          | 0                          | 0                            | 0                           | 0                         | 0                           | 0                       | $-\frac{\sqrt{3}}{10}$ |  |  |   |   |   |   |   |   |   |                          |   |                          |   |                        |   |                       |   |   |   |   |   |   |                 |   |                        |   |                         |   |                       |   |   |                        |   |   |   |   |   |                       |   |                         |   |                        |   |                 |   |   |   |   |   |   |                       |   |                        |   |                          |                        |                          |   |   |                          |   |                       |   |                          |                          |   |                         |                         |                          |   |                           |   |                          |   |                         |   |                          |   |   |                            |   |                              |   |                         |   |                        |   |                        |   |                         |                       |                       |                       |   |                            |   |                           |   |                          |   |                       |   |                         |   |                        |   |                        |                           |   |                            |   |                           |   |                        |                        |                          |   |                        |   |                          |                       |   |                          |   |                             |   |                             |   |                          |   |                       |   |                          |   |   |                          |   |                         |                        |                          |   |                         |   |   |   |   |                         |   |   |   |   |   |
| 0                        | 0                                | 0   | 0                       | 0                        | 0                        | 0                        | $\frac{\sqrt{3}}{10}$      | 0                          | 0                            | 0                           | 0                         | 0                           | 0                       | 0                      |  |  |   |   |   |   |   |   |   |                          |   |                          |   |                        |   |                       |   |   |   |   |   |   |                 |   |                        |   |                         |   |                       |   |   |                        |   |   |   |   |   |                       |   |                         |   |                        |   |                 |   |   |   |   |   |   |                       |   |                        |   |                          |                        |                          |   |   |                          |   |                       |   |                          |                          |   |                         |                         |                          |   |                           |   |                          |   |                         |   |                          |   |   |                            |   |                              |   |                         |   |                        |   |                        |   |                         |                       |                       |                       |   |                            |   |                           |   |                          |   |                       |   |                         |   |                        |   |                        |                           |   |                            |   |                           |   |                        |                        |                          |   |                        |   |                          |                       |   |                          |   |                             |   |                             |   |                          |   |                       |   |                          |   |   |                          |   |                         |                        |                          |   |                         |   |   |   |   |                         |   |   |   |   |   |
| 0                        | 0                                | 0   | 0                       | 0                        | 0                        | 0                        | 0                          | $-\frac{\sqrt{7}}{10}$     | 0                            | 0                           | 0                         | 0                           | 0                       | 0                      |  |  |   |   |   |   |   |   |   |                          |   |                          |   |                        |   |                       |   |   |   |   |   |   |                 |   |                        |   |                         |   |                       |   |   |                        |   |   |   |   |   |                       |   |                         |   |                        |   |                 |   |   |   |   |   |   |                       |   |                        |   |                          |                        |                          |   |   |                          |   |                       |   |                          |                          |   |                         |                         |                          |   |                           |   |                          |   |                         |   |                          |   |   |                            |   |                              |   |                         |   |                        |   |                        |   |                         |                       |                       |                       |   |                            |   |                           |   |                          |   |                       |   |                         |   |                        |   |                        |                           |   |                            |   |                           |   |                        |                        |                          |   |                        |   |                          |                       |   |                          |   |                             |   |                             |   |                          |   |                       |   |                          |   |   |                          |   |                         |                        |                          |   |                         |   |   |   |   |                         |   |   |   |   |   |
| 0                        | 0                                | 0   | 0                       | 0                        | $-\frac{\sqrt{42}}{28}$  | 0                        | 0                          | 0                          | 0                            | 0                           | 0                         | $\frac{\sqrt{105}}{70}$     | 0                       | 0                      |  |  |   |   |   |   |   |   |   |                          |   |                          |   |                        |   |                       |   |   |   |   |   |   |                 |   |                        |   |                         |   |                       |   |   |                        |   |   |   |   |   |                       |   |                         |   |                        |   |                 |   |   |   |   |   |   |                       |   |                        |   |                          |                        |                          |   |   |                          |   |                       |   |                          |                          |   |                         |                         |                          |   |                           |   |                          |   |                         |   |                          |   |   |                            |   |                              |   |                         |   |                        |   |                        |   |                         |                       |                       |                       |   |                            |   |                           |   |                          |   |                       |   |                         |   |                        |   |                        |                           |   |                            |   |                           |   |                        |                        |                          |   |                        |   |                          |                       |   |                          |   |                             |   |                             |   |                          |   |                       |   |                          |   |   |                          |   |                         |                        |                          |   |                         |   |   |   |   |                         |   |   |   |   |   |
| 0                        | 0                                | 0   | 0                       | 0                        | 0                        | $\frac{\sqrt{42}}{28}$   | 0                          | 0                          | 0                            | 0                           | 0                         | 0                           | $\frac{\sqrt{7}}{70}$   | 0                      |  |  |   |   |   |   |   |   |   |                          |   |                          |   |                        |   |                       |   |   |   |   |   |   |                 |   |                        |   |                         |   |                       |   |   |                        |   |   |   |   |   |                       |   |                         |   |                        |   |                 |   |   |   |   |   |   |                       |   |                        |   |                          |                        |                          |   |   |                          |   |                       |   |                          |                          |   |                         |                         |                          |   |                           |   |                          |   |                         |   |                          |   |   |                            |   |                              |   |                         |   |                        |   |                        |   |                         |                       |                       |                       |   |                            |   |                           |   |                          |   |                       |   |                         |   |                        |   |                        |                           |   |                            |   |                           |   |                        |                        |                          |   |                        |   |                          |                       |   |                          |   |                             |   |                             |   |                          |   |                       |   |                          |   |   |                          |   |                         |                        |                          |   |                         |   |   |   |   |                         |   |   |   |   |   |
| 0                        | 0                                | 0   | 0                       | 0                        | 0                        | 0                        | 0                          | 0                          | 0                            | 0                           | 0                         | 0                           | 0                       | $-\frac{\sqrt{2}}{10}$ |  |  |   |   |   |   |   |   |   |                          |   |                          |   |                        |   |                       |   |   |   |   |   |   |                 |   |                        |   |                         |   |                       |   |   |                        |   |   |   |   |   |                       |   |                         |   |                        |   |                 |   |   |   |   |   |   |                       |   |                        |   |                          |                        |                          |   |   |                          |   |                       |   |                          |                          |   |                         |                         |                          |   |                           |   |                          |   |                         |   |                          |   |   |                            |   |                              |   |                         |   |                        |   |                        |   |                         |                       |                       |                       |   |                            |   |                           |   |                          |   |                       |   |                         |   |                        |   |                        |                           |   |                            |   |                           |   |                        |                        |                          |   |                        |   |                          |                       |   |                          |   |                             |   |                             |   |                          |   |                       |   |                          |   |   |                          |   |                         |                        |                          |   |                         |   |   |   |   |                         |   |   |   |   |   |
| 0                        | 0                                | 0   | 0                       | 0                        | 0                        | 0                        | $-\frac{\sqrt{2}}{10}$     | 0                          | 0                            | 0                           | 0                         | 0                           | 0                       | 0                      |  |  |   |   |   |   |   |   |   |                          |   |                          |   |                        |   |                       |   |   |   |   |   |   |                 |   |                        |   |                         |   |                       |   |   |                        |   |   |   |   |   |                       |   |                         |   |                        |   |                 |   |   |   |   |   |   |                       |   |                        |   |                          |                        |                          |   |   |                          |   |                       |   |                          |                          |   |                         |                         |                          |   |                           |   |                          |   |                         |   |                          |   |   |                            |   |                              |   |                         |   |                        |   |                        |   |                         |                       |                       |                       |   |                            |   |                           |   |                          |   |                       |   |                         |   |                        |   |                        |                           |   |                            |   |                           |   |                        |                        |                          |   |                        |   |                          |                       |   |                          |   |                             |   |                             |   |                          |   |                       |   |                          |   |   |                          |   |                         |                        |                          |   |                         |   |   |   |   |                         |   |   |   |   |   |
| $-\frac{\sqrt{42}}{28}$  | 0                                | 0   | 0                       | 0                        | 0                        | 0                        | 0                          | $\frac{\sqrt{7}}{70}$      | 0                            | 0                           | 0                         | 0                           | 0                       | 0                      |  |  |   |   |   |   |   |   |   |                          |   |                          |   |                        |   |                       |   |   |   |   |   |   |                 |   |                        |   |                         |   |                       |   |   |                        |   |   |   |   |   |                       |   |                         |   |                        |   |                 |   |   |   |   |   |   |                       |   |                        |   |                          |                        |                          |   |   |                          |   |                       |   |                          |                          |   |                         |                         |                          |   |                           |   |                          |   |                         |   |                          |   |   |                            |   |                              |   |                         |   |                        |   |                        |   |                         |                       |                       |                       |   |                            |   |                           |   |                          |   |                       |   |                         |   |                        |   |                        |                           |   |                            |   |                           |   |                        |                        |                          |   |                        |   |                          |                       |   |                          |   |                             |   |                             |   |                          |   |                       |   |                          |   |   |                          |   |                         |                        |                          |   |                         |   |   |   |   |                         |   |   |   |   |   |
| 0                        | $\frac{\sqrt{42}}{28}$           | 0   | 0                       | 0                        | 0                        | 0                        | 0                          | 0                          | $\frac{\sqrt{105}}{70}$      | 0                           | 0                         | 0                           | 0                       | 0                      |  |  |   |   |   |   |   |   |   |                          |   |                          |   |                        |   |                       |   |   |   |   |   |   |                 |   |                        |   |                         |   |                       |   |   |                        |   |   |   |   |   |                       |   |                         |   |                        |   |                 |   |   |   |   |   |   |                       |   |                        |   |                          |                        |                          |   |   |                          |   |                       |   |                          |                          |   |                         |                         |                          |   |                           |   |                          |   |                         |   |                          |   |   |                            |   |                              |   |                         |   |                        |   |                        |   |                         |                       |                       |                       |   |                            |   |                           |   |                          |   |                       |   |                         |   |                        |   |                        |                           |   |                            |   |                           |   |                        |                        |                          |   |                        |   |                          |                       |   |                          |   |                             |   |                             |   |                          |   |                       |   |                          |   |   |                          |   |                         |                        |                          |   |                         |   |   |   |   |                         |   |   |   |   |   |
| 567                      | symmetry                         | $\frac{\sqrt{105}x(y-z)(y+z)(2x^2-y^2-z^2)}{4}$ <table><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td><math>-\frac{\sqrt{21}}{120}</math></td><td>0</td><td><math>\frac{\sqrt{105}}{120}</math></td><td>0</td><td><math>-\frac{\sqrt{7}}{40}</math></td><td>0</td><td><math>-\frac{\sqrt{3}}{8}</math></td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td><math>-\frac{1}{40}</math></td><td>0</td><td><math>\frac{\sqrt{21}}{40}</math></td><td>0</td><td><math>-\frac{\sqrt{35}}{40}</math></td><td>0</td><td><math>\frac{\sqrt{7}}{40}</math></td><td>0</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td><math>\frac{\sqrt{7}}{40}</math></td><td>0</td><td><math>-\frac{\sqrt{35}}{40}</math></td><td>0</td><td><math>\frac{\sqrt{21}}{40}</math></td><td>0</td><td><math>-\frac{1}{40}</math></td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td><math>-\frac{\sqrt{3}}{8}</math></td><td>0</td><td><math>-\frac{\sqrt{7}}{40}</math></td><td>0</td><td><math>\frac{\sqrt{105}}{120}</math></td><td>0</td><td><math>-\frac{\sqrt{21}}{120}</math></td><td>0</td></tr><tr><td>0</td><td><math>-\frac{\sqrt{14}}{112}</math></td><td>0</td><td><math>\frac{\sqrt{7}}{56}</math></td><td>0</td><td><math>\frac{3\sqrt{70}}{112}</math></td><td><math>-\frac{\sqrt{15}}{240}</math></td><td>0</td><td><math>\frac{\sqrt{35}}{112}</math></td><td>0</td><td><math>-\frac{\sqrt{21}}{112}</math></td><td>0</td><td><math>-\frac{\sqrt{105}}{112}</math></td><td>0</td></tr><tr><td><math>-\frac{\sqrt{14}}{112}</math></td><td>0</td><td><math>\frac{\sqrt{35}}{56}</math></td><td>0</td><td><math>-\frac{\sqrt{70}}{112}</math></td><td>0</td><td>0</td><td><math>\frac{23\sqrt{21}}{1680}</math></td><td>0</td><td><math>-\frac{13\sqrt{105}}{1680}</math></td><td>0</td><td><math>\frac{3\sqrt{7}}{560}</math></td><td>0</td><td><math>-\frac{\sqrt{3}}{16}</math></td></tr><tr><td>0</td><td><math>\frac{\sqrt{35}}{56}</math></td><td>0</td><td><math>-\frac{\sqrt{70}}{56}</math></td><td>0</td><td><math>\frac{\sqrt{7}}{56}</math></td><td><math>\frac{\sqrt{6}}{80}</math></td><td>0</td><td><math>-\frac{11\sqrt{14}}{560}</math></td><td>0</td><td><math>\frac{\sqrt{210}}{1680}</math></td><td>0</td><td><math>\frac{3\sqrt{42}}{560}</math></td><td>0</td></tr><tr><td><math>\frac{\sqrt{7}}{56}</math></td><td>0</td><td><math>-\frac{\sqrt{70}}{56}</math></td><td>0</td><td><math>\frac{\sqrt{35}}{56}</math></td><td>0</td><td>0</td><td><math>-\frac{3\sqrt{42}}{560}</math></td><td>0</td><td><math>-\frac{\sqrt{210}}{1680}</math></td><td>0</td><td><math>\frac{11\sqrt{14}}{560}</math></td><td>0</td><td><math>-\frac{\sqrt{6}}{80}</math></td></tr><tr><td>0</td><td><math>-\frac{\sqrt{70}}{112}</math></td><td>0</td><td><math>\frac{\sqrt{35}}{56}</math></td><td>0</td><td><math>-\frac{\sqrt{14}}{112}</math></td><td><math>\frac{\sqrt{3}}{16}</math></td><td>0</td><td><math>-\frac{3\sqrt{7}}{560}</math></td><td>0</td><td><math>\frac{13\sqrt{105}}{1680}</math></td><td>0</td><td><math>-\frac{23\sqrt{21}}{1680}</math></td><td>0</td></tr><tr><td><math>\frac{3\sqrt{70}}{112}</math></td><td>0</td><td><math>\frac{\sqrt{7}}{56}</math></td><td>0</td><td><math>-\frac{\sqrt{14}}{112}</math></td><td>0</td><td>0</td><td><math>\frac{\sqrt{105}}{112}</math></td><td>0</td><td><math>\frac{\sqrt{21}}{112}</math></td><td>0</td><td><math>-\frac{\sqrt{35}}{112}</math></td><td>0</td><td><math>\frac{\sqrt{15}}{240}</math></td></tr></table> |                         |                          |                          |                          |                            |                            |                              |                             |                           |                             |                         |                        |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{120}$ | 0 | $\frac{\sqrt{105}}{120}$ | 0 | $-\frac{\sqrt{7}}{40}$ | 0 | $-\frac{\sqrt{3}}{8}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{1}{40}$ | 0 | $\frac{\sqrt{21}}{40}$ | 0 | $-\frac{\sqrt{35}}{40}$ | 0 | $\frac{\sqrt{7}}{40}$ | 0 | 0 | 0                      | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{40}$ | 0 | $-\frac{\sqrt{35}}{40}$ | 0 | $\frac{\sqrt{21}}{40}$ | 0 | $-\frac{1}{40}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{3}}{8}$ | 0 | $-\frac{\sqrt{7}}{40}$ | 0 | $\frac{\sqrt{105}}{120}$ | 0                      | $-\frac{\sqrt{21}}{120}$ | 0 | 0 | $-\frac{\sqrt{14}}{112}$ | 0 | $\frac{\sqrt{7}}{56}$ | 0 | $\frac{3\sqrt{70}}{112}$ | $-\frac{\sqrt{15}}{240}$ | 0 | $\frac{\sqrt{35}}{112}$ | 0                       | $-\frac{\sqrt{21}}{112}$ | 0 | $-\frac{\sqrt{105}}{112}$ | 0 | $-\frac{\sqrt{14}}{112}$ | 0 | $\frac{\sqrt{35}}{56}$  | 0 | $-\frac{\sqrt{70}}{112}$ | 0 | 0 | $\frac{23\sqrt{21}}{1680}$ | 0 | $-\frac{13\sqrt{105}}{1680}$ | 0 | $\frac{3\sqrt{7}}{560}$ | 0 | $-\frac{\sqrt{3}}{16}$ | 0 | $\frac{\sqrt{35}}{56}$ | 0 | $-\frac{\sqrt{70}}{56}$ | 0                     | $\frac{\sqrt{7}}{56}$ | $\frac{\sqrt{6}}{80}$ | 0 | $-\frac{11\sqrt{14}}{560}$ | 0 | $\frac{\sqrt{210}}{1680}$ | 0 | $\frac{3\sqrt{42}}{560}$ | 0 | $\frac{\sqrt{7}}{56}$ | 0 | $-\frac{\sqrt{70}}{56}$ | 0 | $\frac{\sqrt{35}}{56}$ | 0 | 0                      | $-\frac{3\sqrt{42}}{560}$ | 0 | $-\frac{\sqrt{210}}{1680}$ | 0 | $\frac{11\sqrt{14}}{560}$ | 0 | $-\frac{\sqrt{6}}{80}$ | 0                      | $-\frac{\sqrt{70}}{112}$ | 0 | $\frac{\sqrt{35}}{56}$ | 0 | $-\frac{\sqrt{14}}{112}$ | $\frac{\sqrt{3}}{16}$ | 0 | $-\frac{3\sqrt{7}}{560}$ | 0 | $\frac{13\sqrt{105}}{1680}$ | 0 | $-\frac{23\sqrt{21}}{1680}$ | 0 | $\frac{3\sqrt{70}}{112}$ | 0 | $\frac{\sqrt{7}}{56}$ | 0 | $-\frac{\sqrt{14}}{112}$ | 0 | 0 | $\frac{\sqrt{105}}{112}$ | 0 | $\frac{\sqrt{21}}{112}$ | 0                      | $-\frac{\sqrt{35}}{112}$ | 0 | $\frac{\sqrt{15}}{240}$ |   |   |   |   |                         |   |   |   |   |   |
| 0                        | 0                                | 0   | 0                       | 0                        | 0                        | 0                        | $-\frac{\sqrt{21}}{120}$   | 0                          | $\frac{\sqrt{105}}{120}$     | 0                           | $-\frac{\sqrt{7}}{40}$    | 0                           | $-\frac{\sqrt{3}}{8}$   |                        |  |  |   |   |   |   |   |   |   |                          |   |                          |   |                        |   |                       |   |   |   |   |   |   |                 |   |                        |   |                         |   |                       |   |   |                        |   |   |   |   |   |                       |   |                         |   |                        |   |                 |   |   |   |   |   |   |                       |   |                        |   |                          |                        |                          |   |   |                          |   |                       |   |                          |                          |   |                         |                         |                          |   |                           |   |                          |   |                         |   |                          |   |   |                            |   |                              |   |                         |   |                        |   |                        |   |                         |                       |                       |                       |   |                            |   |                           |   |                          |   |                       |   |                         |   |                        |   |                        |                           |   |                            |   |                           |   |                        |                        |                          |   |                        |   |                          |                       |   |                          |   |                             |   |                             |   |                          |   |                       |   |                          |   |   |                          |   |                         |                        |                          |   |                         |   |   |   |   |                         |   |   |   |   |   |
| 0                        | 0                                | 0   | 0                       | 0                        | 0                        | $-\frac{1}{40}$          | 0                          | $\frac{\sqrt{21}}{40}$     | 0                            | $-\frac{\sqrt{35}}{40}$     | 0                         | $\frac{\sqrt{7}}{40}$       | 0                       |                        |  |  |   |   |   |   |   |   |   |                          |   |                          |   |                        |   |                       |   |   |   |   |   |   |                 |   |                        |   |                         |   |                       |   |   |                        |   |   |   |   |   |                       |   |                         |   |                        |   |                 |   |   |   |   |   |   |                       |   |                        |   |                          |                        |                          |   |   |                          |   |                       |   |                          |                          |   |                         |                         |                          |   |                           |   |                          |   |                         |   |                          |   |   |                            |   |                              |   |                         |   |                        |   |                        |   |                         |                       |                       |                       |   |                            |   |                           |   |                          |   |                       |   |                         |   |                        |   |                        |                           |   |                            |   |                           |   |                        |                        |                          |   |                        |   |                          |                       |   |                          |   |                             |   |                             |   |                          |   |                       |   |                          |   |   |                          |   |                         |                        |                          |   |                         |   |   |   |   |                         |   |   |   |   |   |
| 0                        | 0                                | 0   | 0                       | 0                        | 0                        | 0                        | $\frac{\sqrt{7}}{40}$      | 0                          | $-\frac{\sqrt{35}}{40}$      | 0                           | $\frac{\sqrt{21}}{40}$    | 0                           | $-\frac{1}{40}$         |                        |  |  |   |   |   |   |   |   |   |                          |   |                          |   |                        |   |                       |   |   |   |   |   |   |                 |   |                        |   |                         |   |                       |   |   |                        |   |   |   |   |   |                       |   |                         |   |                        |   |                 |   |   |   |   |   |   |                       |   |                        |   |                          |                        |                          |   |   |                          |   |                       |   |                          |                          |   |                         |                         |                          |   |                           |   |                          |   |                         |   |                          |   |   |                            |   |                              |   |                         |   |                        |   |                        |   |                         |                       |                       |                       |   |                            |   |                           |   |                          |   |                       |   |                         |   |                        |   |                        |                           |   |                            |   |                           |   |                        |                        |                          |   |                        |   |                          |                       |   |                          |   |                             |   |                             |   |                          |   |                       |   |                          |   |   |                          |   |                         |                        |                          |   |                         |   |   |   |   |                         |   |   |   |   |   |
| 0                        | 0                                | 0   | 0                       | 0                        | 0                        | $-\frac{\sqrt{3}}{8}$    | 0                          | $-\frac{\sqrt{7}}{40}$     | 0                            | $\frac{\sqrt{105}}{120}$    | 0                         | $-\frac{\sqrt{21}}{120}$    | 0                       |                        |  |  |   |   |   |   |   |   |   |                          |   |                          |   |                        |   |                       |   |   |   |   |   |   |                 |   |                        |   |                         |   |                       |   |   |                        |   |   |   |   |   |                       |   |                         |   |                        |   |                 |   |   |   |   |   |   |                       |   |                        |   |                          |                        |                          |   |   |                          |   |                       |   |                          |                          |   |                         |                         |                          |   |                           |   |                          |   |                         |   |                          |   |   |                            |   |                              |   |                         |   |                        |   |                        |   |                         |                       |                       |                       |   |                            |   |                           |   |                          |   |                       |   |                         |   |                        |   |                        |                           |   |                            |   |                           |   |                        |                        |                          |   |                        |   |                          |                       |   |                          |   |                             |   |                             |   |                          |   |                       |   |                          |   |   |                          |   |                         |                        |                          |   |                         |   |   |   |   |                         |   |   |   |   |   |
| 0                        | $-\frac{\sqrt{14}}{112}$         | 0   | $\frac{\sqrt{7}}{56}$   | 0                        | $\frac{3\sqrt{70}}{112}$ | $-\frac{\sqrt{15}}{240}$ | 0                          | $\frac{\sqrt{35}}{112}$    | 0                            | $-\frac{\sqrt{21}}{112}$    | 0                         | $-\frac{\sqrt{105}}{112}$   | 0                       |                        |  |  |   |   |   |   |   |   |   |                          |   |                          |   |                        |   |                       |   |   |   |   |   |   |                 |   |                        |   |                         |   |                       |   |   |                        |   |   |   |   |   |                       |   |                         |   |                        |   |                 |   |   |   |   |   |   |                       |   |                        |   |                          |                        |                          |   |   |                          |   |                       |   |                          |                          |   |                         |                         |                          |   |                           |   |                          |   |                         |   |                          |   |   |                            |   |                              |   |                         |   |                        |   |                        |   |                         |                       |                       |                       |   |                            |   |                           |   |                          |   |                       |   |                         |   |                        |   |                        |                           |   |                            |   |                           |   |                        |                        |                          |   |                        |   |                          |                       |   |                          |   |                             |   |                             |   |                          |   |                       |   |                          |   |   |                          |   |                         |                        |                          |   |                         |   |   |   |   |                         |   |   |   |   |   |
| $-\frac{\sqrt{14}}{112}$ | 0                                | $\frac{\sqrt{35}}{56}$  | 0                       | $-\frac{\sqrt{70}}{112}$ | 0                        | 0                        | $\frac{23\sqrt{21}}{1680}$ | 0                          | $-\frac{13\sqrt{105}}{1680}$ | 0                           | $\frac{3\sqrt{7}}{560}$   | 0                           | $-\frac{\sqrt{3}}{16}$  |                        |  |  |   |   |   |   |   |   |   |                          |   |                          |   |                        |   |                       |   |   |   |   |   |   |                 |   |                        |   |                         |   |                       |   |   |                        |   |   |   |   |   |                       |   |                         |   |                        |   |                 |   |   |   |   |   |   |                       |   |                        |   |                          |                        |                          |   |   |                          |   |                       |   |                          |                          |   |                         |                         |                          |   |                           |   |                          |   |                         |   |                          |   |   |                            |   |                              |   |                         |   |                        |   |                        |   |                         |                       |                       |                       |   |                            |   |                           |   |                          |   |                       |   |                         |   |                        |   |                        |                           |   |                            |   |                           |   |                        |                        |                          |   |                        |   |                          |                       |   |                          |   |                             |   |                             |   |                          |   |                       |   |                          |   |   |                          |   |                         |                        |                          |   |                         |   |   |   |   |                         |   |   |   |   |   |
| 0                        | $\frac{\sqrt{35}}{56}$           | 0   | $-\frac{\sqrt{70}}{56}$ | 0                        | $\frac{\sqrt{7}}{56}$    | $\frac{\sqrt{6}}{80}$    | 0                          | $-\frac{11\sqrt{14}}{560}$ | 0                            | $\frac{\sqrt{210}}{1680}$   | 0                         | $\frac{3\sqrt{42}}{560}$    | 0                       |                        |  |  |   |   |   |   |   |   |   |                          |   |                          |   |                        |   |                       |   |   |   |   |   |   |                 |   |                        |   |                         |   |                       |   |   |                        |   |   |   |   |   |                       |   |                         |   |                        |   |                 |   |   |   |   |   |   |                       |   |                        |   |                          |                        |                          |   |   |                          |   |                       |   |                          |                          |   |                         |                         |                          |   |                           |   |                          |   |                         |   |                          |   |   |                            |   |                              |   |                         |   |                        |   |                        |   |                         |                       |                       |                       |   |                            |   |                           |   |                          |   |                       |   |                         |   |                        |   |                        |                           |   |                            |   |                           |   |                        |                        |                          |   |                        |   |                          |                       |   |                          |   |                             |   |                             |   |                          |   |                       |   |                          |   |   |                          |   |                         |                        |                          |   |                         |   |   |   |   |                         |   |   |   |   |   |
| $\frac{\sqrt{7}}{56}$    | 0                                | $-\frac{\sqrt{70}}{56}$   | 0                       | $\frac{\sqrt{35}}{56}$   | 0                        | 0                        | $-\frac{3\sqrt{42}}{560}$  | 0                          | $-\frac{\sqrt{210}}{1680}$   | 0                           | $\frac{11\sqrt{14}}{560}$ | 0                           | $-\frac{\sqrt{6}}{80}$  |                        |  |  |   |   |   |   |   |   |   |                          |   |                          |   |                        |   |                       |   |   |   |   |   |   |                 |   |                        |   |                         |   |                       |   |   |                        |   |   |   |   |   |                       |   |                         |   |                        |   |                 |   |   |   |   |   |   |                       |   |                        |   |                          |                        |                          |   |   |                          |   |                       |   |                          |                          |   |                         |                         |                          |   |                           |   |                          |   |                         |   |                          |   |   |                            |   |                              |   |                         |   |                        |   |                        |   |                         |                       |                       |                       |   |                            |   |                           |   |                          |   |                       |   |                         |   |                        |   |                        |                           |   |                            |   |                           |   |                        |                        |                          |   |                        |   |                          |                       |   |                          |   |                             |   |                             |   |                          |   |                       |   |                          |   |   |                          |   |                         |                        |                          |   |                         |   |   |   |   |                         |   |   |   |   |   |
| 0                        | $-\frac{\sqrt{70}}{112}$         | 0   | $\frac{\sqrt{35}}{56}$  | 0                        | $-\frac{\sqrt{14}}{112}$ | $\frac{\sqrt{3}}{16}$    | 0                          | $-\frac{3\sqrt{7}}{560}$   | 0                            | $\frac{13\sqrt{105}}{1680}$ | 0                         | $-\frac{23\sqrt{21}}{1680}$ | 0                       |                        |  |  |   |   |   |   |   |   |   |                          |   |                          |   |                        |   |                       |   |   |   |   |   |   |                 |   |                        |   |                         |   |                       |   |   |                        |   |   |   |   |   |                       |   |                         |   |                        |   |                 |   |   |   |   |   |   |                       |   |                        |   |                          |                        |                          |   |   |                          |   |                       |   |                          |                          |   |                         |                         |                          |   |                           |   |                          |   |                         |   |                          |   |   |                            |   |                              |   |                         |   |                        |   |                        |   |                         |                       |                       |                       |   |                            |   |                           |   |                          |   |                       |   |                         |   |                        |   |                        |                           |   |                            |   |                           |   |                        |                        |                          |   |                        |   |                          |                       |   |                          |   |                             |   |                             |   |                          |   |                       |   |                          |   |   |                          |   |                         |                        |                          |   |                         |   |   |   |   |                         |   |   |   |   |   |
| $\frac{3\sqrt{70}}{112}$ | 0                                | $\frac{\sqrt{7}}{56}$   | 0                       | $-\frac{\sqrt{14}}{112}$ | 0                        | 0                        | $\frac{\sqrt{105}}{112}$   | 0                          | $\frac{\sqrt{21}}{112}$      | 0                           | $-\frac{\sqrt{35}}{112}$  | 0                           | $\frac{\sqrt{15}}{240}$ |                        |  |  |   |   |   |   |   |   |   |                          |   |                          |   |                        |   |                       |   |   |   |   |   |   |                 |   |                        |   |                         |   |                       |   |   |                        |   |   |   |   |   |                       |   |                         |   |                        |   |                 |   |   |   |   |   |   |                       |   |                        |   |                          |                        |                          |   |   |                          |   |                       |   |                          |                          |   |                         |                         |                          |   |                           |   |                          |   |                         |   |                          |   |   |                            |   |                              |   |                         |   |                        |   |                        |   |                         |                       |                       |                       |   |                            |   |                           |   |                          |   |                       |   |                         |   |                        |   |                        |                           |   |                            |   |                           |   |                        |                        |                          |   |                        |   |                          |                       |   |                          |   |                             |   |                             |   |                          |   |                       |   |                          |   |   |                          |   |                         |                        |                          |   |                         |   |   |   |   |                         |   |   |   |   |   |
| 568                      | symmetry                         | $\frac{\sqrt{105}y(x-z)(x+z)(x^2-2y^2+z^2)}{4}$   |                         |                          |                          |                          |                            |                            |                              |                             |                           |                             |                         |                        |  |  |   |   |   |   |   |   |   |                          |   |                          |   |                        |   |                       |   |   |   |   |   |   |                 |   |                        |   |                         |   |                       |   |   |                        |   |   |   |   |   |                       |   |                         |   |                        |   |                 |   |   |   |   |   |   |                       |   |                        |   |                          |                        |                          |   |   |                          |   |                       |   |                          |                          |   |                         |                         |                          |   |                           |   |                          |   |                         |   |                          |   |   |                            |   |                              |   |                         |   |                        |   |                        |   |                         |                       |                       |                       |   |                            |   |                           |   |                          |   |                       |   |                         |   |                        |   |                        |                           |   |                            |   |                           |   |                        |                        |                          |   |                        |   |                          |                       |   |                          |   |                             |   |                             |   |                          |   |                       |   |                          |   |   |                          |   |                         |                        |                          |   |                         |   |   |   |   |                         |   |   |   |   |   |

continued ...

Table 9

| No. | multipole                     | matrix   |                           |                         |                          |                          |                           |                          |                              |                            |                               |                               |                            |                              |                          |
|-----|-------------------------------|--|---------------------------|-------------------------|--------------------------|--------------------------|---------------------------|--------------------------|------------------------------|----------------------------|-------------------------------|-------------------------------|----------------------------|------------------------------|--------------------------|
|     | $\mathbb{Q}_{5,1}^{(a)}(T_2)$ | 0  | 0                         | 0                       | 0                        | 0                        | 0                         | 0                        | $\frac{\sqrt{21}i}{120}$     | 0                          | $\frac{\sqrt{105}i}{120}$     | 0                             | $\frac{\sqrt{7}i}{40}$     | 0                            | $-\frac{\sqrt{3}i}{8}$   |
|     |                               | 0  | 0                         | 0                       | 0                        | 0                        | 0                         | $-\frac{i}{40}$          | 0                            | $-\frac{\sqrt{21}i}{40}$   | 0                             | $-\frac{\sqrt{35}i}{40}$      | 0                          | $-\frac{\sqrt{7}i}{40}$      | 0                        |
|     |                               | 0  | 0                         | 0                       | 0                        | 0                        | 0                         | 0                        | $\frac{\sqrt{7}i}{40}$       | 0                          | $\frac{\sqrt{35}i}{40}$       | 0                             | $\frac{\sqrt{21}i}{40}$    | 0                            | $\frac{i}{40}$           |
|     |                               | 0  | 0                         | 0                       | 0                        | 0                        | 0                         | $\frac{\sqrt{3}i}{8}$    | 0                            | $-\frac{\sqrt{7}i}{40}$    | 0                             | $-\frac{\sqrt{105}i}{120}$    | 0                          | $-\frac{\sqrt{21}i}{120}$    | 0                        |
|     |                               | 0  | $-\frac{\sqrt{14}i}{112}$ | 0                       | $-\frac{\sqrt{7}i}{56}$  | 0                        | $\frac{3\sqrt{70}i}{112}$ | $\frac{\sqrt{15}i}{240}$ | 0                            | $\frac{\sqrt{35}i}{112}$   | 0                             | $\frac{\sqrt{21}i}{112}$      | 0                          | $-\frac{\sqrt{105}i}{112}$   | 0                        |
|     |                               | $\frac{\sqrt{14}i}{112}$                         | 0                         | $\frac{\sqrt{35}i}{56}$ | 0                        | $\frac{\sqrt{70}i}{112}$ | 0                         | 0                        | $-\frac{23\sqrt{21}i}{1680}$ | 0                          | $-\frac{13\sqrt{105}i}{1680}$ | 0                             | $-\frac{3\sqrt{7}i}{560}$  | 0                            | $-\frac{\sqrt{3}i}{16}$  |
|     |                               | 0  | $-\frac{\sqrt{35}i}{56}$  | 0                       | $-\frac{\sqrt{70}i}{56}$ | 0                        | $-\frac{\sqrt{7}i}{56}$   | $\frac{\sqrt{6}i}{80}$   | 0                            | $\frac{11\sqrt{14}i}{560}$ | 0                             | $\frac{\sqrt{210}i}{1680}$    | 0                          | $-\frac{3\sqrt{42}i}{560}$   | 0                        |
|     |                               | $\frac{\sqrt{7}i}{56}$                           | 0                         | $\frac{\sqrt{70}i}{56}$ | 0                        | $\frac{\sqrt{35}i}{56}$  | 0                         | 0                        | $-\frac{3\sqrt{42}i}{560}$   | 0                          | $\frac{\sqrt{210}i}{1680}$    | 0                             | $\frac{11\sqrt{14}i}{560}$ | 0                            | $\frac{\sqrt{6}i}{80}$   |
|     |                               | 0  | $-\frac{\sqrt{70}i}{112}$ | 0                       | $-\frac{\sqrt{35}i}{56}$ | 0                        | $-\frac{\sqrt{14}i}{112}$ | $-\frac{\sqrt{3}i}{16}$  | 0                            | $-\frac{3\sqrt{7}i}{560}$  | 0                             | $-\frac{13\sqrt{105}i}{1680}$ | 0                          | $-\frac{23\sqrt{21}i}{1680}$ | 0                        |
|     |                               | $-\frac{3\sqrt{70}i}{112}$                       | 0                         | $\frac{\sqrt{7}i}{56}$  | 0                        | $\frac{\sqrt{14}i}{112}$ | 0                         | 0                        | $-\frac{\sqrt{105}i}{112}$   | 0                          | $\frac{\sqrt{21}i}{112}$      | 0                             | $\frac{\sqrt{35}i}{112}$   | 0                            | $\frac{\sqrt{15}i}{240}$ |
| 569 | symmetry                      | $-\frac{\sqrt{105}z(x-y)(x+y)(x^2+y^2-2z^2)}{4}$ |                           |                         |                          |                          |                           |                          |                              |                            |                               |                               |                            |                              |                          |
|     | $\mathbb{Q}_{5,2}^{(a)}(T_2)$ | 0  | 0                         | 0                       | 0                        | 0                        | 0                         | $\frac{\sqrt{3}}{60}$    | 0                            | 0                          | 0                             | $\frac{\sqrt{105}}{60}$       | 0                          | 0                            | 0                        |
|     |                               | 0  | 0                         | 0                       | 0                        | 0                        | 0                         | 0                        | $-\frac{\sqrt{7}}{20}$       | 0                          | 0                             | 0                             | $-\frac{\sqrt{21}}{20}$    | 0                            | 0                        |
|     |                               | 0  | 0                         | 0                       | 0                        | 0                        | 0                         | 0                        | 0                            | $\frac{\sqrt{21}}{20}$     | 0                             | 0                             | 0                          | $\frac{\sqrt{7}}{20}$        | 0                        |
|     |                               | 0  | 0                         | 0                       | 0                        | 0                        | 0                         | 0                        | 0                            | 0                          | $-\frac{\sqrt{105}}{60}$      | 0                             | 0                          | 0                            | $-\frac{\sqrt{3}}{60}$   |
|     |                               | 0  | 0                         | $-\frac{\sqrt{7}}{28}$  | 0                        | 0                        | 0                         | 0                        | 0                            | 0                          | $\frac{\sqrt{21}}{42}$        | 0                             | 0                          | 0                            | 0                        |
|     |                               | 0  | 0                         | 0                       | $\frac{\sqrt{35}}{28}$   | 0                        | 0                         | $-\frac{\sqrt{3}}{30}$   | 0                            | 0                          | 0                             | $-\frac{\sqrt{105}}{105}$     | 0                          | 0                            | 0                        |
|     |                               | $-\frac{\sqrt{7}}{28}$                           | 0                         | 0                       | 0                        | $-\frac{\sqrt{35}}{28}$  | 0                         | 0                        | $\frac{2\sqrt{42}}{105}$     | 0                          | 0                             | 0                             | $-\frac{\sqrt{14}}{70}$    | 0                            | 0                        |
|     |                               | 0  | $\frac{\sqrt{35}}{28}$    | 0                       | 0                        | 0                        | $\frac{\sqrt{7}}{28}$     | 0                        | 0                            | $-\frac{\sqrt{14}}{70}$    | 0                             | 0                             | 0                          | $\frac{2\sqrt{42}}{105}$     | 0                        |
|     |                               | 0  | 0                         | $-\frac{\sqrt{35}}{28}$ | 0                        | 0                        | 0                         | 0                        | 0                            | 0                          | $-\frac{\sqrt{105}}{105}$     | 0                             | 0                          | 0                            | $-\frac{\sqrt{3}}{30}$   |
|     |                               | 0  | 0                         | 0                       | $\frac{\sqrt{7}}{28}$    | 0                        | 0                         | 0                        | 0                            | 0                          | 0                             | $\frac{\sqrt{21}}{42}$        | 0                          | 0                            | 0                        |
| 570 | symmetry                      | $\sqrt{15}xyz$                                   |                           |                         |                          |                          |                           |                          |                              |                            |                               |                               |                            |                              |                          |

continued ...

Table 9

| No. | multipole                          | matrix                         |                           |                           |                           |                           |                           |                          |                          |                         |                          |                          |                         |                         |                          |
|-----|------------------------------------|--------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|--------------------------|--------------------------|-------------------------|--------------------------|--------------------------|-------------------------|-------------------------|--------------------------|
|     | $\mathbb{Q}_3^{(1,-1;a)}(A_2)$     | 0                              | 0                         | 0                         | $\frac{\sqrt{5}i}{35}$    | 0                         | 0                         | $-\frac{\sqrt{21}i}{28}$ | 0                        | 0                       | 0                        | $\frac{\sqrt{15}i}{28}$  | 0                       | 0                       | 0                        |
|     |                                    | $\frac{\sqrt{6}i}{42}$         | 0                         | 0                         | 0                         | $\frac{\sqrt{30}i}{210}$  | 0                         | 0                        | $\frac{3i}{28}$          | 0                       | 0                        | 0                        | $\frac{3\sqrt{3}i}{28}$ | 0                       | 0                        |
|     |                                    | 0                              | $-\frac{\sqrt{30}i}{210}$ | 0                         | 0                         | 0                         | $-\frac{\sqrt{6}i}{42}$   | 0                        | 0                        | $\frac{3\sqrt{3}i}{28}$ | 0                        | 0                        | 0                       | $\frac{3i}{28}$         | 0                        |
|     |                                    | 0                              | 0                         | $-\frac{\sqrt{5}i}{35}$   | 0                         | 0                         | 0                         | 0                        | 0                        | 0                       | $\frac{\sqrt{15}i}{28}$  | 0                        | 0                       | 0                       | $-\frac{\sqrt{21}i}{28}$ |
|     |                                    | 0                              | 0                         | $-\frac{3i}{28}$          | 0                         | 0                         | 0                         | 0                        | 0                        | 0                       | $-\frac{2\sqrt{3}i}{21}$ | 0                        | 0                       | 0                       | 0                        |
|     |                                    | 0                              | 0                         | 0                         | $-\frac{3\sqrt{5}i}{140}$ | 0                         | 0                         | $-\frac{\sqrt{21}i}{21}$ | 0                        | 0                       | 0                        | $-\frac{\sqrt{15}i}{21}$ | 0                       | 0                       | 0                        |
|     |                                    | $\frac{3i}{28}$                | 0                         | 0                         | 0                         | $\frac{3\sqrt{5}i}{140}$  | 0                         | 0                        | $-\frac{\sqrt{6}i}{42}$  | 0                       | 0                        | 0                        | $-\frac{\sqrt{2}i}{14}$ | 0                       | 0                        |
|     |                                    | 0                              | $\frac{3\sqrt{5}i}{140}$  | 0                         | 0                         | 0                         | $\frac{3i}{28}$           | 0                        | 0                        | $\frac{\sqrt{2}i}{14}$  | 0                        | 0                        | 0                       | $\frac{\sqrt{6}i}{42}$  | 0                        |
|     |                                    | 0                              | 0                         | $-\frac{3\sqrt{5}i}{140}$ | 0                         | 0                         | 0                         | 0                        | 0                        | 0                       | $\frac{\sqrt{15}i}{21}$  | 0                        | 0                       | 0                       | $\frac{\sqrt{21}i}{21}$  |
|     |                                    | 0                              | 0                         | 0                         | $-\frac{3i}{28}$          | 0                         | 0                         | 0                        | 0                        | 0                       | 0                        | $\frac{2\sqrt{3}i}{21}$  | 0                       | 0                       | 0                        |
| 571 | symmetry                           | $\frac{x(2x^2-3y^2-3z^2)}{2}$  |                           |                           |                           |                           |                           |                          |                          |                         |                          |                          |                         |                         |                          |
|     | $\mathbb{Q}_{3,0}^{(1,-1;a)}(T_1)$ | $-\frac{\sqrt{30}}{280}$       | 0                         | $\frac{3\sqrt{3}}{140}$   | 0                         | $-\frac{\sqrt{6}}{56}$    | 0                         | 0                        | $-\frac{3\sqrt{5}}{56}$  | 0                       | $\frac{3}{28}$           | 0                        | $-\frac{\sqrt{15}}{56}$ | 0                       | 0                        |
|     |                                    | 0                              | $\frac{\sqrt{2}}{40}$     | 0                         | $-\frac{1}{140}$          | 0                         | $-\frac{\sqrt{10}}{56}$   | $-\frac{\sqrt{105}}{56}$ | 0                        | 0                       | 0                        | $\frac{3\sqrt{3}}{56}$   | 0                       | $-\frac{\sqrt{15}}{28}$ | 0                        |
|     |                                    | $\frac{\sqrt{10}}{56}$         | 0                         | $\frac{1}{140}$           | 0                         | $-\frac{\sqrt{2}}{40}$    | 0                         | 0                        | $-\frac{\sqrt{15}}{28}$  | 0                       | $\frac{3\sqrt{3}}{56}$   | 0                        | 0                       | 0                       | $-\frac{\sqrt{105}}{56}$ |
|     |                                    | 0                              | $\frac{\sqrt{6}}{56}$     | 0                         | $-\frac{3\sqrt{3}}{140}$  | 0                         | $\frac{\sqrt{30}}{280}$   | 0                        | 0                        | $-\frac{\sqrt{15}}{56}$ | 0                        | $\frac{3}{28}$           | 0                       | $-\frac{3\sqrt{5}}{56}$ | 0                        |
|     |                                    | 0                              | $-\frac{3\sqrt{30}}{280}$ | 0                         | $\frac{\sqrt{15}}{56}$    | 0                         | 0                         | $\frac{\sqrt{7}}{28}$    | 0                        | $-\frac{\sqrt{3}}{14}$  | 0                        | $\frac{\sqrt{5}}{28}$    | 0                       | 0                       | 0                        |
|     |                                    | $-\frac{3\sqrt{30}}{280}$      | 0                         | $\frac{3\sqrt{3}}{280}$   | 0                         | $\frac{\sqrt{6}}{28}$     | 0                         | 0                        | $-\frac{\sqrt{5}}{28}$   | 0                       | $-\frac{1}{14}$          | 0                        | $\frac{\sqrt{15}}{28}$  | 0                       | 0                        |
|     |                                    | 0                              | $\frac{3\sqrt{3}}{280}$   | 0                         | $\frac{3\sqrt{6}}{140}$   | 0                         | $\frac{\sqrt{15}}{56}$    | $-\frac{\sqrt{70}}{56}$  | 0                        | $-\frac{\sqrt{30}}{56}$ | 0                        | $\frac{\sqrt{2}}{56}$    | 0                       | $\frac{3\sqrt{10}}{56}$ | 0                        |
|     |                                    | $\frac{\sqrt{15}}{56}$         | 0                         | $\frac{3\sqrt{6}}{140}$   | 0                         | $\frac{3\sqrt{3}}{280}$   | 0                         | 0                        | $-\frac{3\sqrt{10}}{56}$ | 0                       | $-\frac{\sqrt{2}}{56}$   | 0                        | $\frac{\sqrt{30}}{56}$  | 0                       | $\frac{\sqrt{70}}{56}$   |
|     |                                    | 0                              | $\frac{\sqrt{6}}{28}$     | 0                         | $\frac{3\sqrt{3}}{280}$   | 0                         | $-\frac{3\sqrt{30}}{280}$ | 0                        | 0                        | $-\frac{\sqrt{15}}{28}$ | 0                        | $\frac{1}{14}$           | 0                       | $\frac{\sqrt{5}}{28}$   | 0                        |
|     |                                    | 0                              | 0                         | $\frac{\sqrt{15}}{56}$    | 0                         | $-\frac{3\sqrt{30}}{280}$ | 0                         | 0                        | 0                        | 0                       | $-\frac{\sqrt{5}}{28}$   | 0                        | $\frac{\sqrt{3}}{14}$   | 0                       | $-\frac{\sqrt{7}}{28}$   |
| 572 | symmetry                           | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ |                           |                           |                           |                           |                           |                          |                          |                         |                          |                          |                         |                         |                          |

continued ...

Table 9

| No. | multipole                          | matrix                           |                           |                           |                           |                            |                           |                          |                          |                          |                         |                          |                          |                          |                           |
|-----|------------------------------------|----------------------------------|---------------------------|---------------------------|---------------------------|----------------------------|---------------------------|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|--------------------------|--------------------------|---------------------------|
|     | $\mathbb{Q}_{3,1}^{(1,-1;a)}(T_1)$ | $-\frac{\sqrt{30}i}{280}$        | 0                         | $-\frac{3\sqrt{3}i}{140}$ | 0                         | $-\frac{\sqrt{6}i}{56}$    | 0                         | 0                        | $-\frac{3\sqrt{5}i}{56}$ | 0                        | $-\frac{3i}{28}$        | 0                        | $-\frac{\sqrt{15}i}{56}$ | 0                        | 0                         |
|     |                                    | 0                                | $\frac{\sqrt{2}i}{40}$    | 0                         | $\frac{i}{140}$           | 0                          | $-\frac{\sqrt{10}i}{56}$  | $\frac{\sqrt{105}i}{56}$ | 0                        | 0                        | 0                       | $-\frac{3\sqrt{3}i}{56}$ | 0                        | $-\frac{\sqrt{15}i}{28}$ | 0                         |
|     |                                    | $-\frac{\sqrt{10}i}{56}$         | 0                         | $\frac{i}{140}$           | 0                         | $\frac{\sqrt{2}i}{40}$     | 0                         | 0                        | $\frac{\sqrt{15}i}{28}$  | 0                        | $\frac{3\sqrt{3}i}{56}$ | 0                        | 0                        | 0                        | $-\frac{\sqrt{105}i}{56}$ |
|     |                                    | 0                                | $-\frac{\sqrt{6}i}{56}$   | 0                         | $-\frac{3\sqrt{3}i}{140}$ | 0                          | $-\frac{\sqrt{30}i}{280}$ | 0                        | 0                        | $\frac{\sqrt{15}i}{56}$  | 0                       | $\frac{3i}{28}$          | 0                        | $\frac{3\sqrt{5}i}{56}$  | 0                         |
|     |                                    | 0                                | $\frac{3\sqrt{30}i}{280}$ | 0                         | $\frac{\sqrt{15}i}{56}$   | 0                          | 0                         | $\frac{\sqrt{7}i}{28}$   | 0                        | $\frac{\sqrt{3}i}{14}$   | 0                       | $\frac{\sqrt{5}i}{28}$   | 0                        | 0                        | 0                         |
|     |                                    | $-\frac{3\sqrt{30}i}{280}$       | 0                         | $-\frac{3\sqrt{3}i}{280}$ | 0                         | $\frac{\sqrt{6}i}{28}$     | 0                         | 0                        | $-\frac{\sqrt{5}i}{28}$  | 0                        | $\frac{i}{14}$          | 0                        | $\frac{\sqrt{15}i}{28}$  | 0                        | 0                         |
|     |                                    | 0                                | $\frac{3\sqrt{3}i}{280}$  | 0                         | $-\frac{3\sqrt{6}i}{140}$ | 0                          | $\frac{\sqrt{15}i}{56}$   | $\frac{\sqrt{70}i}{56}$  | 0                        | $-\frac{\sqrt{30}i}{56}$ | 0                       | $-\frac{\sqrt{2}i}{56}$  | 0                        | $\frac{3\sqrt{10}i}{56}$ | 0                         |
|     |                                    | $-\frac{\sqrt{15}i}{56}$         | 0                         | $\frac{3\sqrt{6}i}{140}$  | 0                         | $-\frac{3\sqrt{3}i}{280}$  | 0                         | 0                        | $\frac{3\sqrt{10}i}{56}$ | 0                        | $-\frac{\sqrt{2}i}{56}$ | 0                        | $-\frac{\sqrt{30}i}{56}$ | 0                        | $\frac{\sqrt{70}i}{56}$   |
|     |                                    | 0                                | $-\frac{\sqrt{6}i}{28}$   | 0                         | $\frac{3\sqrt{3}i}{280}$  | 0                          | $\frac{3\sqrt{30}i}{280}$ | 0                        | 0                        | $\frac{\sqrt{15}i}{28}$  | 0                       | $\frac{i}{14}$           | 0                        | $-\frac{\sqrt{5}i}{28}$  | 0                         |
|     |                                    | 0                                | 0                         | $-\frac{\sqrt{15}i}{56}$  | 0                         | $-\frac{3\sqrt{30}i}{280}$ | 0                         | 0                        | 0                        | 0                        | $\frac{\sqrt{5}i}{28}$  | 0                        | $\frac{\sqrt{3}i}{14}$   | 0                        | $\frac{\sqrt{7}i}{28}$    |
| 573 | symmetry                           | $-\frac{z(3x^2+3y^2-2z^2)}{2}$   |                           |                           |                           |                            |                           |                          |                          |                          |                         |                          |                          |                          |                           |
|     | $\mathbb{Q}_{3,2}^{(1,-1;a)}(T_1)$ | 0                                | $-\frac{\sqrt{6}}{35}$    | 0                         | 0                         | 0                          | 0                         | 0                        | 0                        | $-\frac{\sqrt{15}}{14}$  | 0                       | 0                        | 0                        | 0                        | 0                         |
|     |                                    | 0                                | 0                         | $\frac{2}{35}$            | 0                         | 0                          | 0                         | 0                        | 0                        | $-\frac{\sqrt{3}}{14}$   | 0                       | 0                        | 0                        | 0                        | 0                         |
|     |                                    | 0                                | 0                         | 0                         | $\frac{2}{35}$            | 0                          | 0                         | 0                        | 0                        | 0                        | $\frac{\sqrt{3}}{14}$   | 0                        | 0                        | 0                        | 0                         |
|     |                                    | 0                                | 0                         | 0                         | 0                         | $-\frac{\sqrt{6}}{35}$     | 0                         | 0                        | 0                        | 0                        | 0                       | $\frac{\sqrt{15}}{14}$   | 0                        | 0                        | 0                         |
|     |                                    | $\frac{\sqrt{6}}{28}$            | 0                         | 0                         | 0                         | 0                          | 0                         | 0                        | $\frac{2}{7}$            | 0                        | 0                       | 0                        | 0                        | 0                        | 0                         |
|     |                                    | 0                                | $-\frac{\sqrt{6}}{20}$    | 0                         | 0                         | 0                          | 0                         | 0                        | 0                        | 0                        | 0                       | 0                        | 0                        | 0                        | 0                         |
|     |                                    | 0                                | 0                         | $-\frac{\sqrt{6}}{35}$    | 0                         | 0                          | 0                         | 0                        | 0                        | $-\frac{\sqrt{2}}{7}$    | 0                       | 0                        | 0                        | 0                        | 0                         |
|     |                                    | 0                                | 0                         | 0                         | $\frac{\sqrt{6}}{35}$     | 0                          | 0                         | 0                        | 0                        | 0                        | $-\frac{\sqrt{2}}{7}$   | 0                        | 0                        | 0                        | 0                         |
|     |                                    | 0                                | 0                         | 0                         | 0                         | $\frac{\sqrt{6}}{20}$      | 0                         | 0                        | 0                        | 0                        | 0                       | 0                        | 0                        | 0                        | 0                         |
|     |                                    | 0                                | 0                         | 0                         | 0                         | 0                          | $-\frac{\sqrt{6}}{28}$    | 0                        | 0                        | 0                        | 0                       | 0                        | 0                        | $\frac{2}{7}$            | 0                         |
| 574 | symmetry                           | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ |                           |                           |                           |                            |                           |                          |                          |                          |                         |                          |                          |                          |                           |

continued ...

Table 9

| No. | multipole                          | matrix                            |                            |                            |                           |                            |                          |                           |                         |                         |                          |                          |                         |                          |                           |
|-----|------------------------------------|-----------------------------------|----------------------------|----------------------------|---------------------------|----------------------------|--------------------------|---------------------------|-------------------------|-------------------------|--------------------------|--------------------------|-------------------------|--------------------------|---------------------------|
|     | $\mathbb{Q}_{3,0}^{(1,-1;a)}(T_2)$ | $-\frac{\sqrt{2}}{56}$            | 0                          | $\frac{3\sqrt{5}}{140}$    | 0                         | $\frac{3\sqrt{10}}{280}$   | 0                        | 0                         | $-\frac{5\sqrt{3}}{56}$ | 0                       | $\frac{\sqrt{15}}{28}$   | 0                        | $\frac{3}{56}$          | 0                        | 0                         |
|     |                                    | 0                                 | $\frac{\sqrt{30}}{120}$    | 0                          | $-\frac{\sqrt{15}}{420}$  | 0                          | $\frac{\sqrt{6}}{56}$    | $\frac{3\sqrt{7}}{56}$    | 0                       | 0                       | 0                        | $\frac{3\sqrt{5}}{56}$   | 0                       | $\frac{3}{28}$           | 0                         |
|     |                                    | $-\frac{\sqrt{6}}{56}$            | 0                          | $\frac{\sqrt{15}}{420}$    | 0                         | $-\frac{\sqrt{30}}{120}$   | 0                        | 0                         | $\frac{3}{28}$          | 0                       | $\frac{3\sqrt{5}}{56}$   | 0                        | 0                       | 0                        | $\frac{3\sqrt{7}}{56}$    |
|     |                                    | 0                                 | $-\frac{3\sqrt{10}}{280}$  | 0                          | $-\frac{3\sqrt{5}}{140}$  | 0                          | $\frac{\sqrt{2}}{56}$    | 0                         | 0                       | $\frac{3}{56}$          | 0                        | $\frac{\sqrt{15}}{28}$   | 0                       | $-\frac{5\sqrt{3}}{56}$  | 0                         |
|     |                                    | 0                                 | $-\frac{3\sqrt{2}}{56}$    | 0                          | $-\frac{3}{56}$           | 0                          | 0                        | $\frac{\sqrt{105}}{84}$   | 0                       | $-\frac{\sqrt{5}}{14}$  | 0                        | $-\frac{\sqrt{3}}{28}$   | 0                       | 0                        | 0                         |
|     |                                    | $-\frac{3\sqrt{2}}{56}$           | 0                          | $\frac{3\sqrt{5}}{280}$    | 0                         | $-\frac{3\sqrt{10}}{140}$  | 0                        | 0                         | $-\frac{5\sqrt{3}}{84}$ | 0                       | $-\frac{\sqrt{15}}{42}$  | 0                        | $-\frac{3}{28}$         | 0                        | 0                         |
|     |                                    | 0                                 | $\frac{3\sqrt{5}}{280}$    | 0                          | $\frac{3\sqrt{10}}{140}$  | 0                          | $-\frac{3}{56}$          | $\frac{\sqrt{42}}{56}$    | 0                       | $-\frac{5\sqrt{2}}{56}$ | 0                        | $\frac{\sqrt{30}}{168}$  | 0                       | $-\frac{3\sqrt{6}}{56}$  | 0                         |
|     |                                    | $-\frac{3}{56}$                   | 0                          | $\frac{3\sqrt{10}}{140}$   | 0                         | $\frac{3\sqrt{5}}{280}$    | 0                        | 0                         | $\frac{3\sqrt{6}}{56}$  | 0                       | $-\frac{\sqrt{30}}{168}$ | 0                        | $\frac{5\sqrt{2}}{56}$  | 0                        | $-\frac{\sqrt{42}}{56}$   |
|     |                                    | 0                                 | $-\frac{3\sqrt{10}}{140}$  | 0                          | $\frac{3\sqrt{5}}{280}$   | 0                          | $-\frac{3\sqrt{2}}{56}$  | 0                         | 0                       | $\frac{3}{28}$          | 0                        | $\frac{\sqrt{15}}{42}$   | 0                       | $\frac{5\sqrt{3}}{84}$   | 0                         |
|     |                                    | 0                                 | 0                          | $-\frac{3}{56}$            | 0                         | $-\frac{3\sqrt{2}}{56}$    | 0                        | 0                         | 0                       | 0                       | $\frac{\sqrt{3}}{28}$    | 0                        | $\frac{\sqrt{5}}{14}$   | 0                        | $-\frac{\sqrt{105}}{84}$  |
| 575 | symmetry                           | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |                            |                            |                           |                            |                          |                           |                         |                         |                          |                          |                         |                          |                           |
|     | $\mathbb{Q}_{3,1}^{(1,-1;a)}(T_2)$ | $\frac{\sqrt{2}i}{56}$            | 0                          | $\frac{3\sqrt{5}i}{140}$   | 0                         | $-\frac{3\sqrt{10}i}{280}$ | 0                        | 0                         | $\frac{5\sqrt{3}i}{56}$ | 0                       | $\frac{\sqrt{15}i}{28}$  | 0                        | $-\frac{3i}{56}$        | 0                        | 0                         |
|     |                                    | 0                                 | $-\frac{\sqrt{30}i}{120}$  | 0                          | $-\frac{\sqrt{15}i}{420}$ | 0                          | $-\frac{\sqrt{6}i}{56}$  | $\frac{3\sqrt{7}i}{56}$   | 0                       | 0                       | 0                        | $\frac{3\sqrt{5}i}{56}$  | 0                       | $-\frac{3i}{28}$         | 0                         |
|     |                                    | $-\frac{\sqrt{6}i}{56}$           | 0                          | $-\frac{\sqrt{15}i}{420}$  | 0                         | $-\frac{\sqrt{30}i}{120}$  | 0                        | 0                         | $\frac{3i}{28}$         | 0                       | $-\frac{3\sqrt{5}i}{56}$ | 0                        | 0                       | 0                        | $-\frac{3\sqrt{7}i}{56}$  |
|     |                                    | 0                                 | $-\frac{3\sqrt{10}i}{280}$ | 0                          | $\frac{3\sqrt{5}i}{140}$  | 0                          | $\frac{\sqrt{2}i}{56}$   | 0                         | 0                       | $\frac{3i}{56}$         | 0                        | $-\frac{\sqrt{15}i}{28}$ | 0                       | $-\frac{5\sqrt{3}i}{56}$ | 0                         |
|     |                                    | 0                                 | $-\frac{3\sqrt{2}i}{56}$   | 0                          | $\frac{3i}{56}$           | 0                          | 0                        | $-\frac{\sqrt{105}i}{84}$ | 0                       | $-\frac{\sqrt{5}i}{14}$ | 0                        | $\frac{\sqrt{3}i}{28}$   | 0                       | 0                        | 0                         |
|     |                                    | $\frac{3\sqrt{2}i}{56}$           | 0                          | $\frac{3\sqrt{5}i}{280}$   | 0                         | $\frac{3\sqrt{10}i}{140}$  | 0                        | 0                         | $\frac{5\sqrt{3}i}{84}$ | 0                       | $-\frac{\sqrt{15}i}{42}$ | 0                        | $\frac{3i}{28}$         | 0                        | 0                         |
|     |                                    | 0                                 | $-\frac{3\sqrt{5}i}{280}$  | 0                          | $\frac{3\sqrt{10}i}{140}$ | 0                          | $\frac{3i}{56}$          | $\frac{\sqrt{42}i}{56}$   | 0                       | $\frac{5\sqrt{2}i}{56}$ | 0                        | $\frac{\sqrt{30}i}{168}$ | 0                       | $\frac{3\sqrt{6}i}{56}$  | 0                         |
|     |                                    | $-\frac{3i}{56}$                  | 0                          | $-\frac{3\sqrt{10}i}{140}$ | 0                         | $\frac{3\sqrt{5}i}{280}$   | 0                        | 0                         | $\frac{3\sqrt{6}i}{56}$ | 0                       | $\frac{\sqrt{30}i}{168}$ | 0                        | $\frac{5\sqrt{2}i}{56}$ | 0                        | $\frac{\sqrt{42}i}{56}$   |
|     |                                    | 0                                 | $-\frac{3\sqrt{10}i}{140}$ | 0                          | $-\frac{3\sqrt{5}i}{280}$ | 0                          | $-\frac{3\sqrt{2}i}{56}$ | 0                         | 0                       | $\frac{3i}{28}$         | 0                        | $-\frac{\sqrt{15}i}{42}$ | 0                       | $\frac{5\sqrt{3}i}{84}$  | 0                         |
|     |                                    | 0                                 | 0                          | $-\frac{3i}{56}$           | 0                         | $\frac{3\sqrt{2}i}{56}$    | 0                        | 0                         | 0                       | 0                       | $\frac{\sqrt{3}i}{28}$   | 0                        | $-\frac{\sqrt{5}i}{14}$ | 0                        | $-\frac{\sqrt{105}i}{84}$ |
| 576 | symmetry                           | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$  |                            |                            |                           |                            |                          |                           |                         |                         |                          |                          |                         |                          |                           |

continued ...



Table 9

| No. | multipole                          | matrix                                  |                          |                          |                         |                          |                          |                            |                            |                           |                        |                         |                            |                           |                         |
|-----|------------------------------------|---|--------------------------|--------------------------|-------------------------|--------------------------|--------------------------|----------------------------|----------------------------|---------------------------|------------------------|-------------------------|----------------------------|---------------------------|-------------------------|
|     | $\mathbb{Q}_{3,2}^{(1,-1;a)}(T_2)$ | 0                                       | 0                        | 0                        | $-\frac{\sqrt{5}}{35}$  | 0                        | 0                        | $-\frac{\sqrt{21}}{28}$    | 0                          | 0                         | 0                      | $-\frac{\sqrt{15}}{28}$ | 0                          | 0                         | 0                       |
|     |                                    | $\frac{\sqrt{6}}{42}$                   | 0                        | 0                        | 0                       | $-\frac{\sqrt{30}}{210}$ | 0                        | 0                          | $\frac{3}{28}$             | 0                         | 0                      | 0                       | $-\frac{3\sqrt{3}}{28}$    | 0                         | 0                       |
|     |                                    | 0                                       | $-\frac{\sqrt{30}}{210}$ | 0                        | 0                       | 0                        | $\frac{\sqrt{6}}{42}$    | 0                          | 0                          | $\frac{3\sqrt{3}}{28}$    | 0                      | 0                       | 0                          | $-\frac{3}{28}$           | 0                       |
|     |                                    | 0                                       | 0                        | $-\frac{\sqrt{5}}{35}$   | 0                       | 0                        | 0                        | 0                          | 0                          | 0                         | $\frac{\sqrt{15}}{28}$ | 0                       | 0                          | 0                         | $\frac{\sqrt{21}}{28}$  |
|     |                                    | 0                                       | 0                        | $\frac{3}{28}$           | 0                       | 0                        | 0                        | 0                          | 0                          | 0                         | $\frac{2\sqrt{3}}{21}$ | 0                       | 0                          | 0                         | 0                       |
|     |                                    | 0                                       | 0                        | 0                        | $\frac{3\sqrt{5}}{140}$ | 0                        | 0                        | $-\frac{\sqrt{21}}{21}$    | 0                          | 0                         | 0                      | $\frac{\sqrt{15}}{21}$  | 0                          | 0                         | 0                       |
|     |                                    | $\frac{3}{28}$                          | 0                        | 0                        | 0                       | $-\frac{3\sqrt{5}}{140}$ | 0                        | 0                          | $-\frac{\sqrt{6}}{42}$     | 0                         | 0                      | 0                       | $\frac{\sqrt{2}}{14}$      | 0                         | 0                       |
|     |                                    | 0                                       | $\frac{3\sqrt{5}}{140}$  | 0                        | 0                       | 0                        | $-\frac{3}{28}$          | 0                          | 0                          | $\frac{\sqrt{2}}{14}$     | 0                      | 0                       | 0                          | $-\frac{\sqrt{6}}{42}$    | 0                       |
|     |                                    | 0                                       | 0                        | $-\frac{3\sqrt{5}}{140}$ | 0                       | 0                        | 0                        | 0                          | 0                          | 0                         | $\frac{\sqrt{15}}{21}$ | 0                       | 0                          | 0                         | $-\frac{\sqrt{21}}{21}$ |
|     |                                    | 0                                       | 0                        | 0                        | $-\frac{3}{28}$         | 0                        | 0                        | 0                          | 0                          | 0                         | 0                      | $\frac{2\sqrt{3}}{21}$  | 0                          | 0                         | 0                       |
| 577 | symmetry                           | $\frac{3\sqrt{35}xyz(x-y)(x+y)}{2}$     |                          |                          |                         |                          |                          |                            |                            |                           |                        |                         |                            |                           |                         |
|     | $\mathbb{Q}_{5,0}^{(1,-1;a)}(E)$   | 0                                       | 0                        | 0                        | 0                       | 0                        | 0                        | 0                          | 0                          | 0                         | 0                      | 0                       | $-\frac{\sqrt{210}i}{100}$ | 0                         | 0                       |
|     |                                    | 0                                       | 0                        | 0                        | 0                       | 0                        | 0                        | 0                          | 0                          | 0                         | 0                      | 0                       | 0                          | $\frac{3\sqrt{10}i}{100}$ | 0                       |
|     |                                    | 0                                       | 0                        | 0                        | 0                       | 0                        | 0                        | $\frac{3\sqrt{10}i}{100}$  | 0                          | 0                         | 0                      | 0                       | 0                          | 0                         | 0                       |
|     |                                    | 0                                       | 0                        | 0                        | 0                       | 0                        | 0                        | $-\frac{\sqrt{210}i}{100}$ | 0                          | 0                         | 0                      | 0                       | 0                          | 0                         | 0                       |
|     |                                    | 0                                       | 0                        | 0                        | 0                       | $\frac{\sqrt{35}i}{70}$  | 0                        | 0                          | 0                          | 0                         | 0                      | 0                       | $\frac{3\sqrt{14}i}{35}$   | 0                         | 0                       |
|     |                                    | 0                                       | 0                        | 0                        | 0                       | 0                        | $-\frac{\sqrt{35}i}{70}$ | 0                          | 0                          | 0                         | 0                      | 0                       | 0                          | $\frac{\sqrt{210}i}{175}$ | 0                       |
|     |                                    | 0                                       | 0                        | 0                        | 0                       | 0                        | 0                        | 0                          | 0                          | 0                         | 0                      | 0                       | 0                          | $-\frac{2\sqrt{15}i}{25}$ | 0                       |
|     |                                    | 0                                       | 0                        | 0                        | 0                       | 0                        | 0                        | $\frac{2\sqrt{15}i}{25}$   | 0                          | 0                         | 0                      | 0                       | 0                          | 0                         | 0                       |
|     |                                    | $-\frac{\sqrt{35}i}{70}$                | 0                        | 0                        | 0                       | 0                        | 0                        | 0                          | $-\frac{\sqrt{210}i}{175}$ | 0                         | 0                      | 0                       | 0                          | 0                         | 0                       |
|     |                                    | 0                                       | $\frac{\sqrt{35}i}{70}$  | 0                        | 0                       | 0                        | 0                        | 0                          | 0                          | $-\frac{3\sqrt{14}i}{35}$ | 0                      | 0                       | 0                          | 0                         | 0                       |
| 578 | symmetry                           | $\frac{\sqrt{105}xyz(x^2+y^2-2z^2)}{2}$ |                          |                          |                         |                          |                          |                            |                            |                           |                        |                         |                            |                           |                         |

continued ...

Table 9

| No. | multipole                             | matrix   |                          |                            |                            |                          |                           |                           |                            |                             |                           |                            |                            |                            |                           |
|-----|---------------------------------------|--|--------------------------|----------------------------|----------------------------|--------------------------|---------------------------|---------------------------|----------------------------|-----------------------------|---------------------------|----------------------------|----------------------------|----------------------------|---------------------------|
|     | $\mathbb{Q}_{5,1}^{(1,-1;a)}(E)$      | 0  | 0                        | 0                          | 0                          | 0                        | 0                         | $-\frac{\sqrt{10}i}{200}$ | 0                          | 0                           | 0                         | $\frac{\sqrt{14}i}{40}$    | 0                          | 0                          | 0                         |
|     |                                       | 0  | 0                        | 0                          | 0                          | 0                        | 0                         | $\frac{\sqrt{210}i}{200}$ | 0                          | 0                           | 0                         | $-\frac{3\sqrt{70}i}{200}$ | 0                          | 0                          | 0                         |
|     |                                       | 0  | 0                        | 0                          | 0                          | 0                        | 0                         | 0                         | $-\frac{3\sqrt{70}i}{200}$ | 0                           | 0                         | 0                          | $\frac{\sqrt{210}i}{200}$  | 0                          | 0                         |
|     |                                       | 0  | 0                        | 0                          | 0                          | 0                        | 0                         | 0                         | 0                          | $\frac{\sqrt{14}i}{40}$     | 0                         | 0                          | 0                          | $-\frac{\sqrt{10}i}{200}$  | 0                         |
|     |                                       | 0  | 0                        | $-\frac{\sqrt{210}i}{420}$ | 0                          | 0                        | 0                         | 0                         | 0                          | $-\frac{\sqrt{70}i}{35}$    | 0                         | 0                          | 0                          | 0                          | 0                         |
|     |                                       | 0  | 0                        | 0                          | $\frac{\sqrt{42}i}{84}$    | 0                        | 0                         | $-\frac{\sqrt{10}i}{25}$  | 0                          | 0                           | 0                         | $\frac{2\sqrt{14}i}{35}$   | 0                          | 0                          | 0                         |
|     |                                       | $\frac{\sqrt{210}i}{420}$                                  | 0                        | 0                          | 0                          | $-\frac{\sqrt{42}i}{84}$ | 0                         | 0                         | $\frac{8\sqrt{35}i}{175}$  | 0                           | 0                         | 0                          | $\frac{2\sqrt{105}i}{175}$ | 0                          | 0                         |
|     |                                       | 0  | $-\frac{\sqrt{42}i}{84}$ | 0                          | 0                          | 0                        | $\frac{\sqrt{210}i}{420}$ | 0                         | 0                          | $-\frac{2\sqrt{105}i}{175}$ | 0                         | 0                          | 0                          | $-\frac{8\sqrt{35}i}{175}$ | 0                         |
|     |                                       | 0  | 0                        | $\frac{\sqrt{42}i}{84}$    | 0                          | 0                        | 0                         | 0                         | 0                          | $-\frac{2\sqrt{14}i}{35}$   | 0                         | 0                          | 0                          | 0                          | $\frac{\sqrt{10}i}{25}$   |
|     |                                       | 0  | 0                        | 0                          | $-\frac{\sqrt{210}i}{420}$ | 0                        | 0                         | 0                         | 0                          | 0                           | $\frac{\sqrt{70}i}{35}$   | 0                          | 0                          | 0                          | 0                         |
| 579 | symmetry                              | $\frac{x(8x^4-40x^2y^2-40x^2z^2+15y^4+30y^2z^2+15z^4)}{8}$ |                          |                            |                            |                          |                           |                           |                            |                             |                           |                            |                            |                            |                           |
|     | $\mathbb{Q}_{5,0}^{(1,-1;a)}(T_1, 1)$ | 0  | 0                        | 0                          | 0                          | 0                        | 0                         | $-\frac{\sqrt{6}}{160}$   | 0                          | $\frac{\sqrt{30}}{160}$     | 0                         | $-\frac{7\sqrt{2}}{160}$   | 0                          | $\frac{3\sqrt{42}}{160}$   | 0                         |
|     |                                       | 0  | 0                        | 0                          | 0                          | 0                        | 0                         | $-\frac{\sqrt{14}}{160}$  | 0                          | $\frac{3\sqrt{6}}{160}$     | 0                         | $-\frac{3\sqrt{10}}{160}$  | 0                          | $\frac{7\sqrt{2}}{160}$    | 0                         |
|     |                                       | 0  | 0                        | 0                          | 0                          | 0                        | 0                         | $\frac{7\sqrt{2}}{160}$   | 0                          | $-\frac{3\sqrt{10}}{160}$   | 0                         | $\frac{3\sqrt{6}}{160}$    | 0                          | $-\frac{\sqrt{14}}{160}$   | 0                         |
|     |                                       | 0  | 0                        | 0                          | 0                          | 0                        | 0                         | $\frac{3\sqrt{42}}{160}$  | 0                          | $-\frac{7\sqrt{2}}{160}$    | 0                         | $\frac{\sqrt{30}}{160}$    | 0                          | $-\frac{\sqrt{6}}{160}$    | 0                         |
|     |                                       | 0  | $-\frac{1}{112}$         | 0                          | $\frac{\sqrt{2}}{48}$      | 0                        | $-\frac{3\sqrt{5}}{80}$   | $\frac{\sqrt{210}}{560}$  | 0                          | $-\frac{3\sqrt{10}}{112}$   | 0                         | $\frac{\sqrt{6}}{16}$      | 0                          | $-\frac{3\sqrt{30}}{80}$   | 0                         |
|     |                                       | $-\frac{1}{112}$   | 0                        | $\frac{\sqrt{10}}{112}$    | 0                          | $-\frac{\sqrt{5}}{48}$   | 0                         | 0                         | $-\frac{23\sqrt{6}}{560}$  | 0                           | $\frac{13\sqrt{30}}{560}$ | 0                          | $-\frac{3\sqrt{2}}{80}$    | 0                          | $-\frac{3\sqrt{42}}{80}$  |
|     |                                       | 0  | $\frac{\sqrt{10}}{112}$  | 0                          | $-\frac{\sqrt{5}}{56}$     | 0                        | $\frac{\sqrt{2}}{48}$     | $-\frac{\sqrt{21}}{40}$   | 0                          | $\frac{33}{280}$            | 0                         | $-\frac{\sqrt{15}}{280}$   | 0                          | $-\frac{3\sqrt{3}}{40}$    | 0                         |
|     |                                       | $\frac{\sqrt{2}}{48}$                                      | 0                        | $-\frac{\sqrt{5}}{56}$     | 0                          | $\frac{\sqrt{10}}{112}$  | 0                         | 0                         | $\frac{3\sqrt{3}}{40}$     | 0                           | $\frac{\sqrt{15}}{280}$   | 0                          | $-\frac{33}{280}$          | 0                          | $\frac{\sqrt{21}}{40}$    |
|     |                                       | 0  | $-\frac{\sqrt{5}}{48}$   | 0                          | $\frac{\sqrt{10}}{112}$    | 0                        | $-\frac{1}{112}$          | $\frac{3\sqrt{42}}{80}$   | 0                          | $\frac{3\sqrt{2}}{80}$      | 0                         | $-\frac{13\sqrt{30}}{560}$ | 0                          | $\frac{23\sqrt{6}}{560}$   | 0                         |
|     |                                       | $-\frac{3\sqrt{5}}{80}$                                    | 0                        | $\frac{\sqrt{2}}{48}$      | 0                          | $-\frac{1}{112}$         | 0                         | 0                         | $\frac{3\sqrt{30}}{80}$    | 0                           | $-\frac{\sqrt{6}}{16}$    | 0                          | $\frac{3\sqrt{10}}{112}$   | 0                          | $-\frac{\sqrt{210}}{560}$ |
| 580 | symmetry                              | $\frac{y(15x^4-40x^2y^2+30x^2z^2+8y^4-40y^2z^2+15z^4)}{8}$ |                          |                            |                            |                          |                           |                           |                            |                             |                           |                            |                            |                            |                           |

continued ...

Table 9

| No. | multipole                             | matrix   |                          |                           |                          |                           |                         |                           |                            |                           |                             |                             |                           |                            |                            |
|-----|---------------------------------------|--|--------------------------|---------------------------|--------------------------|---------------------------|-------------------------|---------------------------|----------------------------|---------------------------|-----------------------------|-----------------------------|---------------------------|----------------------------|----------------------------|
|     | $\mathbb{Q}_{5,1}^{(1,-1;a)}(T_1, 1)$ | 0  | 0                        | 0                         | 0                        | 0                         | 0                       | 0                         | $-\frac{\sqrt{6}i}{160}$   | 0                         | $-\frac{\sqrt{30}i}{160}$   | 0                           | $-\frac{7\sqrt{2}i}{160}$ | 0                          | $-\frac{3\sqrt{42}i}{160}$ |
|     |                                       | 0  | 0                        | 0                         | 0                        | 0                         | 0                       | $\frac{\sqrt{14}i}{160}$  | 0                          | $\frac{3\sqrt{6}i}{160}$  | 0                           | $\frac{3\sqrt{10}i}{160}$   | 0                         | $\frac{7\sqrt{2}i}{160}$   | 0                          |
|     |                                       | 0  | 0                        | 0                         | 0                        | 0                         | 0                       | 0                         | $-\frac{7\sqrt{2}i}{160}$  | 0                         | $-\frac{3\sqrt{10}i}{160}$  | 0                           | $-\frac{3\sqrt{6}i}{160}$ | 0                          | $-\frac{\sqrt{14}i}{160}$  |
|     |                                       | 0  | 0                        | 0                         | 0                        | 0                         | 0                       | $\frac{3\sqrt{42}i}{160}$ | 0                          | $\frac{7\sqrt{2}i}{160}$  | 0                           | $\frac{\sqrt{30}i}{160}$    | 0                         | $\frac{\sqrt{6}i}{160}$    | 0                          |
|     |                                       | 0  | $\frac{i}{112}$          | 0                         | $\frac{\sqrt{2}i}{48}$   | 0                         | $\frac{3\sqrt{5}i}{80}$ | $\frac{\sqrt{210}i}{560}$ | 0                          | $\frac{3\sqrt{10}i}{112}$ | 0                           | $\frac{\sqrt{6}i}{16}$      | 0                         | $\frac{3\sqrt{30}i}{80}$   | 0                          |
|     |                                       | $-\frac{i}{112}$   | 0                        | $-\frac{\sqrt{10}i}{112}$ | 0                        | $-\frac{\sqrt{5}i}{48}$   | 0                       | 0                         | $-\frac{23\sqrt{6}i}{560}$ | 0                         | $-\frac{13\sqrt{30}i}{560}$ | 0                           | $-\frac{3\sqrt{2}i}{80}$  | 0                          | $\frac{3\sqrt{42}i}{80}$   |
|     |                                       | 0  | $\frac{\sqrt{10}i}{112}$ | 0                         | $\frac{\sqrt{5}i}{56}$   | 0                         | $\frac{\sqrt{2}i}{48}$  | $\frac{\sqrt{21}i}{40}$   | 0                          | $\frac{33i}{280}$         | 0                           | $\frac{\sqrt{15}i}{280}$    | 0                         | $-\frac{3\sqrt{3}i}{40}$   | 0                          |
|     |                                       | $-\frac{\sqrt{2}i}{48}$                                    | 0                        | $-\frac{\sqrt{5}i}{56}$   | 0                        | $-\frac{\sqrt{10}i}{112}$ | 0                       | 0                         | $-\frac{3\sqrt{3}i}{40}$   | 0                         | $\frac{\sqrt{15}i}{280}$    | 0                           | $\frac{33i}{280}$         | 0                          | $\frac{\sqrt{21}i}{40}$    |
|     |                                       | 0  | $\frac{\sqrt{5}i}{48}$   | 0                         | $\frac{\sqrt{10}i}{112}$ | 0                         | $\frac{i}{112}$         | $\frac{3\sqrt{42}i}{80}$  | 0                          | $-\frac{3\sqrt{2}i}{80}$  | 0                           | $-\frac{13\sqrt{30}i}{560}$ | 0                         | $-\frac{23\sqrt{6}i}{560}$ | 0                          |
|     |                                       | $-\frac{3\sqrt{5}i}{80}$                                   | 0                        | $-\frac{\sqrt{2}i}{48}$   | 0                        | $-\frac{i}{112}$          | 0                       | 0                         | $\frac{3\sqrt{30}i}{80}$   | 0                         | $\frac{\sqrt{6}i}{16}$      | 0                           | $\frac{3\sqrt{10}i}{112}$ | 0                          | $\frac{\sqrt{210}i}{560}$  |
| 581 | symmetry                              | $\frac{z(15x^4+30x^2y^2-40x^2z^2+15y^4-40y^2z^2+8z^4)}{8}$ |                          |                           |                          |                           |                         |                           |                            |                           |                             |                             |                           |                            |                            |
|     | $\mathbb{Q}_{5,2}^{(1,-1;a)}(T_1, 1)$ | 0  | 0                        | 0                         | 0                        | 0                         | 0                       | 0                         | $\frac{\sqrt{2}}{20}$      | 0                         | 0                           | 0                           | 0                         | 0                          | 0                          |
|     |                                       | 0  | 0                        | 0                         | 0                        | 0                         | 0                       | 0                         | 0                          | $-\frac{\sqrt{10}}{20}$   | 0                           | 0                           | 0                         | 0                          | 0                          |
|     |                                       | 0  | 0                        | 0                         | 0                        | 0                         | 0                       | 0                         | 0                          | 0                         | $\frac{\sqrt{10}}{20}$      | 0                           | 0                         | 0                          | 0                          |
|     |                                       | 0  | 0                        | 0                         | 0                        | 0                         | 0                       | 0                         | 0                          | 0                         | 0                           | $-\frac{\sqrt{2}}{20}$      | 0                         | 0                          | 0                          |
|     |                                       | $-\frac{\sqrt{5}}{210}$                                    | 0                        | 0                         | 0                        | 0                         | 0                       | 0                         | $-\frac{\sqrt{30}}{35}$    | 0                         | 0                           | 0                           | 0                         | 0                          | 0                          |
|     |                                       | 0  | $\frac{\sqrt{5}}{42}$    | 0                         | 0                        | 0                         | 0                       | 0                         | $\frac{9\sqrt{2}}{35}$     | 0                         | 0                           | 0                           | 0                         | 0                          | 0                          |
|     |                                       | 0  | 0                        | $-\frac{\sqrt{5}}{21}$    | 0                        | 0                         | 0                       | 0                         | 0                          | $-\frac{2\sqrt{15}}{35}$  | 0                           | 0                           | 0                         | 0                          | 0                          |
|     |                                       | 0  | 0                        | 0                         | $\frac{\sqrt{5}}{21}$    | 0                         | 0                       | 0                         | 0                          | 0                         | $-\frac{2\sqrt{15}}{35}$    | 0                           | 0                         | 0                          | 0                          |
|     |                                       | 0  | 0                        | 0                         | 0                        | $-\frac{\sqrt{5}}{42}$    | 0                       | 0                         | 0                          | 0                         | 0                           | $\frac{9\sqrt{2}}{35}$      | 0                         | 0                          | 0                          |
|     |                                       | 0  | 0                        | 0                         | 0                        | 0                         | $\frac{\sqrt{5}}{210}$  | 0                         | 0                          | 0                         | 0                           | 0                           | 0                         | $-\frac{\sqrt{30}}{35}$    | 0                          |
| 582 | symmetry                              | $\frac{3\sqrt{35}x(y^2-2yz-z^2)(y^2+2yz-z^2)}{8}$          |                          |                           |                          |                           |                         |                           |                            |                           |                             |                             |                           |                            |                            |

continued ...

Table 9

| No. | multipole                             | matrix  |                           |                           |                            |                           |                            |                            |                               |                             |                             |                             |                             |                               |                            |
|-----|---------------------------------------|---|---------------------------|---------------------------|----------------------------|---------------------------|----------------------------|----------------------------|-------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-------------------------------|----------------------------|
|     | $\mathbb{Q}_{5,0}^{(1,-1;a)}(T_1, 2)$ | 0   | 0                         | 0                         | 0                          | 0                         | 0                          | 0                          | $-\frac{\sqrt{210}}{800}$     | 0                           | $\frac{\sqrt{42}}{160}$     | 0                           | $\frac{9\sqrt{70}}{800}$    | 0                             | $\frac{\sqrt{30}}{160}$    |
|     |                                       | 0   | 0                         | 0                         | 0                          | 0                         | 0                          | $\frac{9\sqrt{10}}{800}$   | 0                             | $\frac{3\sqrt{210}}{800}$   | 0                           | $-\frac{3\sqrt{14}}{160}$   | 0                           | $-\frac{9\sqrt{70}}{800}$     | 0                          |
|     |                                       | 0   | 0                         | 0                         | 0                          | 0                         | 0                          | 0                          | $-\frac{9\sqrt{70}}{800}$     | 0                           | $-\frac{3\sqrt{14}}{160}$   | 0                           | $\frac{3\sqrt{210}}{800}$   | 0                             | $\frac{9\sqrt{10}}{800}$   |
|     |                                       | 0   | 0                         | 0                         | 0                          | 0                         | 0                          | $\frac{\sqrt{30}}{160}$    | 0                             | $\frac{9\sqrt{70}}{800}$    | 0                           | $\frac{\sqrt{42}}{160}$     | 0                           | $-\frac{\sqrt{210}}{800}$     | 0                          |
|     |                                       | 0   | $-\frac{\sqrt{35}}{560}$  | 0                         | $-\frac{3\sqrt{70}}{560}$  | 0                         | $-\frac{\sqrt{7}}{112}$    | $\frac{\sqrt{6}}{80}$      | 0                             | $-\frac{3\sqrt{14}}{112}$   | 0                           | $-\frac{9\sqrt{210}}{560}$  | 0                           | $-\frac{\sqrt{42}}{112}$      | 0                          |
|     |                                       | $-\frac{\sqrt{35}}{560}$                          | 0                         | $\frac{\sqrt{14}}{112}$   | 0                          | $\frac{3\sqrt{7}}{112}$   | 0                          | 0                          | $-\frac{23\sqrt{210}}{2800}$  | 0                           | $\frac{13\sqrt{42}}{560}$   | 0                           | $\frac{27\sqrt{70}}{2800}$  | 0                             | $-\frac{\sqrt{30}}{80}$    |
|     |                                       | 0   | $\frac{\sqrt{14}}{112}$   | 0                         | $-\frac{\sqrt{7}}{56}$     | 0                         | $-\frac{3\sqrt{70}}{560}$  | $\frac{9\sqrt{15}}{200}$   | 0                             | $\frac{33\sqrt{35}}{1400}$  | 0                           | $-\frac{\sqrt{21}}{280}$    | 0                           | $\frac{27\sqrt{105}}{1400}$   | 0                          |
|     |                                       | $-\frac{3\sqrt{70}}{560}$                         | 0                         | $-\frac{\sqrt{7}}{56}$    | 0                          | $\frac{\sqrt{14}}{112}$   | 0                          | 0                          | $-\frac{27\sqrt{105}}{1400}$  | 0                           | $\frac{\sqrt{21}}{280}$     | 0                           | $-\frac{33\sqrt{35}}{1400}$ | 0                             | $-\frac{9\sqrt{15}}{200}$  |
|     |                                       | 0   | $\frac{3\sqrt{7}}{112}$   | 0                         | $\frac{\sqrt{14}}{112}$    | 0                         | $-\frac{\sqrt{35}}{560}$   | $\frac{\sqrt{30}}{80}$     | 0                             | $-\frac{27\sqrt{70}}{2800}$ | 0                           | $-\frac{13\sqrt{42}}{560}$  | 0                           | $\frac{23\sqrt{210}}{2800}$   | 0                          |
|     |                                       | $-\frac{\sqrt{7}}{112}$                           | 0                         | $-\frac{3\sqrt{70}}{560}$ | 0                          | $-\frac{\sqrt{35}}{560}$  | 0                          | 0                          | $\frac{\sqrt{42}}{112}$       | 0                           | $\frac{9\sqrt{210}}{560}$   | 0                           | $\frac{3\sqrt{14}}{112}$    | 0                             | $-\frac{\sqrt{6}}{80}$     |
| 583 | symmetry                              | $\frac{3\sqrt{35}y(x^2-2xz-z^2)(x^2+2xz-z^2)}{8}$ |                           |                           |                            |                           |                            |                            |                               |                             |                             |                             |                             |                               |                            |
|     | $\mathbb{Q}_{5,1}^{(1,-1;a)}(T_1, 2)$ | 0   | 0                         | 0                         | 0                          | 0                         | 0                          | 0                          | $-\frac{\sqrt{210}i}{800}$    | 0                           | $-\frac{\sqrt{42}i}{160}$   | 0                           | $\frac{9\sqrt{70}i}{800}$   | 0                             | $-\frac{\sqrt{30}i}{160}$  |
|     |                                       | 0   | 0                         | 0                         | 0                          | 0                         | 0                          | $-\frac{9\sqrt{10}i}{800}$ | 0                             | $\frac{3\sqrt{210}i}{800}$  | 0                           | $\frac{3\sqrt{14}i}{160}$   | 0                           | $-\frac{9\sqrt{70}i}{800}$    | 0                          |
|     |                                       | 0   | 0                         | 0                         | 0                          | 0                         | 0                          | 0                          | $\frac{9\sqrt{70}i}{800}$     | 0                           | $-\frac{3\sqrt{14}i}{160}$  | 0                           | $-\frac{3\sqrt{210}i}{800}$ | 0                             | $\frac{9\sqrt{10}i}{800}$  |
|     |                                       | 0   | 0                         | 0                         | 0                          | 0                         | 0                          | $\frac{\sqrt{30}i}{160}$   | 0                             | $-\frac{9\sqrt{70}i}{800}$  | 0                           | $\frac{\sqrt{42}i}{160}$    | 0                           | $\frac{\sqrt{210}i}{800}$     | 0                          |
|     |                                       | 0   | $\frac{\sqrt{35}i}{560}$  | 0                         | $-\frac{3\sqrt{70}i}{560}$ | 0                         | $\frac{\sqrt{7}i}{112}$    | $\frac{\sqrt{6}i}{80}$     | 0                             | $\frac{3\sqrt{14}i}{112}$   | 0                           | $-\frac{9\sqrt{210}i}{560}$ | 0                           | $\frac{\sqrt{42}i}{112}$      | 0                          |
|     |                                       | $-\frac{\sqrt{35}i}{560}$                         | 0                         | $-\frac{\sqrt{14}i}{112}$ | 0                          | $\frac{3\sqrt{7}i}{112}$  | 0                          | 0                          | $-\frac{23\sqrt{210}i}{2800}$ | 0                           | $-\frac{13\sqrt{42}i}{560}$ | 0                           | $\frac{27\sqrt{70}i}{2800}$ | 0                             | $\frac{\sqrt{30}i}{80}$    |
|     |                                       | 0   | $\frac{\sqrt{14}i}{112}$  | 0                         | $\frac{\sqrt{7}i}{56}$     | 0                         | $-\frac{3\sqrt{70}i}{560}$ | $-\frac{9\sqrt{15}i}{200}$ | 0                             | $\frac{33\sqrt{35}i}{1400}$ | 0                           | $\frac{\sqrt{21}i}{280}$    | 0                           | $\frac{27\sqrt{105}i}{1400}$  | 0                          |
|     |                                       | $\frac{3\sqrt{70}i}{560}$                         | 0                         | $-\frac{\sqrt{7}i}{56}$   | 0                          | $-\frac{\sqrt{14}i}{112}$ | 0                          | 0                          | $\frac{27\sqrt{105}i}{1400}$  | 0                           | $\frac{\sqrt{21}i}{280}$    | 0                           | $\frac{33\sqrt{35}i}{1400}$ | 0                             | $-\frac{9\sqrt{15}i}{200}$ |
|     |                                       | 0   | $-\frac{3\sqrt{7}i}{112}$ | 0                         | $\frac{\sqrt{14}i}{112}$   | 0                         | $\frac{\sqrt{35}i}{560}$   | $\frac{\sqrt{30}i}{80}$    | 0                             | $\frac{27\sqrt{70}i}{2800}$ | 0                           | $-\frac{13\sqrt{42}i}{560}$ | 0                           | $-\frac{23\sqrt{210}i}{2800}$ | 0                          |
|     |                                       | $-\frac{\sqrt{7}i}{112}$                          | 0                         | $\frac{3\sqrt{70}i}{560}$ | 0                          | $-\frac{\sqrt{35}i}{560}$ | 0                          | 0                          | $\frac{\sqrt{42}i}{112}$      | 0                           | $-\frac{9\sqrt{210}i}{560}$ | 0                           | $\frac{3\sqrt{14}i}{112}$   | 0                             | $\frac{\sqrt{6}i}{80}$     |
| 584 | symmetry                              | $\frac{3\sqrt{35}z(x^2-2xy-y^2)(x^2+2xy-y^2)}{8}$ |                           |                           |                            |                           |                            |                            |                               |                             |                             |                             |                             |                               |                            |

continued ...

Table 9

| No.                                   | multipole   | matrix  |                         |                           |                          |                           |                          |                             |                            |                           |                            |                             |                            |                           |   |   |   |   |   |   |   |   |                          |   |                        |   |                           |                          |                          |   |   |   |   |   |   |                          |   |                          |   |                         |   |                          |                           |   |   |   |   |   |   |                          |                          |   |                         |   |                          |   |                          |   |   |   |   |   |   |                          |                           |                           |   |                        |   |                          |   |   |                           |   |                          |                         |                        |                       |   |                         |   |                          |                          |                         |   |                           |   |                         |   |                          |                        |   |                             |   |                           |   |                             |                           |                         |   |                         |   |                         |   |                          |                          |   |                            |   |                         |   |                           |                         |                          |   |                         |   |                         |   |                         |                          |   |                        |   |                             |   |                         |                         |                          |   |                         |   |                           |                          |   |                            |   |                            |   |                            |   |                        |   |                          |   |                           |   |   |                          |   |                           |                          |                        |   |                        |   |   |
|---------------------------------------|---|---|-------------------------|---------------------------|--------------------------|---------------------------|--------------------------|-----------------------------|----------------------------|---------------------------|----------------------------|-----------------------------|----------------------------|---------------------------|---|---|---|---|---|---|---|---|--------------------------|---|------------------------|---|---------------------------|--------------------------|--------------------------|---|---|---|---|---|---|--------------------------|---|--------------------------|---|-------------------------|---|--------------------------|---------------------------|---|---|---|---|---|---|--------------------------|--------------------------|---|-------------------------|---|--------------------------|---|--------------------------|---|---|---|---|---|---|--------------------------|---------------------------|---------------------------|---|------------------------|---|--------------------------|---|---|---------------------------|---|--------------------------|-------------------------|------------------------|-----------------------|---|-------------------------|---|--------------------------|--------------------------|-------------------------|---|---------------------------|---|-------------------------|---|--------------------------|------------------------|---|-----------------------------|---|---------------------------|---|-----------------------------|---------------------------|-------------------------|---|-------------------------|---|-------------------------|---|--------------------------|--------------------------|---|----------------------------|---|-------------------------|---|---------------------------|-------------------------|--------------------------|---|-------------------------|---|-------------------------|---|-------------------------|--------------------------|---|------------------------|---|-----------------------------|---|-------------------------|-------------------------|--------------------------|---|-------------------------|---|---------------------------|--------------------------|---|----------------------------|---|----------------------------|---|----------------------------|---|------------------------|---|--------------------------|---|---------------------------|---|---|--------------------------|---|---------------------------|--------------------------|------------------------|---|------------------------|---|---|
| $\mathbb{Q}_{5,2}^{(1,-1;a)}(T_1, 2)$ | <table><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td><math>\frac{\sqrt{210}}{100}</math></td><td>0</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td><math>-\frac{3\sqrt{10}}{100}</math></td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td><math>\frac{3\sqrt{10}}{100}</math></td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td><math>-\frac{\sqrt{210}}{100}</math></td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td><math>-\frac{\sqrt{35}}{70}</math></td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td><math>-\frac{3\sqrt{14}}{35}</math></td><td>0</td><td>0</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td><math>\frac{\sqrt{35}}{70}</math></td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td><math>-\frac{\sqrt{210}}{175}</math></td><td>0</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td><math>\frac{2\sqrt{15}}{25}</math></td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td><math>\frac{2\sqrt{15}}{25}</math></td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td><math>-\frac{\sqrt{35}}{70}</math></td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td><math>-\frac{\sqrt{210}}{175}</math></td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td><math>\frac{\sqrt{35}}{70}</math></td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td><math>-\frac{3\sqrt{14}}{35}</math></td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr></table>   |   |                         |                           |                          |                           |                          |                             |                            |                           |                            |                             |                            |                           |   | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0                        | 0 | 0                      | 0 | 0                         | $\frac{\sqrt{210}}{100}$ | 0                        | 0 | 0 | 0 | 0 | 0 | 0 | 0                        | 0 | 0                        | 0 | 0                       | 0 | 0                        | $-\frac{3\sqrt{10}}{100}$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{10}}{100}$ | 0                        | 0 | 0                       | 0 | 0                        | 0 | 0                        | 0 | 0 | 0 | 0 | 0 | 0 | 0                        | $-\frac{\sqrt{210}}{100}$ | 0                         | 0 | 0                      | 0 | 0                        | 0 | 0 | 0                         | 0 | 0                        | $-\frac{\sqrt{35}}{70}$ | 0                      | 0                     | 0 | 0                       | 0 | 0                        | $-\frac{3\sqrt{14}}{35}$ | 0                       | 0 | 0                         | 0 | 0                       | 0 | 0                        | $\frac{\sqrt{35}}{70}$ | 0 | 0                           | 0 | 0                         | 0 | 0                           | $-\frac{\sqrt{210}}{175}$ | 0                       | 0 | 0                       | 0 | 0                       | 0 | 0                        | 0                        | 0 | 0                          | 0 | 0                       | 0 | 0                         | $\frac{2\sqrt{15}}{25}$ | 0                        | 0 | 0                       | 0 | 0                       | 0 | $\frac{2\sqrt{15}}{25}$ | 0                        | 0 | 0                      | 0 | 0                           | 0 | 0                       | $-\frac{\sqrt{35}}{70}$ | 0                        | 0 | 0                       | 0 | 0                         | 0                        | 0 | $-\frac{\sqrt{210}}{175}$  | 0 | 0                          | 0 | 0                          | 0 | 0                      | 0 | $\frac{\sqrt{35}}{70}$   | 0 | 0                         | 0 | 0 | 0                        | 0 | 0                         | $-\frac{3\sqrt{14}}{35}$ | 0                      | 0 | 0                      | 0 | 0 |
|                                       | 0   | 0   | 0                       | 0                         | 0                        | 0                         | 0                        | 0                           | 0                          | 0                         | 0                          | 0                           | $\frac{\sqrt{210}}{100}$   | 0                         |   |   |   |   |   |   |   |   |                          |   |                        |   |                           |                          |                          |   |   |   |   |   |   |                          |   |                          |   |                         |   |                          |                           |   |   |   |   |   |   |                          |                          |   |                         |   |                          |   |                          |   |   |   |   |   |   |                          |                           |                           |   |                        |   |                          |   |   |                           |   |                          |                         |                        |                       |   |                         |   |                          |                          |                         |   |                           |   |                         |   |                          |                        |   |                             |   |                           |   |                             |                           |                         |   |                         |   |                         |   |                          |                          |   |                            |   |                         |   |                           |                         |                          |   |                         |   |                         |   |                         |                          |   |                        |   |                             |   |                         |                         |                          |   |                         |   |                           |                          |   |                            |   |                            |   |                            |   |                        |   |                          |   |                           |   |   |                          |   |                           |                          |                        |   |                        |   |   |
|                                       | 0   | 0   | 0                       | 0                         | 0                        | 0                         | 0                        | 0                           | 0                          | 0                         | 0                          | 0                           | 0                          | $-\frac{3\sqrt{10}}{100}$ |   |   |   |   |   |   |   |   |                          |   |                        |   |                           |                          |                          |   |   |   |   |   |   |                          |   |                          |   |                         |   |                          |                           |   |   |   |   |   |   |                          |                          |   |                         |   |                          |   |                          |   |   |   |   |   |   |                          |                           |                           |   |                        |   |                          |   |   |                           |   |                          |                         |                        |                       |   |                         |   |                          |                          |                         |   |                           |   |                         |   |                          |                        |   |                             |   |                           |   |                             |                           |                         |   |                         |   |                         |   |                          |                          |   |                            |   |                         |   |                           |                         |                          |   |                         |   |                         |   |                         |                          |   |                        |   |                             |   |                         |                         |                          |   |                         |   |                           |                          |   |                            |   |                            |   |                            |   |                        |   |                          |   |                           |   |   |                          |   |                           |                          |                        |   |                        |   |   |
|                                       | 0   | 0   | 0                       | 0                         | 0                        | 0                         | $\frac{3\sqrt{10}}{100}$ | 0                           | 0                          | 0                         | 0                          | 0                           | 0                          | 0                         |   |   |   |   |   |   |   |   |                          |   |                        |   |                           |                          |                          |   |   |   |   |   |   |                          |   |                          |   |                         |   |                          |                           |   |   |   |   |   |   |                          |                          |   |                         |   |                          |   |                          |   |   |   |   |   |   |                          |                           |                           |   |                        |   |                          |   |   |                           |   |                          |                         |                        |                       |   |                         |   |                          |                          |                         |   |                           |   |                         |   |                          |                        |   |                             |   |                           |   |                             |                           |                         |   |                         |   |                         |   |                          |                          |   |                            |   |                         |   |                           |                         |                          |   |                         |   |                         |   |                         |                          |   |                        |   |                             |   |                         |                         |                          |   |                         |   |                           |                          |   |                            |   |                            |   |                            |   |                        |   |                          |   |                           |   |   |                          |   |                           |                          |                        |   |                        |   |   |
|                                       | 0   | 0   | 0                       | 0                         | 0                        | 0                         | 0                        | $-\frac{\sqrt{210}}{100}$   | 0                          | 0                         | 0                          | 0                           | 0                          | 0                         |   |   |   |   |   |   |   |   |                          |   |                        |   |                           |                          |                          |   |   |   |   |   |   |                          |   |                          |   |                         |   |                          |                           |   |   |   |   |   |   |                          |                          |   |                         |   |                          |   |                          |   |   |   |   |   |   |                          |                           |                           |   |                        |   |                          |   |   |                           |   |                          |                         |                        |                       |   |                         |   |                          |                          |                         |   |                           |   |                         |   |                          |                        |   |                             |   |                           |   |                             |                           |                         |   |                         |   |                         |   |                          |                          |   |                            |   |                         |   |                           |                         |                          |   |                         |   |                         |   |                         |                          |   |                        |   |                             |   |                         |                         |                          |   |                         |   |                           |                          |   |                            |   |                            |   |                            |   |                        |   |                          |   |                           |   |   |                          |   |                           |                          |                        |   |                        |   |   |
|                                       | 0   | 0   | 0                       | 0                         | $-\frac{\sqrt{35}}{70}$  | 0                         | 0                        | 0                           | 0                          | 0                         | 0                          | $-\frac{3\sqrt{14}}{35}$    | 0                          | 0                         |   |   |   |   |   |   |   |   |                          |   |                        |   |                           |                          |                          |   |   |   |   |   |   |                          |   |                          |   |                         |   |                          |                           |   |   |   |   |   |   |                          |                          |   |                         |   |                          |   |                          |   |   |   |   |   |   |                          |                           |                           |   |                        |   |                          |   |   |                           |   |                          |                         |                        |                       |   |                         |   |                          |                          |                         |   |                           |   |                         |   |                          |                        |   |                             |   |                           |   |                             |                           |                         |   |                         |   |                         |   |                          |                          |   |                            |   |                         |   |                           |                         |                          |   |                         |   |                         |   |                         |                          |   |                        |   |                             |   |                         |                         |                          |   |                         |   |                           |                          |   |                            |   |                            |   |                            |   |                        |   |                          |   |                           |   |   |                          |   |                           |                          |                        |   |                        |   |   |
|                                       | 0   | 0   | 0                       | 0                         | 0                        | $\frac{\sqrt{35}}{70}$    | 0                        | 0                           | 0                          | 0                         | 0                          | 0                           | $-\frac{\sqrt{210}}{175}$  | 0                         |   |   |   |   |   |   |   |   |                          |   |                        |   |                           |                          |                          |   |   |   |   |   |   |                          |   |                          |   |                         |   |                          |                           |   |   |   |   |   |   |                          |                          |   |                         |   |                          |   |                          |   |   |   |   |   |   |                          |                           |                           |   |                        |   |                          |   |   |                           |   |                          |                         |                        |                       |   |                         |   |                          |                          |                         |   |                           |   |                         |   |                          |                        |   |                             |   |                           |   |                             |                           |                         |   |                         |   |                         |   |                          |                          |   |                            |   |                         |   |                           |                         |                          |   |                         |   |                         |   |                         |                          |   |                        |   |                             |   |                         |                         |                          |   |                         |   |                           |                          |   |                            |   |                            |   |                            |   |                        |   |                          |   |                           |   |   |                          |   |                           |                          |                        |   |                        |   |   |
|                                       | 0   | 0   | 0                       | 0                         | 0                        | 0                         | 0                        | 0                           | 0                          | 0                         | 0                          | 0                           | 0                          | $\frac{2\sqrt{15}}{25}$   |   |   |   |   |   |   |   |   |                          |   |                        |   |                           |                          |                          |   |   |   |   |   |   |                          |   |                          |   |                         |   |                          |                           |   |   |   |   |   |   |                          |                          |   |                         |   |                          |   |                          |   |   |   |   |   |   |                          |                           |                           |   |                        |   |                          |   |   |                           |   |                          |                         |                        |                       |   |                         |   |                          |                          |                         |   |                           |   |                         |   |                          |                        |   |                             |   |                           |   |                             |                           |                         |   |                         |   |                         |   |                          |                          |   |                            |   |                         |   |                           |                         |                          |   |                         |   |                         |   |                         |                          |   |                        |   |                             |   |                         |                         |                          |   |                         |   |                           |                          |   |                            |   |                            |   |                            |   |                        |   |                          |   |                           |   |   |                          |   |                           |                          |                        |   |                        |   |   |
|                                       | 0   | 0   | 0                       | 0                         | 0                        | 0                         | $\frac{2\sqrt{15}}{25}$  | 0                           | 0                          | 0                         | 0                          | 0                           | 0                          | 0                         |   |   |   |   |   |   |   |   |                          |   |                        |   |                           |                          |                          |   |   |   |   |   |   |                          |   |                          |   |                         |   |                          |                           |   |   |   |   |   |   |                          |                          |   |                         |   |                          |   |                          |   |   |   |   |   |   |                          |                           |                           |   |                        |   |                          |   |   |                           |   |                          |                         |                        |                       |   |                         |   |                          |                          |                         |   |                           |   |                         |   |                          |                        |   |                             |   |                           |   |                             |                           |                         |   |                         |   |                         |   |                          |                          |   |                            |   |                         |   |                           |                         |                          |   |                         |   |                         |   |                         |                          |   |                        |   |                             |   |                         |                         |                          |   |                         |   |                           |                          |   |                            |   |                            |   |                            |   |                        |   |                          |   |                           |   |   |                          |   |                           |                          |                        |   |                        |   |   |
|                                       | $-\frac{\sqrt{35}}{70}$   | 0   | 0                       | 0                         | 0                        | 0                         | 0                        | 0                           | $-\frac{\sqrt{210}}{175}$  | 0                         | 0                          | 0                           | 0                          | 0                         | 0 |   |   |   |   |   |   |   |                          |   |                        |   |                           |                          |                          |   |   |   |   |   |   |                          |   |                          |   |                         |   |                          |                           |   |   |   |   |   |   |                          |                          |   |                         |   |                          |   |                          |   |   |   |   |   |   |                          |                           |                           |   |                        |   |                          |   |   |                           |   |                          |                         |                        |                       |   |                         |   |                          |                          |                         |   |                           |   |                         |   |                          |                        |   |                             |   |                           |   |                             |                           |                         |   |                         |   |                         |   |                          |                          |   |                            |   |                         |   |                           |                         |                          |   |                         |   |                         |   |                         |                          |   |                        |   |                             |   |                         |                         |                          |   |                         |   |                           |                          |   |                            |   |                            |   |                            |   |                        |   |                          |   |                           |   |   |                          |   |                           |                          |                        |   |                        |   |   |
| 0                                     | $\frac{\sqrt{35}}{70}$  | 0   | 0                       | 0                         | 0                        | 0                         | 0                        | 0                           | $-\frac{3\sqrt{14}}{35}$   | 0                         | 0                          | 0                           | 0                          | 0                         |   |   |   |   |   |   |   |   |                          |   |                        |   |                           |                          |                          |   |   |   |   |   |   |                          |   |                          |   |                         |   |                          |                           |   |   |   |   |   |   |                          |                          |   |                         |   |                          |   |                          |   |   |   |   |   |   |                          |                           |                           |   |                        |   |                          |   |   |                           |   |                          |                         |                        |                       |   |                         |   |                          |                          |                         |   |                           |   |                         |   |                          |                        |   |                             |   |                           |   |                             |                           |                         |   |                         |   |                         |   |                          |                          |   |                            |   |                         |   |                           |                         |                          |   |                         |   |                         |   |                         |                          |   |                        |   |                             |   |                         |                         |                          |   |                         |   |                           |                          |   |                            |   |                            |   |                            |   |                        |   |                          |   |                           |   |   |                          |   |                           |                          |                        |   |                        |   |   |
| 585                                   | symmetry  | $\frac{\sqrt{105}x(y-z)(y+z)(2x^2-y^2-z^2)}{4}$ |                         |                           |                          |                           |                          |                             |                            |                           |                            |                             |                            |                           |   |   |   |   |   |   |   |   |                          |   |                        |   |                           |                          |                          |   |   |   |   |   |   |                          |   |                          |   |                         |   |                          |                           |   |   |   |   |   |   |                          |                          |   |                         |   |                          |   |                          |   |   |   |   |   |   |                          |                           |                           |   |                        |   |                          |   |   |                           |   |                          |                         |                        |                       |   |                         |   |                          |                          |                         |   |                           |   |                         |   |                          |                        |   |                             |   |                           |   |                             |                           |                         |   |                         |   |                         |   |                          |                          |   |                            |   |                         |   |                           |                         |                          |   |                         |   |                         |   |                         |                          |   |                        |   |                             |   |                         |                         |                          |   |                         |   |                           |                          |   |                            |   |                            |   |                            |   |                        |   |                          |   |                           |   |   |                          |   |                           |                          |                        |   |                        |   |   |
| $\mathbb{Q}_{5,0}^{(1,-1;a)}(T_2)$    | <table><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td><math>-\frac{\sqrt{70}}{400}</math></td><td>0</td><td><math>\frac{\sqrt{14}}{80}</math></td><td>0</td><td><math>-\frac{\sqrt{210}}{400}</math></td><td>0</td><td><math>-\frac{3\sqrt{10}}{80}</math></td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td><math>-\frac{\sqrt{30}}{400}</math></td><td>0</td><td><math>\frac{3\sqrt{70}}{400}</math></td><td>0</td><td><math>-\frac{\sqrt{42}}{80}</math></td><td>0</td><td><math>\frac{\sqrt{210}}{400}</math></td><td>0</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td><math>\frac{\sqrt{210}}{400}</math></td><td>0</td><td><math>-\frac{\sqrt{42}}{80}</math></td><td>0</td><td><math>\frac{3\sqrt{70}}{400}</math></td><td>0</td><td><math>-\frac{\sqrt{30}}{400}</math></td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td><math>-\frac{3\sqrt{10}}{80}</math></td><td>0</td><td><math>-\frac{\sqrt{210}}{400}</math></td><td>0</td><td><math>\frac{\sqrt{14}}{80}</math></td><td>0</td><td><math>-\frac{\sqrt{70}}{400}</math></td><td>0</td></tr><tr><td>0</td><td><math>-\frac{\sqrt{105}}{840}</math></td><td>0</td><td><math>\frac{\sqrt{210}}{840}</math></td><td>0</td><td><math>\frac{\sqrt{21}}{56}</math></td><td><math>\frac{\sqrt{2}}{40}</math></td><td>0</td><td><math>-\frac{\sqrt{42}}{56}</math></td><td>0</td><td><math>\frac{3\sqrt{70}}{280}</math></td><td>0</td><td><math>\frac{3\sqrt{14}}{56}</math></td><td>0</td></tr><tr><td><math>-\frac{\sqrt{105}}{840}</math></td><td>0</td><td><math>\frac{\sqrt{42}}{168}</math></td><td>0</td><td><math>-\frac{\sqrt{21}}{168}</math></td><td>0</td><td>0</td><td><math>-\frac{23\sqrt{70}}{1400}</math></td><td>0</td><td><math>\frac{13\sqrt{14}}{280}</math></td><td>0</td><td><math>-\frac{3\sqrt{210}}{1400}</math></td><td>0</td><td><math>\frac{3\sqrt{10}}{40}</math></td></tr><tr><td>0</td><td><math>\frac{\sqrt{42}}{168}</math></td><td>0</td><td><math>-\frac{\sqrt{21}}{84}</math></td><td>0</td><td><math>\frac{\sqrt{210}}{840}</math></td><td><math>-\frac{3\sqrt{5}}{100}</math></td><td>0</td><td><math>\frac{11\sqrt{105}}{700}</math></td><td>0</td><td><math>-\frac{\sqrt{7}}{140}</math></td><td>0</td><td><math>-\frac{9\sqrt{35}}{700}</math></td><td>0</td></tr><tr><td><math>\frac{\sqrt{210}}{840}</math></td><td>0</td><td><math>-\frac{\sqrt{21}}{84}</math></td><td>0</td><td><math>\frac{\sqrt{42}}{168}</math></td><td>0</td><td>0</td><td><math>\frac{9\sqrt{35}}{700}</math></td><td>0</td><td><math>\frac{\sqrt{7}}{140}</math></td><td>0</td><td><math>-\frac{11\sqrt{105}}{700}</math></td><td>0</td><td><math>\frac{3\sqrt{5}}{100}</math></td></tr><tr><td>0</td><td><math>-\frac{\sqrt{21}}{168}</math></td><td>0</td><td><math>\frac{\sqrt{42}}{168}</math></td><td>0</td><td><math>-\frac{\sqrt{105}}{840}</math></td><td><math>-\frac{3\sqrt{10}}{40}</math></td><td>0</td><td><math>\frac{3\sqrt{210}}{1400}</math></td><td>0</td><td><math>-\frac{13\sqrt{14}}{280}</math></td><td>0</td><td><math>\frac{23\sqrt{70}}{1400}</math></td><td>0</td></tr><tr><td><math>\frac{\sqrt{21}}{56}</math></td><td>0</td><td><math>\frac{\sqrt{210}}{840}</math></td><td>0</td><td><math>-\frac{\sqrt{105}}{840}</math></td><td>0</td><td>0</td><td><math>-\frac{3\sqrt{14}}{56}</math></td><td>0</td><td><math>-\frac{3\sqrt{70}}{280}</math></td><td>0</td><td><math>\frac{\sqrt{42}}{56}</math></td><td>0</td><td><math>-\frac{\sqrt{2}}{40}</math></td></tr></table> |   |                         |                           |                          |                           |                          |                             |                            |                           |                            |                             |                            |                           |   | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{70}}{400}$ | 0 | $\frac{\sqrt{14}}{80}$ | 0 | $-\frac{\sqrt{210}}{400}$ | 0                        | $-\frac{3\sqrt{10}}{80}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{30}}{400}$ | 0 | $\frac{3\sqrt{70}}{400}$ | 0 | $-\frac{\sqrt{42}}{80}$ | 0 | $\frac{\sqrt{210}}{400}$ | 0                         | 0 | 0 | 0 | 0 | 0 | 0 | 0                        | $\frac{\sqrt{210}}{400}$ | 0 | $-\frac{\sqrt{42}}{80}$ | 0 | $\frac{3\sqrt{70}}{400}$ | 0 | $-\frac{\sqrt{30}}{400}$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{10}}{80}$ | 0                         | $-\frac{\sqrt{210}}{400}$ | 0 | $\frac{\sqrt{14}}{80}$ | 0 | $-\frac{\sqrt{70}}{400}$ | 0 | 0 | $-\frac{\sqrt{105}}{840}$ | 0 | $\frac{\sqrt{210}}{840}$ | 0                       | $\frac{\sqrt{21}}{56}$ | $\frac{\sqrt{2}}{40}$ | 0 | $-\frac{\sqrt{42}}{56}$ | 0 | $\frac{3\sqrt{70}}{280}$ | 0                        | $\frac{3\sqrt{14}}{56}$ | 0 | $-\frac{\sqrt{105}}{840}$ | 0 | $\frac{\sqrt{42}}{168}$ | 0 | $-\frac{\sqrt{21}}{168}$ | 0                      | 0 | $-\frac{23\sqrt{70}}{1400}$ | 0 | $\frac{13\sqrt{14}}{280}$ | 0 | $-\frac{3\sqrt{210}}{1400}$ | 0                         | $\frac{3\sqrt{10}}{40}$ | 0 | $\frac{\sqrt{42}}{168}$ | 0 | $-\frac{\sqrt{21}}{84}$ | 0 | $\frac{\sqrt{210}}{840}$ | $-\frac{3\sqrt{5}}{100}$ | 0 | $\frac{11\sqrt{105}}{700}$ | 0 | $-\frac{\sqrt{7}}{140}$ | 0 | $-\frac{9\sqrt{35}}{700}$ | 0                       | $\frac{\sqrt{210}}{840}$ | 0 | $-\frac{\sqrt{21}}{84}$ | 0 | $\frac{\sqrt{42}}{168}$ | 0 | 0                       | $\frac{9\sqrt{35}}{700}$ | 0 | $\frac{\sqrt{7}}{140}$ | 0 | $-\frac{11\sqrt{105}}{700}$ | 0 | $\frac{3\sqrt{5}}{100}$ | 0                       | $-\frac{\sqrt{21}}{168}$ | 0 | $\frac{\sqrt{42}}{168}$ | 0 | $-\frac{\sqrt{105}}{840}$ | $-\frac{3\sqrt{10}}{40}$ | 0 | $\frac{3\sqrt{210}}{1400}$ | 0 | $-\frac{13\sqrt{14}}{280}$ | 0 | $\frac{23\sqrt{70}}{1400}$ | 0 | $\frac{\sqrt{21}}{56}$ | 0 | $\frac{\sqrt{210}}{840}$ | 0 | $-\frac{\sqrt{105}}{840}$ | 0 | 0 | $-\frac{3\sqrt{14}}{56}$ | 0 | $-\frac{3\sqrt{70}}{280}$ | 0                        | $\frac{\sqrt{42}}{56}$ | 0 | $-\frac{\sqrt{2}}{40}$ |   |   |
|                                       | 0   | 0   | 0                       | 0                         | 0                        | 0                         | 0                        | $-\frac{\sqrt{70}}{400}$    | 0                          | $\frac{\sqrt{14}}{80}$    | 0                          | $-\frac{\sqrt{210}}{400}$   | 0                          | $-\frac{3\sqrt{10}}{80}$  |   |   |   |   |   |   |   |   |                          |   |                        |   |                           |                          |                          |   |   |   |   |   |   |                          |   |                          |   |                         |   |                          |                           |   |   |   |   |   |   |                          |                          |   |                         |   |                          |   |                          |   |   |   |   |   |   |                          |                           |                           |   |                        |   |                          |   |   |                           |   |                          |                         |                        |                       |   |                         |   |                          |                          |                         |   |                           |   |                         |   |                          |                        |   |                             |   |                           |   |                             |                           |                         |   |                         |   |                         |   |                          |                          |   |                            |   |                         |   |                           |                         |                          |   |                         |   |                         |   |                         |                          |   |                        |   |                             |   |                         |                         |                          |   |                         |   |                           |                          |   |                            |   |                            |   |                            |   |                        |   |                          |   |                           |   |   |                          |   |                           |                          |                        |   |                        |   |   |
|                                       | 0   | 0   | 0                       | 0                         | 0                        | 0                         | $-\frac{\sqrt{30}}{400}$ | 0                           | $\frac{3\sqrt{70}}{400}$   | 0                         | $-\frac{\sqrt{42}}{80}$    | 0                           | $\frac{\sqrt{210}}{400}$   | 0                         |   |   |   |   |   |   |   |   |                          |   |                        |   |                           |                          |                          |   |   |   |   |   |   |                          |   |                          |   |                         |   |                          |                           |   |   |   |   |   |   |                          |                          |   |                         |   |                          |   |                          |   |   |   |   |   |   |                          |                           |                           |   |                        |   |                          |   |   |                           |   |                          |                         |                        |                       |   |                         |   |                          |                          |                         |   |                           |   |                         |   |                          |                        |   |                             |   |                           |   |                             |                           |                         |   |                         |   |                         |   |                          |                          |   |                            |   |                         |   |                           |                         |                          |   |                         |   |                         |   |                         |                          |   |                        |   |                             |   |                         |                         |                          |   |                         |   |                           |                          |   |                            |   |                            |   |                            |   |                        |   |                          |   |                           |   |   |                          |   |                           |                          |                        |   |                        |   |   |
|                                       | 0   | 0   | 0                       | 0                         | 0                        | 0                         | 0                        | $\frac{\sqrt{210}}{400}$    | 0                          | $-\frac{\sqrt{42}}{80}$   | 0                          | $\frac{3\sqrt{70}}{400}$    | 0                          | $-\frac{\sqrt{30}}{400}$  |   |   |   |   |   |   |   |   |                          |   |                        |   |                           |                          |                          |   |   |   |   |   |   |                          |   |                          |   |                         |   |                          |                           |   |   |   |   |   |   |                          |                          |   |                         |   |                          |   |                          |   |   |   |   |   |   |                          |                           |                           |   |                        |   |                          |   |   |                           |   |                          |                         |                        |                       |   |                         |   |                          |                          |                         |   |                           |   |                         |   |                          |                        |   |                             |   |                           |   |                             |                           |                         |   |                         |   |                         |   |                          |                          |   |                            |   |                         |   |                           |                         |                          |   |                         |   |                         |   |                         |                          |   |                        |   |                             |   |                         |                         |                          |   |                         |   |                           |                          |   |                            |   |                            |   |                            |   |                        |   |                          |   |                           |   |   |                          |   |                           |                          |                        |   |                        |   |   |
|                                       | 0   | 0   | 0                       | 0                         | 0                        | 0                         | $-\frac{3\sqrt{10}}{80}$ | 0                           | $-\frac{\sqrt{210}}{400}$  | 0                         | $\frac{\sqrt{14}}{80}$     | 0                           | $-\frac{\sqrt{70}}{400}$   | 0                         |   |   |   |   |   |   |   |   |                          |   |                        |   |                           |                          |                          |   |   |   |   |   |   |                          |   |                          |   |                         |   |                          |                           |   |   |   |   |   |   |                          |                          |   |                         |   |                          |   |                          |   |   |   |   |   |   |                          |                           |                           |   |                        |   |                          |   |   |                           |   |                          |                         |                        |                       |   |                         |   |                          |                          |                         |   |                           |   |                         |   |                          |                        |   |                             |   |                           |   |                             |                           |                         |   |                         |   |                         |   |                          |                          |   |                            |   |                         |   |                           |                         |                          |   |                         |   |                         |   |                         |                          |   |                        |   |                             |   |                         |                         |                          |   |                         |   |                           |                          |   |                            |   |                            |   |                            |   |                        |   |                          |   |                           |   |   |                          |   |                           |                          |                        |   |                        |   |   |
|                                       | 0   | $-\frac{\sqrt{105}}{840}$                       | 0                       | $\frac{\sqrt{210}}{840}$  | 0                        | $\frac{\sqrt{21}}{56}$    | $\frac{\sqrt{2}}{40}$    | 0                           | $-\frac{\sqrt{42}}{56}$    | 0                         | $\frac{3\sqrt{70}}{280}$   | 0                           | $\frac{3\sqrt{14}}{56}$    | 0                         |   |   |   |   |   |   |   |   |                          |   |                        |   |                           |                          |                          |   |   |   |   |   |   |                          |   |                          |   |                         |   |                          |                           |   |   |   |   |   |   |                          |                          |   |                         |   |                          |   |                          |   |   |   |   |   |   |                          |                           |                           |   |                        |   |                          |   |   |                           |   |                          |                         |                        |                       |   |                         |   |                          |                          |                         |   |                           |   |                         |   |                          |                        |   |                             |   |                           |   |                             |                           |                         |   |                         |   |                         |   |                          |                          |   |                            |   |                         |   |                           |                         |                          |   |                         |   |                         |   |                         |                          |   |                        |   |                             |   |                         |                         |                          |   |                         |   |                           |                          |   |                            |   |                            |   |                            |   |                        |   |                          |   |                           |   |   |                          |   |                           |                          |                        |   |                        |   |   |
|                                       | $-\frac{\sqrt{105}}{840}$   | 0   | $\frac{\sqrt{42}}{168}$ | 0                         | $-\frac{\sqrt{21}}{168}$ | 0                         | 0                        | $-\frac{23\sqrt{70}}{1400}$ | 0                          | $\frac{13\sqrt{14}}{280}$ | 0                          | $-\frac{3\sqrt{210}}{1400}$ | 0                          | $\frac{3\sqrt{10}}{40}$   |   |   |   |   |   |   |   |   |                          |   |                        |   |                           |                          |                          |   |   |   |   |   |   |                          |   |                          |   |                         |   |                          |                           |   |   |   |   |   |   |                          |                          |   |                         |   |                          |   |                          |   |   |   |   |   |   |                          |                           |                           |   |                        |   |                          |   |   |                           |   |                          |                         |                        |                       |   |                         |   |                          |                          |                         |   |                           |   |                         |   |                          |                        |   |                             |   |                           |   |                             |                           |                         |   |                         |   |                         |   |                          |                          |   |                            |   |                         |   |                           |                         |                          |   |                         |   |                         |   |                         |                          |   |                        |   |                             |   |                         |                         |                          |   |                         |   |                           |                          |   |                            |   |                            |   |                            |   |                        |   |                          |   |                           |   |   |                          |   |                           |                          |                        |   |                        |   |   |
|                                       | 0   | $\frac{\sqrt{42}}{168}$                         | 0                       | $-\frac{\sqrt{21}}{84}$   | 0                        | $\frac{\sqrt{210}}{840}$  | $-\frac{3\sqrt{5}}{100}$ | 0                           | $\frac{11\sqrt{105}}{700}$ | 0                         | $-\frac{\sqrt{7}}{140}$    | 0                           | $-\frac{9\sqrt{35}}{700}$  | 0                         |   |   |   |   |   |   |   |   |                          |   |                        |   |                           |                          |                          |   |   |   |   |   |   |                          |   |                          |   |                         |   |                          |                           |   |   |   |   |   |   |                          |                          |   |                         |   |                          |   |                          |   |   |   |   |   |   |                          |                           |                           |   |                        |   |                          |   |   |                           |   |                          |                         |                        |                       |   |                         |   |                          |                          |                         |   |                           |   |                         |   |                          |                        |   |                             |   |                           |   |                             |                           |                         |   |                         |   |                         |   |                          |                          |   |                            |   |                         |   |                           |                         |                          |   |                         |   |                         |   |                         |                          |   |                        |   |                             |   |                         |                         |                          |   |                         |   |                           |                          |   |                            |   |                            |   |                            |   |                        |   |                          |   |                           |   |   |                          |   |                           |                          |                        |   |                        |   |   |
|                                       | $\frac{\sqrt{210}}{840}$  | 0   | $-\frac{\sqrt{21}}{84}$ | 0                         | $\frac{\sqrt{42}}{168}$  | 0                         | 0                        | $\frac{9\sqrt{35}}{700}$    | 0                          | $\frac{\sqrt{7}}{140}$    | 0                          | $-\frac{11\sqrt{105}}{700}$ | 0                          | $\frac{3\sqrt{5}}{100}$   |   |   |   |   |   |   |   |   |                          |   |                        |   |                           |                          |                          |   |   |   |   |   |   |                          |   |                          |   |                         |   |                          |                           |   |   |   |   |   |   |                          |                          |   |                         |   |                          |   |                          |   |   |   |   |   |   |                          |                           |                           |   |                        |   |                          |   |   |                           |   |                          |                         |                        |                       |   |                         |   |                          |                          |                         |   |                           |   |                         |   |                          |                        |   |                             |   |                           |   |                             |                           |                         |   |                         |   |                         |   |                          |                          |   |                            |   |                         |   |                           |                         |                          |   |                         |   |                         |   |                         |                          |   |                        |   |                             |   |                         |                         |                          |   |                         |   |                           |                          |   |                            |   |                            |   |                            |   |                        |   |                          |   |                           |   |   |                          |   |                           |                          |                        |   |                        |   |   |
|                                       | 0   | $-\frac{\sqrt{21}}{168}$                        | 0                       | $\frac{\sqrt{42}}{168}$   | 0                        | $-\frac{\sqrt{105}}{840}$ | $-\frac{3\sqrt{10}}{40}$ | 0                           | $\frac{3\sqrt{210}}{1400}$ | 0                         | $-\frac{13\sqrt{14}}{280}$ | 0                           | $\frac{23\sqrt{70}}{1400}$ | 0                         |   |   |   |   |   |   |   |   |                          |   |                        |   |                           |                          |                          |   |   |   |   |   |   |                          |   |                          |   |                         |   |                          |                           |   |   |   |   |   |   |                          |                          |   |                         |   |                          |   |                          |   |   |   |   |   |   |                          |                           |                           |   |                        |   |                          |   |   |                           |   |                          |                         |                        |                       |   |                         |   |                          |                          |                         |   |                           |   |                         |   |                          |                        |   |                             |   |                           |   |                             |                           |                         |   |                         |   |                         |   |                          |                          |   |                            |   |                         |   |                           |                         |                          |   |                         |   |                         |   |                         |                          |   |                        |   |                             |   |                         |                         |                          |   |                         |   |                           |                          |   |                            |   |                            |   |                            |   |                        |   |                          |   |                           |   |   |                          |   |                           |                          |                        |   |                        |   |   |
| $\frac{\sqrt{21}}{56}$                | 0   | $\frac{\sqrt{210}}{840}$                        | 0                       | $-\frac{\sqrt{105}}{840}$ | 0                        | 0                         | $-\frac{3\sqrt{14}}{56}$ | 0                           | $-\frac{3\sqrt{70}}{280}$  | 0                         | $\frac{\sqrt{42}}{56}$     | 0                           | $-\frac{\sqrt{2}}{40}$     |                           |   |   |   |   |   |   |   |   |                          |   |                        |   |                           |                          |                          |   |   |   |   |   |   |                          |   |                          |   |                         |   |                          |                           |   |   |   |   |   |   |                          |                          |   |                         |   |                          |   |                          |   |   |   |   |   |   |                          |                           |                           |   |                        |   |                          |   |   |                           |   |                          |                         |                        |                       |   |                         |   |                          |                          |                         |   |                           |   |                         |   |                          |                        |   |                             |   |                           |   |                             |                           |                         |   |                         |   |                         |   |                          |                          |   |                            |   |                         |   |                           |                         |                          |   |                         |   |                         |   |                         |                          |   |                        |   |                             |   |                         |                         |                          |   |                         |   |                           |                          |   |                            |   |                            |   |                            |   |                        |   |                          |   |                           |   |   |                          |   |                           |                          |                        |   |                        |   |   |
| 586                                   | symmetry  | $\frac{\sqrt{105}y(x-z)(x+z)(x^2-2y^2+z^2)}{4}$ |                         |                           |                          |                           |                          |                             |                            |                           |                            |                             |                            |                           |   |   |   |   |   |   |   |   |                          |   |                        |   |                           |                          |                          |   |   |   |   |   |   |                          |   |                          |   |                         |   |                          |                           |   |   |   |   |   |   |                          |                          |   |                         |   |                          |   |                          |   |   |   |   |   |   |                          |                           |                           |   |                        |   |                          |   |   |                           |   |                          |                         |                        |                       |   |                         |   |                          |                          |                         |   |                           |   |                         |   |                          |                        |   |                             |   |                           |   |                             |                           |                         |   |                         |   |                         |   |                          |                          |   |                            |   |                         |   |                           |                         |                          |   |                         |   |                         |   |                         |                          |   |                        |   |                             |   |                         |                         |                          |   |                         |   |                           |                          |   |                            |   |                            |   |                            |   |                        |   |                          |   |                           |   |   |                          |   |                           |                          |                        |   |                        |   |   |

continued ...

Table 9

| No. | multipole                          | matrix   |                            |                           |                            |                           |                            |                           |                             |                              |                            |                            |                              |                             |                           |
|-----|------------------------------------|--|----------------------------|---------------------------|----------------------------|---------------------------|----------------------------|---------------------------|-----------------------------|------------------------------|----------------------------|----------------------------|------------------------------|-----------------------------|---------------------------|
|     | $\mathbb{Q}_{5,1}^{(1,-1;a)}(T_2)$ | 0  | 0                          | 0                         | 0                          | 0                         | 0                          | 0                         | $\frac{\sqrt{70}i}{400}$    | 0                            | $\frac{\sqrt{14}i}{80}$    | 0                          | $\frac{\sqrt{210}i}{400}$    | 0                           | $-\frac{3\sqrt{10}i}{80}$ |
|     |                                    | 0  | 0                          | 0                         | 0                          | 0                         | 0                          | $-\frac{\sqrt{30}i}{400}$ | 0                           | $-\frac{3\sqrt{70}i}{400}$   | 0                          | $-\frac{\sqrt{42}i}{80}$   | 0                            | $-\frac{\sqrt{210}i}{400}$  | 0                         |
|     |                                    | 0  | 0                          | 0                         | 0                          | 0                         | 0                          | 0                         | $\frac{\sqrt{210}i}{400}$   | 0                            | $\frac{\sqrt{42}i}{80}$    | 0                          | $\frac{3\sqrt{70}i}{400}$    | 0                           | $\frac{\sqrt{30}i}{400}$  |
|     |                                    | 0  | 0                          | 0                         | 0                          | 0                         | 0                          | $\frac{3\sqrt{10}i}{80}$  | 0                           | $-\frac{\sqrt{210}i}{400}$   | 0                          | $-\frac{\sqrt{14}i}{80}$   | 0                            | $-\frac{\sqrt{70}i}{400}$   | 0                         |
|     |                                    | 0  | $-\frac{\sqrt{105}i}{840}$ | 0                         | $-\frac{\sqrt{210}i}{840}$ | 0                         | $\frac{\sqrt{21}i}{56}$    | $-\frac{\sqrt{2}i}{40}$   | 0                           | $-\frac{\sqrt{42}i}{56}$     | 0                          | $-\frac{3\sqrt{70}i}{280}$ | 0                            | $\frac{3\sqrt{14}i}{56}$    | 0                         |
|     |                                    | $\frac{\sqrt{105}i}{840}$                        | 0                          | $\frac{\sqrt{42}i}{168}$  | 0                          | $\frac{\sqrt{21}i}{168}$  | 0                          | 0                         | $\frac{23\sqrt{70}i}{1400}$ | 0                            | $\frac{13\sqrt{14}i}{280}$ | 0                          | $\frac{3\sqrt{210}i}{1400}$  | 0                           | $\frac{3\sqrt{10}i}{40}$  |
|     |                                    | 0  | $-\frac{\sqrt{42}i}{168}$  | 0                         | $-\frac{\sqrt{21}i}{84}$   | 0                         | $-\frac{\sqrt{210}i}{840}$ | $-\frac{3\sqrt{5}i}{100}$ | 0                           | $-\frac{11\sqrt{105}i}{700}$ | 0                          | $-\frac{\sqrt{7}i}{140}$   | 0                            | $\frac{9\sqrt{35}i}{700}$   | 0                         |
|     |                                    | $\frac{\sqrt{210}i}{840}$                        | 0                          | $\frac{\sqrt{21}i}{84}$   | 0                          | $\frac{\sqrt{42}i}{168}$  | 0                          | 0                         | $\frac{9\sqrt{35}i}{700}$   | 0                            | $-\frac{\sqrt{7}i}{140}$   | 0                          | $-\frac{11\sqrt{105}i}{700}$ | 0                           | $-\frac{3\sqrt{5}i}{100}$ |
|     |                                    | 0  | $-\frac{\sqrt{21}i}{168}$  | 0                         | $-\frac{\sqrt{42}i}{168}$  | 0                         | $-\frac{\sqrt{105}i}{840}$ | $\frac{3\sqrt{10}i}{40}$  | 0                           | $\frac{3\sqrt{210}i}{1400}$  | 0                          | $\frac{13\sqrt{14}i}{280}$ | 0                            | $\frac{23\sqrt{70}i}{1400}$ | 0                         |
|     |                                    | $-\frac{\sqrt{21}i}{56}$                         | 0                          | $\frac{\sqrt{210}i}{840}$ | 0                          | $\frac{\sqrt{105}i}{840}$ | 0                          | 0                         | $\frac{3\sqrt{14}i}{56}$    | 0                            | $-\frac{3\sqrt{70}i}{280}$ | 0                          | $-\frac{\sqrt{42}i}{56}$     | 0                           | $-\frac{\sqrt{2}i}{40}$   |
| 587 | symmetry                           | $-\frac{\sqrt{105}z(x-y)(x+y)(x^2+y^2-2z^2)}{4}$ |                            |                           |                            |                           |                            |                           |                             |                              |                            |                            |                              |                             |                           |
|     | $\mathbb{Q}_{5,2}^{(1,-1;a)}(T_2)$ | 0  | 0                          | 0                         | 0                          | 0                         | 0                          | $\frac{\sqrt{10}}{200}$   | 0                           | 0                            | 0                          | $\frac{\sqrt{14}}{40}$     | 0                            | 0                           | 0                         |
|     |                                    | 0  | 0                          | 0                         | 0                          | 0                         | 0                          | 0                         | $-\frac{\sqrt{210}}{200}$   | 0                            | 0                          | 0                          | $-\frac{3\sqrt{70}}{200}$    | 0                           | 0                         |
|     |                                    | 0  | 0                          | 0                         | 0                          | 0                         | 0                          | 0                         | 0                           | $\frac{3\sqrt{70}}{200}$     | 0                          | 0                          | 0                            | $\frac{\sqrt{210}}{200}$    | 0                         |
|     |                                    | 0  | 0                          | 0                         | 0                          | 0                         | 0                          | 0                         | 0                           | 0                            | $-\frac{\sqrt{14}}{40}$    | 0                          | 0                            | 0                           | $-\frac{\sqrt{10}}{200}$  |
|     |                                    | 0  | 0                          | $-\frac{\sqrt{210}}{420}$ | 0                          | 0                         | 0                          | 0                         | 0                           | 0                            | $-\frac{\sqrt{70}}{35}$    | 0                          | 0                            | 0                           | 0                         |
|     |                                    | 0  | 0                          | 0                         | $\frac{\sqrt{42}}{84}$     | 0                         | 0                          | $\frac{\sqrt{10}}{25}$    | 0                           | 0                            | 0                          | $\frac{2\sqrt{14}}{35}$    | 0                            | 0                           | 0                         |
|     |                                    | $-\frac{\sqrt{210}}{420}$                        | 0                          | 0                         | 0                          | $-\frac{\sqrt{42}}{84}$   | 0                          | 0                         | $-\frac{8\sqrt{35}}{175}$   | 0                            | 0                          | 0                          | $\frac{2\sqrt{105}}{175}$    | 0                           | 0                         |
|     |                                    | 0  | $\frac{\sqrt{42}}{84}$     | 0                         | 0                          | 0                         | $\frac{\sqrt{210}}{420}$   | 0                         | 0                           | $\frac{2\sqrt{105}}{175}$    | 0                          | 0                          | 0                            | $-\frac{8\sqrt{35}}{175}$   | 0                         |
|     |                                    | 0  | 0                          | $-\frac{\sqrt{42}}{84}$   | 0                          | 0                         | 0                          | 0                         | 0                           | 0                            | $\frac{2\sqrt{14}}{35}$    | 0                          | 0                            | 0                           | $\frac{\sqrt{10}}{25}$    |
|     |                                    | 0  | 0                          | 0                         | $\frac{\sqrt{210}}{420}$   | 0                         | 0                          | 0                         | 0                           | 0                            | 0                          | $-\frac{\sqrt{70}}{35}$    | 0                            | 0                           | 0                         |
| 588 | symmetry                           | $x$  |                            |                           |                            |                           |                            |                           |                             |                              |                            |                            |                              |                             |                           |

continued ...

Table 9

| No. | multipole                         | matrix                   |                           |                         |                          |                          |                           |                          |   |                          |                         |                          |                          |                          |   |
|-----|-----------------------------------|--------------------------|---------------------------|-------------------------|--------------------------|--------------------------|---------------------------|--------------------------|---|--------------------------|-------------------------|--------------------------|--------------------------|--------------------------|---|
|     | $\mathbb{Q}_{1,0}^{(1,0;a)}(T_1)$ | $\frac{\sqrt{10}}{20}$   | 0                         | $-\frac{1}{20}$         | 0                        | 0                        | 0                         | 0                        | 0 | 0                        | 0                       | 0                        | 0                        | 0                        | 0 |
|     |                                   | 0                        | $\frac{\sqrt{6}}{20}$     | 0                       | $-\frac{\sqrt{3}}{20}$   | 0                        | 0                         | 0                        | 0 | 0                        | 0                       | 0                        | 0                        | 0                        | 0 |
|     |                                   | 0                        | 0                         | $\frac{\sqrt{3}}{20}$   | 0                        | $-\frac{\sqrt{6}}{20}$   | 0                         | 0                        | 0 | 0                        | 0                       | 0                        | 0                        | 0                        | 0 |
|     |                                   | 0                        | 0                         | 0                       | $\frac{1}{20}$           | 0                        | $-\frac{\sqrt{10}}{20}$   | 0                        | 0 | 0                        | 0                       | 0                        | 0                        | 0                        | 0 |
|     |                                   | 0                        | $\frac{3\sqrt{10}}{70}$   | 0                       | 0                        | 0                        | 0                         | $-\frac{\sqrt{21}}{28}$  | 0 | $\frac{1}{28}$           | 0                       | 0                        | 0                        | 0                        | 0 |
|     |                                   | $\frac{3\sqrt{10}}{70}$  | 0                         | $\frac{6}{35}$          | 0                        | 0                        | 0                         | $-\frac{\sqrt{15}}{28}$  | 0 | $\frac{\sqrt{3}}{28}$    | 0                       | 0                        | 0                        | 0                        | 0 |
|     |                                   | 0                        | $\frac{6}{35}$            | 0                       | $\frac{9\sqrt{2}}{70}$   | 0                        | 0                         | 0                        | 0 | $-\frac{\sqrt{10}}{28}$  | 0                       | $\frac{\sqrt{6}}{28}$    | 0                        | 0                        | 0 |
|     |                                   | 0                        | 0                         | $\frac{9\sqrt{2}}{70}$  | 0                        | $\frac{6}{35}$           | 0                         | 0                        | 0 | $-\frac{\sqrt{6}}{28}$   | 0                       | $\frac{\sqrt{10}}{28}$   | 0                        | 0                        | 0 |
|     |                                   | 0                        | 0                         | 0                       | $\frac{6}{35}$           | 0                        | $\frac{3\sqrt{10}}{70}$   | 0                        | 0 | 0                        | $-\frac{\sqrt{3}}{28}$  | 0                        | $\frac{\sqrt{15}}{28}$   | 0                        | 0 |
|     |                                   | 0                        | 0                         | 0                       | 0                        | $\frac{3\sqrt{10}}{70}$  | 0                         | 0                        | 0 | 0                        | 0                       | $-\frac{1}{28}$          | 0                        | $\frac{\sqrt{21}}{28}$   | 0 |
| 589 | symmetry                          | $y$                      |                           |                         |                          |                          |                           |                          |   |                          |                         |                          |                          |                          |   |
|     | $\mathbb{Q}_{1,1}^{(1,0;a)}(T_1)$ | $\frac{\sqrt{10}i}{20}$  | 0                         | $\frac{i}{20}$          | 0                        | 0                        | 0                         | 0                        | 0 | 0                        | 0                       | 0                        | 0                        | 0                        | 0 |
|     |                                   | 0                        | $\frac{\sqrt{6}i}{20}$    | 0                       | $\frac{\sqrt{3}i}{20}$   | 0                        | 0                         | 0                        | 0 | 0                        | 0                       | 0                        | 0                        | 0                        | 0 |
|     |                                   | 0                        | 0                         | $\frac{\sqrt{3}i}{20}$  | 0                        | $\frac{\sqrt{6}i}{20}$   | 0                         | 0                        | 0 | 0                        | 0                       | 0                        | 0                        | 0                        | 0 |
|     |                                   | 0                        | 0                         | 0                       | $\frac{i}{20}$           | 0                        | $\frac{\sqrt{10}i}{20}$   | 0                        | 0 | 0                        | 0                       | 0                        | 0                        | 0                        | 0 |
|     |                                   | 0                        | $-\frac{3\sqrt{10}i}{70}$ | 0                       | 0                        | 0                        | 0                         | $-\frac{\sqrt{21}i}{28}$ | 0 | $-\frac{i}{28}$          | 0                       | 0                        | 0                        | 0                        | 0 |
|     |                                   | $\frac{3\sqrt{10}i}{70}$ | 0                         | $-\frac{6i}{35}$        | 0                        | 0                        | 0                         | $-\frac{\sqrt{15}i}{28}$ | 0 | $-\frac{\sqrt{3}i}{28}$  | 0                       | 0                        | 0                        | 0                        | 0 |
|     |                                   | 0                        | $\frac{6i}{35}$           | 0                       | $-\frac{9\sqrt{2}i}{70}$ | 0                        | 0                         | 0                        | 0 | $-\frac{\sqrt{10}i}{28}$ | 0                       | $-\frac{\sqrt{6}i}{28}$  | 0                        | 0                        | 0 |
|     |                                   | 0                        | 0                         | $\frac{9\sqrt{2}i}{70}$ | 0                        | $-\frac{6i}{35}$         | 0                         | 0                        | 0 | $-\frac{\sqrt{6}i}{28}$  | 0                       | $-\frac{\sqrt{10}i}{28}$ | 0                        | 0                        | 0 |
|     |                                   | 0                        | 0                         | 0                       | $\frac{6i}{35}$          | 0                        | $-\frac{3\sqrt{10}i}{70}$ | 0                        | 0 | 0                        | $-\frac{\sqrt{3}i}{28}$ | 0                        | $-\frac{\sqrt{15}i}{28}$ | 0                        | 0 |
|     |                                   | 0                        | 0                         | 0                       | 0                        | $\frac{3\sqrt{10}i}{70}$ | 0                         | 0                        | 0 | 0                        | 0                       | $-\frac{i}{28}$          | 0                        | $-\frac{\sqrt{21}i}{28}$ | 0 |
| 590 | symmetry                          | $z$                      |                           |                         |                          |                          |                           |                          |   |                          |                         |                          |                          |                          |   |

continued ...

Table 9

| No. | multipole                         | matrix   |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----|-----------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
|     | $\mathbb{Q}_{1,2}^{(1,0;a)}(T_1)$ | $ \begin{bmatrix} 0 & -\frac{\sqrt{2}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{3}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{3}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{3\sqrt{2}}{14} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{14} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{9\sqrt{2}}{70} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{14} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{3\sqrt{2}}{70} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{14} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{3\sqrt{2}}{70} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{14} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{9\sqrt{2}}{70} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{14} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{2}}{14} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{14} & 0 \end{bmatrix} $  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 591 | symmetry                          | $ \begin{matrix} \sqrt{15}xyz \\ \begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{210i}}{280} & 0 & 0 & -\frac{\sqrt{2i}}{8} & 0 & 0 & 0 & \frac{\sqrt{70i}}{56} & 0 & 0 & 0 \\ -\frac{\sqrt{7i}}{56} & 0 & 0 & 0 & -\frac{\sqrt{35i}}{280} & 0 & 0 & \frac{\sqrt{42i}}{56} & 0 & 0 & 0 & \frac{3\sqrt{14i}}{56} & 0 & 0 \\ 0 & \frac{\sqrt{35i}}{280} & 0 & 0 & 0 & \frac{\sqrt{7i}}{56} & 0 & 0 & \frac{3\sqrt{14i}}{56} & 0 & 0 & 0 & \frac{\sqrt{42i}}{56} & 0 \\ 0 & 0 & \frac{\sqrt{210i}}{280} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{70i}}{56} & 0 & 0 & 0 & -\frac{\sqrt{2i}}{8} \\ 0 & 0 & \frac{\sqrt{42i}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{14i}}{84} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{210i}}{140} & 0 & 0 & \frac{\sqrt{2i}}{24} & 0 & 0 & 0 & \frac{\sqrt{70i}}{168} & 0 & 0 & 0 \\ -\frac{\sqrt{42i}}{28} & 0 & 0 & 0 & -\frac{\sqrt{210i}}{140} & 0 & 0 & \frac{\sqrt{7i}}{168} & 0 & 0 & 0 & \frac{\sqrt{21i}}{168} & 0 & 0 \\ 0 & -\frac{\sqrt{210i}}{140} & 0 & 0 & 0 & -\frac{\sqrt{42i}}{28} & 0 & 0 & -\frac{\sqrt{21i}}{168} & 0 & 0 & 0 & -\frac{\sqrt{7i}}{168} & 0 \\ 0 & 0 & \frac{\sqrt{210i}}{140} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70i}}{168} & 0 & 0 & 0 & -\frac{\sqrt{2i}}{24} \\ 0 & 0 & 0 & \frac{\sqrt{42i}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{14i}}{84} & 0 & 0 & 0 \end{bmatrix} \end{matrix} $ |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 592 | symmetry                          | $ \frac{x(2x^2-3y^2-3z^2)}{2} $  |  |  |  |  |  |  |  |  |  |  |  |  |  |

continued ...



Table 9

| No. | multipole                         | matrix                         |                            |                            |                            |                           |                            |                          |                            |                           |                            |                            |                           |                            |                          |
|-----|-----------------------------------|--------------------------------|----------------------------|----------------------------|----------------------------|---------------------------|----------------------------|--------------------------|----------------------------|---------------------------|----------------------------|----------------------------|---------------------------|----------------------------|--------------------------|
|     | $\mathbb{Q}_{3,0}^{(1,0;a)}(T_1)$ | $\frac{3\sqrt{35}}{1120}$      | 0                          | $-\frac{9\sqrt{14}}{1120}$ | 0                          | $\frac{3\sqrt{7}}{224}$   | 0                          | 0                        | $-\frac{\sqrt{210}}{112}$  | 0                         | $\frac{\sqrt{42}}{56}$     | 0                          | $-\frac{\sqrt{70}}{112}$  | 0                          | 0                        |
|     |                                   | 0                              | $-\frac{\sqrt{21}}{160}$   | 0                          | $\frac{\sqrt{42}}{1120}$   | 0                         | $\frac{\sqrt{105}}{224}$   | $-\frac{\sqrt{10}}{16}$  | 0                          | 0                         | 0                          | $\frac{3\sqrt{14}}{112}$   | 0                         | $-\frac{\sqrt{70}}{56}$    | 0                        |
|     |                                   | $-\frac{\sqrt{105}}{224}$      | 0                          | $-\frac{\sqrt{42}}{1120}$  | 0                          | $\frac{\sqrt{21}}{160}$   | 0                          | 0                        | $-\frac{\sqrt{70}}{56}$    | 0                         | $\frac{3\sqrt{14}}{112}$   | 0                          | 0                         | 0                          | $-\frac{\sqrt{10}}{16}$  |
|     |                                   | 0                              | $-\frac{3\sqrt{7}}{224}$   | 0                          | $\frac{9\sqrt{14}}{1120}$  | 0                         | $-\frac{3\sqrt{35}}{1120}$ | 0                        | 0                          | $-\frac{\sqrt{70}}{112}$  | 0                          | $\frac{\sqrt{42}}{56}$     | 0                         | $-\frac{\sqrt{210}}{112}$  | 0                        |
|     |                                   | 0                              | $\frac{3\sqrt{35}}{140}$   | 0                          | $-\frac{\sqrt{70}}{56}$    | 0                         | 0                          | $-\frac{\sqrt{6}}{96}$   | 0                          | $\frac{\sqrt{14}}{112}$   | 0                          | $-\frac{\sqrt{210}}{672}$  | 0                         | 0                          | 0                        |
|     |                                   | $\frac{3\sqrt{35}}{140}$       | 0                          | $-\frac{3\sqrt{14}}{280}$  | 0                          | $-\frac{\sqrt{7}}{14}$    | 0                          | 0                        | $\frac{\sqrt{210}}{672}$   | 0                         | $\frac{\sqrt{42}}{336}$    | 0                          | $-\frac{\sqrt{70}}{224}$  | 0                          | 0                        |
|     |                                   | 0                              | $-\frac{3\sqrt{14}}{280}$  | 0                          | $-\frac{3\sqrt{7}}{70}$    | 0                         | $-\frac{\sqrt{70}}{56}$    | $\frac{\sqrt{15}}{96}$   | 0                          | $\frac{\sqrt{35}}{224}$   | 0                          | $-\frac{\sqrt{21}}{672}$   | 0                         | $-\frac{\sqrt{105}}{224}$  | 0                        |
|     |                                   | $-\frac{\sqrt{70}}{56}$        | 0                          | $-\frac{3\sqrt{7}}{70}$    | 0                          | $-\frac{3\sqrt{14}}{280}$ | 0                          | 0                        | $\frac{\sqrt{105}}{224}$   | 0                         | $\frac{\sqrt{21}}{672}$    | 0                          | $-\frac{\sqrt{35}}{224}$  | 0                          | $-\frac{\sqrt{15}}{96}$  |
|     |                                   | 0                              | $-\frac{\sqrt{7}}{14}$     | 0                          | $-\frac{3\sqrt{14}}{280}$  | 0                         | $\frac{3\sqrt{35}}{140}$   | 0                        | 0                          | $\frac{\sqrt{70}}{224}$   | 0                          | $-\frac{\sqrt{42}}{336}$   | 0                         | $-\frac{\sqrt{210}}{672}$  | 0                        |
|     |                                   | 0                              | 0                          | $-\frac{\sqrt{70}}{56}$    | 0                          | $\frac{3\sqrt{35}}{140}$  | 0                          | 0                        | 0                          | 0                         | $\frac{\sqrt{210}}{672}$   | 0                          | $-\frac{\sqrt{14}}{112}$  | 0                          | $\frac{\sqrt{6}}{96}$    |
| 593 | symmetry                          | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ |                            |                            |                            |                           |                            |                          |                            |                           |                            |                            |                           |                            |                          |
|     | $\mathbb{Q}_{3,1}^{(1,0;a)}(T_1)$ | $\frac{3\sqrt{35}i}{1120}$     | 0                          | $\frac{9\sqrt{14}i}{1120}$ | 0                          | $\frac{3\sqrt{7}i}{224}$  | 0                          | 0                        | $-\frac{\sqrt{210}i}{112}$ | 0                         | $-\frac{\sqrt{42}i}{56}$   | 0                          | $-\frac{\sqrt{70}i}{112}$ | 0                          | 0                        |
|     |                                   | 0                              | $-\frac{\sqrt{21}i}{160}$  | 0                          | $-\frac{\sqrt{42}i}{1120}$ | 0                         | $\frac{\sqrt{105}i}{224}$  | $\frac{\sqrt{10}i}{16}$  | 0                          | 0                         | 0                          | $-\frac{3\sqrt{14}i}{112}$ | 0                         | $-\frac{\sqrt{70}i}{56}$   | 0                        |
|     |                                   | $\frac{\sqrt{105}i}{224}$      | 0                          | $-\frac{\sqrt{42}i}{1120}$ | 0                          | $-\frac{\sqrt{21}i}{160}$ | 0                          | 0                        | $\frac{\sqrt{70}i}{56}$    | 0                         | $\frac{3\sqrt{14}i}{112}$  | 0                          | 0                         | 0                          | $-\frac{\sqrt{10}i}{16}$ |
|     |                                   | 0                              | $\frac{3\sqrt{7}i}{224}$   | 0                          | $\frac{9\sqrt{14}i}{1120}$ | 0                         | $\frac{3\sqrt{35}i}{1120}$ | 0                        | 0                          | $\frac{\sqrt{70}i}{112}$  | 0                          | $\frac{\sqrt{42}i}{56}$    | 0                         | $\frac{\sqrt{210}i}{112}$  | 0                        |
|     |                                   | 0                              | $-\frac{3\sqrt{35}i}{140}$ | 0                          | $-\frac{\sqrt{70}i}{56}$   | 0                         | 0                          | $-\frac{\sqrt{6}i}{96}$  | 0                          | $-\frac{\sqrt{14}i}{112}$ | 0                          | $-\frac{\sqrt{210}i}{672}$ | 0                         | 0                          | 0                        |
|     |                                   | $\frac{3\sqrt{35}i}{140}$      | 0                          | $\frac{3\sqrt{14}i}{280}$  | 0                          | $-\frac{\sqrt{7}i}{14}$   | 0                          | 0                        | $\frac{\sqrt{210}i}{672}$  | 0                         | $-\frac{\sqrt{42}i}{336}$  | 0                          | $-\frac{\sqrt{70}i}{224}$ | 0                          | 0                        |
|     |                                   | 0                              | $-\frac{3\sqrt{14}i}{280}$ | 0                          | $\frac{3\sqrt{7}i}{70}$    | 0                         | $-\frac{\sqrt{70}i}{56}$   | $-\frac{\sqrt{15}i}{96}$ | 0                          | $\frac{\sqrt{35}i}{224}$  | 0                          | $\frac{\sqrt{21}i}{672}$   | 0                         | $-\frac{\sqrt{105}i}{224}$ | 0                        |
|     |                                   | $\frac{\sqrt{70}i}{56}$        | 0                          | $-\frac{3\sqrt{7}i}{70}$   | 0                          | $\frac{3\sqrt{14}i}{280}$ | 0                          | 0                        | $-\frac{\sqrt{105}i}{224}$ | 0                         | $\frac{\sqrt{21}i}{672}$   | 0                          | $\frac{\sqrt{35}i}{224}$  | 0                          | $-\frac{\sqrt{15}i}{96}$ |
|     |                                   | 0                              | $\frac{\sqrt{7}i}{14}$     | 0                          | $-\frac{3\sqrt{14}i}{280}$ | 0                         | $-\frac{3\sqrt{35}i}{140}$ | 0                        | 0                          | $-\frac{\sqrt{70}i}{224}$ | 0                          | $-\frac{\sqrt{42}i}{336}$  | 0                         | $\frac{\sqrt{210}i}{672}$  | 0                        |
|     |                                   | 0                              | 0                          | $\frac{\sqrt{70}i}{56}$    | 0                          | $\frac{3\sqrt{35}i}{140}$ | 0                          | 0                        | 0                          | 0                         | $-\frac{\sqrt{210}i}{672}$ | 0                          | $-\frac{\sqrt{14}i}{112}$ | 0                          | $-\frac{\sqrt{6}i}{96}$  |
| 594 | symmetry                          | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ |                            |                            |                            |                           |                            |                          |                            |                           |                            |                            |                           |                            |                          |

continued ...

Table 9

| No. | multipole                         | matrix                            |                            |                             |                            |                             |                          |                         |                           |                          |                          |                          |                           |                           |                        |
|-----|-----------------------------------|-----------------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|--------------------------|-------------------------|---------------------------|--------------------------|--------------------------|--------------------------|---------------------------|---------------------------|------------------------|
|     | $\mathbb{Q}_{3,2}^{(1,0;a)}(T_1)$ | 0                                 | $\frac{3\sqrt{7}}{140}$    | 0                           | 0                          | 0                           | 0                        | 0                       | 0                         | $-\frac{\sqrt{70}}{28}$  | 0                        | 0                        | 0                         | 0                         | 0                      |
|     |                                   | 0                                 | 0                          | $-\frac{\sqrt{42}}{140}$    | 0                          | 0                           | 0                        | 0                       | 0                         | 0                        | $-\frac{\sqrt{14}}{28}$  | 0                        | 0                         | 0                         | 0                      |
|     |                                   | 0                                 | 0                          | 0                           | $-\frac{\sqrt{42}}{140}$   | 0                           | 0                        | 0                       | 0                         | 0                        | 0                        | $\frac{\sqrt{14}}{28}$   | 0                         | 0                         | 0                      |
|     |                                   | 0                                 | 0                          | 0                           | 0                          | $\frac{3\sqrt{7}}{140}$     | 0                        | 0                       | 0                         | 0                        | 0                        | 0                        | $\frac{\sqrt{70}}{28}$    | 0                         | 0                      |
|     |                                   | $-\frac{\sqrt{7}}{14}$            | 0                          | 0                           | 0                          | 0                           | 0                        | 0                       | $-\frac{\sqrt{42}}{84}$   | 0                        | 0                        | 0                        | 0                         | 0                         | 0                      |
|     |                                   | 0                                 | $\frac{\sqrt{7}}{10}$      | 0                           | 0                          | 0                           | 0                        | 0                       | 0                         | 0                        | 0                        | 0                        | 0                         | 0                         | 0                      |
|     |                                   | 0                                 | 0                          | $\frac{2\sqrt{7}}{35}$      | 0                          | 0                           | 0                        | 0                       | 0                         | 0                        | $\frac{\sqrt{21}}{84}$   | 0                        | 0                         | 0                         | 0                      |
|     |                                   | 0                                 | 0                          | 0                           | $-\frac{2\sqrt{7}}{35}$    | 0                           | 0                        | 0                       | 0                         | 0                        | 0                        | $\frac{\sqrt{21}}{84}$   | 0                         | 0                         | 0                      |
|     |                                   | 0                                 | 0                          | 0                           | 0                          | $-\frac{\sqrt{7}}{10}$      | 0                        | 0                       | 0                         | 0                        | 0                        | 0                        | 0                         | 0                         | 0                      |
|     |                                   | 0                                 | 0                          | 0                           | 0                          | 0                           | $\frac{\sqrt{7}}{14}$    | 0                       | 0                         | 0                        | 0                        | 0                        | 0                         | $-\frac{\sqrt{42}}{84}$   | 0                      |
| 595 | symmetry                          | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$  |                            |                             |                            |                             |                          |                         |                           |                          |                          |                          |                           |                           |                        |
|     | $\mathbb{Q}_{3,0}^{(1,0;a)}(T_2)$ | $\frac{\sqrt{21}}{224}$           | 0                          | $-\frac{3\sqrt{210}}{1120}$ | 0                          | $-\frac{3\sqrt{105}}{1120}$ | 0                        | 0                       | $-\frac{5\sqrt{14}}{112}$ | 0                        | $\frac{\sqrt{70}}{56}$   | 0                        | $\frac{\sqrt{42}}{112}$   | 0                         | 0                      |
|     |                                   | 0                                 | $-\frac{\sqrt{35}}{160}$   | 0                           | $\frac{\sqrt{70}}{1120}$   | 0                           | $-\frac{3\sqrt{7}}{224}$ | $\frac{\sqrt{6}}{16}$   | 0                         | 0                        | 0                        | $\frac{\sqrt{210}}{112}$ | 0                         | $\frac{\sqrt{42}}{56}$    | 0                      |
|     |                                   | $\frac{3\sqrt{7}}{224}$           | 0                          | $-\frac{\sqrt{70}}{1120}$   | 0                          | $\frac{\sqrt{35}}{160}$     | 0                        | 0                       | $\frac{\sqrt{42}}{56}$    | 0                        | $\frac{\sqrt{210}}{112}$ | 0                        | 0                         | 0                         | $\frac{\sqrt{6}}{16}$  |
|     |                                   | 0                                 | $\frac{3\sqrt{105}}{1120}$ | 0                           | $\frac{3\sqrt{210}}{1120}$ | 0                           | $-\frac{\sqrt{21}}{224}$ | 0                       | 0                         | $\frac{\sqrt{42}}{112}$  | 0                        | $\frac{\sqrt{70}}{56}$   | 0                         | $-\frac{5\sqrt{14}}{112}$ | 0                      |
|     |                                   | 0                                 | $\frac{\sqrt{21}}{28}$     | 0                           | $\frac{\sqrt{42}}{56}$     | 0                           | 0                        | $-\frac{\sqrt{10}}{96}$ | 0                         | $\frac{\sqrt{210}}{336}$ | 0                        | $\frac{\sqrt{14}}{224}$  | 0                         | 0                         | 0                      |
|     |                                   | $\frac{\sqrt{21}}{28}$            | 0                          | $-\frac{\sqrt{210}}{280}$   | 0                          | $\frac{\sqrt{105}}{70}$     | 0                        | 0                       | $\frac{5\sqrt{14}}{672}$  | 0                        | $\frac{\sqrt{70}}{336}$  | 0                        | $\frac{\sqrt{42}}{224}$   | 0                         | 0                      |
|     |                                   | 0                                 | $-\frac{\sqrt{210}}{280}$  | 0                           | $-\frac{\sqrt{105}}{70}$   | 0                           | $\frac{\sqrt{42}}{56}$   | $-\frac{1}{32}$         | 0                         | $\frac{5\sqrt{21}}{672}$ | 0                        | $-\frac{\sqrt{35}}{672}$ | 0                         | $\frac{3\sqrt{7}}{224}$   | 0                      |
|     |                                   | $\frac{\sqrt{42}}{56}$            | 0                          | $-\frac{\sqrt{105}}{70}$    | 0                          | $-\frac{\sqrt{210}}{280}$   | 0                        | 0                       | $-\frac{3\sqrt{7}}{224}$  | 0                        | $\frac{\sqrt{35}}{672}$  | 0                        | $-\frac{5\sqrt{21}}{672}$ | 0                         | $\frac{1}{32}$         |
|     |                                   | 0                                 | $\frac{\sqrt{105}}{70}$    | 0                           | $-\frac{\sqrt{210}}{280}$  | 0                           | $\frac{\sqrt{21}}{28}$   | 0                       | 0                         | $-\frac{\sqrt{42}}{224}$ | 0                        | $-\frac{\sqrt{70}}{336}$ | 0                         | $-\frac{5\sqrt{14}}{672}$ | 0                      |
|     |                                   | 0                                 | 0                          | $\frac{\sqrt{42}}{56}$      | 0                          | $\frac{\sqrt{21}}{28}$      | 0                        | 0                       | 0                         | 0                        | $-\frac{\sqrt{14}}{224}$ | 0                        | $-\frac{\sqrt{210}}{336}$ | 0                         | $\frac{\sqrt{10}}{96}$ |
| 596 | symmetry                          | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |                            |                             |                            |                             |                          |                         |                           |                          |                          |                          |                           |                           |                        |

continued ...

Table 9

| No.                               | multipole | matrix                              |                             |                              |                              |                             |                           |                         |                            |                            |                            |                           |                            |                            |                         |
|-----------------------------------|-----------|-------------------------------------|-----------------------------|------------------------------|------------------------------|-----------------------------|---------------------------|-------------------------|----------------------------|----------------------------|----------------------------|---------------------------|----------------------------|----------------------------|-------------------------|
| $\mathbb{Q}_{3,1}^{(1,0;a)}(T_2)$ |           | $-\frac{\sqrt{21}i}{224}$           | 0                           | $-\frac{3\sqrt{210}i}{1120}$ | 0                            | $\frac{3\sqrt{105}i}{1120}$ | 0                         | 0                       | $\frac{5\sqrt{14}i}{112}$  | 0                          | $\frac{\sqrt{70}i}{56}$    | 0                         | $-\frac{\sqrt{42}i}{112}$  | 0                          | 0                       |
|                                   |           | 0                                   | $\frac{\sqrt{35}i}{160}$    | 0                            | $\frac{\sqrt{70}i}{1120}$    | 0                           | $\frac{3\sqrt{7}i}{224}$  | $\frac{\sqrt{6}i}{16}$  | 0                          | 0                          | 0                          | $\frac{\sqrt{210}i}{112}$ | 0                          | $-\frac{\sqrt{42}i}{56}$   | 0                       |
|                                   |           | $\frac{3\sqrt{7}i}{224}$            | 0                           | $\frac{\sqrt{70}i}{1120}$    | 0                            | $\frac{\sqrt{35}i}{160}$    | 0                         | 0                       | $\frac{\sqrt{42}i}{56}$    | 0                          | $-\frac{\sqrt{210}i}{112}$ | 0                         | 0                          | 0                          | $-\frac{\sqrt{6}i}{16}$ |
|                                   |           | 0                                   | $\frac{3\sqrt{105}i}{1120}$ | 0                            | $-\frac{3\sqrt{210}i}{1120}$ | 0                           | $-\frac{\sqrt{21}i}{224}$ | 0                       | 0                          | $\frac{\sqrt{42}i}{112}$   | 0                          | $-\frac{\sqrt{70}i}{56}$  | 0                          | $-\frac{5\sqrt{14}i}{112}$ | 0                       |
|                                   |           | 0                                   | $\frac{\sqrt{21}i}{28}$     | 0                            | $-\frac{\sqrt{42}i}{56}$     | 0                           | 0                         | $\frac{\sqrt{10}i}{96}$ | 0                          | $\frac{\sqrt{210}i}{336}$  | 0                          | $-\frac{\sqrt{14}i}{224}$ | 0                          | 0                          | 0                       |
|                                   |           | $-\frac{\sqrt{21}i}{28}$            | 0                           | $-\frac{\sqrt{210}i}{280}$   | 0                            | $-\frac{\sqrt{105}i}{70}$   | 0                         | 0                       | $-\frac{5\sqrt{14}i}{672}$ | 0                          | $\frac{\sqrt{70}i}{336}$   | 0                         | $-\frac{\sqrt{42}i}{224}$  | 0                          | 0                       |
|                                   |           | 0                                   | $\frac{\sqrt{210}i}{280}$   | 0                            | $-\frac{\sqrt{105}i}{70}$    | 0                           | $-\frac{\sqrt{42}i}{56}$  | $-\frac{i}{32}$         | 0                          | $-\frac{5\sqrt{21}i}{672}$ | 0                          | $-\frac{\sqrt{35}i}{672}$ | 0                          | $-\frac{3\sqrt{7}i}{224}$  | 0                       |
|                                   |           | $\frac{\sqrt{42}i}{56}$             | 0                           | $\frac{\sqrt{105}i}{70}$     | 0                            | $-\frac{\sqrt{210}i}{280}$  | 0                         | 0                       | $-\frac{3\sqrt{7}i}{224}$  | 0                          | $-\frac{\sqrt{35}i}{672}$  | 0                         | $-\frac{5\sqrt{21}i}{672}$ | 0                          | $-\frac{i}{32}$         |
|                                   |           | 0                                   | $\frac{\sqrt{105}i}{70}$    | 0                            | $\frac{\sqrt{210}i}{280}$    | 0                           | $\frac{\sqrt{21}i}{28}$   | 0                       | 0                          | $-\frac{\sqrt{42}i}{224}$  | 0                          | $\frac{\sqrt{70}i}{336}$  | 0                          | $-\frac{5\sqrt{14}i}{672}$ | 0                       |
|                                   |           | 0                                   | 0                           | $\frac{\sqrt{42}i}{56}$      | 0                            | $-\frac{\sqrt{21}i}{28}$    | 0                         | 0                       | 0                          | 0                          | $-\frac{\sqrt{14}i}{224}$  | 0                         | $\frac{\sqrt{210}i}{336}$  | 0                          | $\frac{\sqrt{10}i}{96}$ |
| 597                               | symmetry  | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$    |                             |                              |                              |                             |                           |                         |                            |                            |                            |                           |                            |                            |                         |
| $\mathbb{Q}_{3,2}^{(1,0;a)}(T_2)$ |           | 0                                   | 0                           | 0                            | $\frac{\sqrt{210}}{280}$     | 0                           | 0                         | $-\frac{\sqrt{2}}{8}$   | 0                          | 0                          | 0                          | $-\frac{\sqrt{70}}{56}$   | 0                          | 0                          | 0                       |
|                                   |           | $-\frac{\sqrt{7}}{56}$              | 0                           | 0                            | 0                            | $\frac{\sqrt{35}}{280}$     | 0                         | 0                       | $\frac{\sqrt{42}}{56}$     | 0                          | 0                          | 0                         | $-\frac{3\sqrt{14}}{56}$   | 0                          | 0                       |
|                                   |           | 0                                   | $\frac{\sqrt{35}}{280}$     | 0                            | 0                            | 0                           | $-\frac{\sqrt{7}}{56}$    | 0                       | 0                          | $\frac{3\sqrt{14}}{56}$    | 0                          | 0                         | 0                          | $-\frac{\sqrt{42}}{56}$    | 0                       |
|                                   |           | 0                                   | 0                           | $\frac{\sqrt{210}}{280}$     | 0                            | 0                           | 0                         | 0                       | 0                          | 0                          | $\frac{\sqrt{70}}{56}$     | 0                         | 0                          | 0                          | $\frac{\sqrt{2}}{8}$    |
|                                   |           | 0                                   | 0                           | $-\frac{\sqrt{42}}{28}$      | 0                            | 0                           | 0                         | 0                       | 0                          | 0                          | $-\frac{\sqrt{14}}{84}$    | 0                         | 0                          | 0                          | 0                       |
|                                   |           | 0                                   | 0                           | 0                            | $-\frac{\sqrt{210}}{140}$    | 0                           | 0                         | $\frac{\sqrt{2}}{24}$   | 0                          | 0                          | 0                          | $-\frac{\sqrt{70}}{168}$  | 0                          | 0                          | 0                       |
|                                   |           | $-\frac{\sqrt{42}}{28}$             | 0                           | 0                            | 0                            | $\frac{\sqrt{210}}{140}$    | 0                         | 0                       | $\frac{\sqrt{7}}{168}$     | 0                          | 0                          | 0                         | $-\frac{\sqrt{21}}{168}$   | 0                          | 0                       |
|                                   |           | 0                                   | $-\frac{\sqrt{210}}{140}$   | 0                            | 0                            | 0                           | $\frac{\sqrt{42}}{28}$    | 0                       | 0                          | $-\frac{\sqrt{21}}{168}$   | 0                          | 0                         | 0                          | $\frac{\sqrt{7}}{168}$     | 0                       |
|                                   |           | 0                                   | 0                           | $\frac{\sqrt{210}}{140}$     | 0                            | 0                           | 0                         | 0                       | 0                          | 0                          | $-\frac{\sqrt{70}}{168}$   | 0                         | 0                          | 0                          | $\frac{\sqrt{2}}{24}$   |
|                                   |           | 0                                   | 0                           | 0                            | $\frac{\sqrt{42}}{28}$       | 0                           | 0                         | 0                       | 0                          | 0                          | 0                          | $-\frac{\sqrt{14}}{84}$   | 0                          | 0                          | 0                       |
| 598                               | symmetry  | $\frac{3\sqrt{35}xyz(x-y)(x+y)}{2}$ |                             |                              |                              |                             |                           |                         |                            |                            |                            |                           |                            |                            |                         |

continued ...

Table 9

| No. | multipole                       | matrix   |                           |                           |                           |                           |                            |                            |                            |                            |                           |                            |                             |                           |  |
|-----|---------------------------------|--|---------------------------|---------------------------|---------------------------|---------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|----------------------------|-----------------------------|---------------------------|--|
|     | $\mathbb{Q}_{5,0}^{(1,0;a)}(E)$ | 0  | 0                         | 0                         | 0                         | 0                         | 0                          | 0                          | 0                          | 0                          | 0                         | 0                          | $-\frac{\sqrt{210i}}{50}$   | 0                         |  |
|     |                                 | 0  | 0                         | 0                         | 0                         | 0                         | 0                          | 0                          | 0                          | 0                          | 0                         | 0                          | 0                           | $\frac{3\sqrt{10i}}{50}$  |  |
|     |                                 | 0  | 0                         | 0                         | 0                         | 0                         | $\frac{3\sqrt{10i}}{50}$   | 0                          | 0                          | 0                          | 0                         | 0                          | 0                           | 0                         |  |
|     |                                 | 0  | 0                         | 0                         | 0                         | 0                         | 0                          | $-\frac{\sqrt{210i}}{50}$  | 0                          | 0                          | 0                         | 0                          | 0                           | 0                         |  |
|     |                                 | 0  | 0                         | 0                         | 0                         | $-\frac{3\sqrt{35i}}{70}$ | 0                          | 0                          | 0                          | 0                          | 0                         | $-\frac{\sqrt{14i}}{140}$  | 0                           | 0                         |  |
|     |                                 | 0  | 0                         | 0                         | 0                         | 0                         | $\frac{3\sqrt{35i}}{70}$   | 0                          | 0                          | 0                          | 0                         | 0                          | $-\frac{\sqrt{210i}}{2100}$ | 0                         |  |
|     |                                 | 0  | 0                         | 0                         | 0                         | 0                         | 0                          | 0                          | 0                          | 0                          | 0                         | 0                          | 0                           | $\frac{\sqrt{15i}}{150}$  |  |
|     |                                 | 0  | 0                         | 0                         | 0                         | 0                         | $-\frac{\sqrt{15i}}{150}$  | 0                          | 0                          | 0                          | 0                         | 0                          | 0                           | 0                         |  |
|     |                                 | $\frac{3\sqrt{35i}}{70}$                                   | 0                         | 0                         | 0                         | 0                         | 0                          | $\frac{\sqrt{210i}}{2100}$ | 0                          | 0                          | 0                         | 0                          | 0                           | 0                         |  |
|     |                                 | 0  | $-\frac{3\sqrt{35i}}{70}$ | 0                         | 0                         | 0                         | 0                          | 0                          | $\frac{\sqrt{14i}}{140}$   | 0                          | 0                         | 0                          | 0                           | 0                         |  |
| 599 | symmetry                        | $\frac{\sqrt{105}xyz(x^2+y^2-2z^2)}{2}$                    |                           |                           |                           |                           |                            |                            |                            |                            |                           |                            |                             |                           |  |
|     | $\mathbb{Q}_{5,1}^{(1,0;a)}(E)$ | 0  | 0                         | 0                         | 0                         | 0                         | $-\frac{\sqrt{10i}}{100}$  | 0                          | 0                          | 0                          | $\frac{\sqrt{14i}}{20}$   | 0                          | 0                           | 0                         |  |
|     |                                 | 0  | 0                         | 0                         | 0                         | 0                         | 0                          | $\frac{\sqrt{210i}}{100}$  | 0                          | 0                          | 0                         | $-\frac{3\sqrt{70i}}{100}$ | 0                           | 0                         |  |
|     |                                 | 0  | 0                         | 0                         | 0                         | 0                         | 0                          | 0                          | $-\frac{3\sqrt{70i}}{100}$ | 0                          | 0                         | 0                          | $\frac{\sqrt{210i}}{100}$   | 0                         |  |
|     |                                 | 0  | 0                         | 0                         | 0                         | 0                         | 0                          | 0                          | 0                          | $\frac{\sqrt{14i}}{20}$    | 0                         | 0                          | 0                           | $-\frac{\sqrt{10i}}{100}$ |  |
|     |                                 | 0  | 0                         | $\frac{\sqrt{210i}}{140}$ | 0                         | 0                         | 0                          | 0                          | 0                          | $\frac{\sqrt{70i}}{420}$   | 0                         | 0                          | 0                           | 0                         |  |
|     |                                 | 0  | 0                         | 0                         | $-\frac{\sqrt{42i}}{28}$  | 0                         | 0                          | $\frac{\sqrt{10i}}{300}$   | 0                          | 0                          | 0                         | $-\frac{\sqrt{14i}}{210}$  | 0                           | 0                         |  |
|     |                                 | $-\frac{\sqrt{210i}}{140}$                                 | 0                         | 0                         | 0                         | $\frac{\sqrt{42i}}{28}$   | 0                          | 0                          | $-\frac{2\sqrt{35i}}{525}$ | 0                          | 0                         | 0                          | $-\frac{\sqrt{105i}}{1050}$ | 0                         |  |
|     |                                 | 0  | $\frac{\sqrt{42i}}{28}$   | 0                         | 0                         | 0                         | $-\frac{\sqrt{210i}}{140}$ | 0                          | 0                          | $\frac{\sqrt{105i}}{1050}$ | 0                         | 0                          | 0                           | $\frac{2\sqrt{35i}}{525}$ |  |
|     |                                 | 0  | 0                         | $-\frac{\sqrt{42i}}{28}$  | 0                         | 0                         | 0                          | 0                          | 0                          | $\frac{\sqrt{14i}}{210}$   | 0                         | 0                          | 0                           | $-\frac{\sqrt{10i}}{300}$ |  |
|     |                                 | 0  | 0                         | 0                         | $\frac{\sqrt{210i}}{140}$ | 0                         | 0                          | 0                          | 0                          | 0                          | $-\frac{\sqrt{70i}}{420}$ | 0                          | 0                           | 0                         |  |
| 600 | symmetry                        | $\frac{x(8x^4-40x^2y^2-40x^2z^2+15y^4+30y^2z^2+15z^4)}{8}$ |                           |                           |                           |                           |                            |                            |                            |                            |                           |                            |                             |                           |  |

continued ...

Table 9

| No. | multipole                            | matrix   |                            |                           |                            |                           |                          |                             |                            |                           |                             |                             |                           |                            |                             |
|-----|--------------------------------------|--|----------------------------|---------------------------|----------------------------|---------------------------|--------------------------|-----------------------------|----------------------------|---------------------------|-----------------------------|-----------------------------|---------------------------|----------------------------|-----------------------------|
|     | $\mathbb{Q}_{5,0}^{(1,0;a)}(T_1, 1)$ | 0  | 0                          | 0                         | 0                          | 0                         | 0                        | 0                           | $-\frac{\sqrt{6}}{80}$     | 0                         | $\frac{\sqrt{30}}{80}$      | 0                           | $-\frac{7\sqrt{2}}{80}$   | 0                          | $\frac{3\sqrt{42}}{80}$     |
|     |                                      | 0  | 0                          | 0                         | 0                          | 0                         | 0                        | $-\frac{\sqrt{14}}{80}$     | 0                          | $\frac{3\sqrt{6}}{80}$    | 0                           | $-\frac{3\sqrt{10}}{80}$    | 0                         | $\frac{7\sqrt{2}}{80}$     | 0                           |
|     |                                      | 0  | 0                          | 0                         | 0                          | 0                         | 0                        | 0                           | $\frac{7\sqrt{2}}{80}$     | 0                         | $-\frac{3\sqrt{10}}{80}$    | 0                           | $\frac{3\sqrt{6}}{80}$    | 0                          | $-\frac{\sqrt{14}}{80}$     |
|     |                                      | 0  | 0                          | 0                         | 0                          | 0                         | 0                        | $\frac{3\sqrt{42}}{80}$     | 0                          | $-\frac{7\sqrt{2}}{80}$   | 0                           | $\frac{\sqrt{30}}{80}$      | 0                         | $-\frac{\sqrt{6}}{80}$     | 0                           |
|     |                                      | 0  | $\frac{3}{112}$            | 0                         | $-\frac{\sqrt{2}}{16}$     | 0                         | $\frac{9\sqrt{5}}{80}$   | $-\frac{\sqrt{210}}{6720}$  | 0                          | $\frac{\sqrt{10}}{448}$   | 0                           | $-\frac{\sqrt{6}}{192}$     | 0                         | $\frac{\sqrt{30}}{320}$    | 0                           |
|     |                                      | $\frac{3}{112}$  | 0                          | $-\frac{3\sqrt{10}}{112}$ | 0                          | $\frac{\sqrt{5}}{16}$     | 0                        | 0                           | $\frac{23\sqrt{6}}{6720}$  | 0                         | $-\frac{13\sqrt{30}}{6720}$ | 0                           | $\frac{\sqrt{2}}{320}$    | 0                          | $\frac{\sqrt{42}}{320}$     |
|     |                                      | 0  | $-\frac{3\sqrt{10}}{112}$  | 0                         | $\frac{3\sqrt{5}}{56}$     | 0                         | $-\frac{\sqrt{2}}{16}$   | $\frac{\sqrt{21}}{480}$     | 0                          | $-\frac{11}{1120}$        | 0                           | $\frac{\sqrt{15}}{3360}$    | 0                         | $\frac{\sqrt{3}}{160}$     | 0                           |
|     |                                      | $-\frac{\sqrt{2}}{16}$                                     | 0                          | $\frac{3\sqrt{5}}{56}$    | 0                          | $-\frac{3\sqrt{10}}{112}$ | 0                        | 0                           | $-\frac{\sqrt{3}}{160}$    | 0                         | $-\frac{\sqrt{15}}{3360}$   | 0                           | $\frac{11}{1120}$         | 0                          | $-\frac{\sqrt{21}}{480}$    |
|     |                                      | 0  | $\frac{\sqrt{5}}{16}$      | 0                         | $-\frac{3\sqrt{10}}{112}$  | 0                         | $\frac{3}{112}$          | $-\frac{\sqrt{42}}{320}$    | 0                          | $-\frac{\sqrt{2}}{320}$   | 0                           | $\frac{13\sqrt{30}}{6720}$  | 0                         | $-\frac{23\sqrt{6}}{6720}$ | 0                           |
|     |                                      | $\frac{9\sqrt{5}}{80}$                                     | 0                          | $-\frac{\sqrt{2}}{16}$    | 0                          | $\frac{3}{112}$           | 0                        | 0                           | $-\frac{\sqrt{30}}{320}$   | 0                         | $\frac{\sqrt{6}}{192}$      | 0                           | $-\frac{\sqrt{10}}{448}$  | 0                          | $\frac{\sqrt{210}}{6720}$   |
| 601 | symmetry                             | $\frac{y(15x^4-40x^2y^2+30x^2z^2+8y^4-40y^2z^2+15z^4)}{8}$ |                            |                           |                            |                           |                          |                             |                            |                           |                             |                             |                           |                            |                             |
|     | $\mathbb{Q}_{5,1}^{(1,0;a)}(T_1, 1)$ | 0  | 0                          | 0                         | 0                          | 0                         | 0                        | 0                           | $-\frac{\sqrt{6}i}{80}$    | 0                         | $-\frac{\sqrt{30}i}{80}$    | 0                           | $-\frac{7\sqrt{2}i}{80}$  | 0                          | $-\frac{3\sqrt{42}i}{80}$   |
|     |                                      | 0  | 0                          | 0                         | 0                          | 0                         | 0                        | $\frac{\sqrt{14}i}{80}$     | 0                          | $\frac{3\sqrt{6}i}{80}$   | 0                           | $\frac{3\sqrt{10}i}{80}$    | 0                         | $\frac{7\sqrt{2}i}{80}$    | 0                           |
|     |                                      | 0  | 0                          | 0                         | 0                          | 0                         | 0                        | 0                           | $-\frac{7\sqrt{2}i}{80}$   | 0                         | $-\frac{3\sqrt{10}i}{80}$   | 0                           | $-\frac{3\sqrt{6}i}{80}$  | 0                          | $-\frac{\sqrt{14}i}{80}$    |
|     |                                      | 0  | 0                          | 0                         | 0                          | 0                         | 0                        | $\frac{3\sqrt{42}i}{80}$    | 0                          | $\frac{7\sqrt{2}i}{80}$   | 0                           | $\frac{\sqrt{30}i}{80}$     | 0                         | $\frac{\sqrt{6}i}{80}$     | 0                           |
|     |                                      | 0  | $-\frac{3i}{112}$          | 0                         | $-\frac{\sqrt{2}i}{16}$    | 0                         | $-\frac{9\sqrt{5}i}{80}$ | $-\frac{\sqrt{210}i}{6720}$ | 0                          | $-\frac{\sqrt{10}i}{448}$ | 0                           | $-\frac{\sqrt{6}i}{192}$    | 0                         | $-\frac{\sqrt{30}i}{320}$  | 0                           |
|     |                                      | $\frac{3i}{112}$   | 0                          | $\frac{3\sqrt{10}i}{112}$ | 0                          | $\frac{\sqrt{5}i}{16}$    | 0                        | 0                           | $\frac{23\sqrt{6}i}{6720}$ | 0                         | $\frac{13\sqrt{30}i}{6720}$ | 0                           | $\frac{\sqrt{2}i}{320}$   | 0                          | $-\frac{\sqrt{42}i}{320}$   |
|     |                                      | 0  | $-\frac{3\sqrt{10}i}{112}$ | 0                         | $-\frac{3\sqrt{5}i}{56}$   | 0                         | $-\frac{\sqrt{2}i}{16}$  | $-\frac{\sqrt{21}i}{480}$   | 0                          | $-\frac{11i}{1120}$       | 0                           | $-\frac{\sqrt{15}i}{3360}$  | 0                         | $\frac{\sqrt{3}i}{160}$    | 0                           |
|     |                                      | $\frac{\sqrt{2}i}{16}$                                     | 0                          | $\frac{3\sqrt{5}i}{56}$   | 0                          | $\frac{3\sqrt{10}i}{112}$ | 0                        | 0                           | $\frac{\sqrt{3}i}{160}$    | 0                         | $-\frac{\sqrt{15}i}{3360}$  | 0                           | $-\frac{11i}{1120}$       | 0                          | $-\frac{\sqrt{21}i}{480}$   |
|     |                                      | 0  | $-\frac{\sqrt{5}i}{16}$    | 0                         | $-\frac{3\sqrt{10}i}{112}$ | 0                         | $-\frac{3i}{112}$        | $-\frac{\sqrt{42}i}{320}$   | 0                          | $\frac{\sqrt{2}i}{320}$   | 0                           | $\frac{13\sqrt{30}i}{6720}$ | 0                         | $\frac{23\sqrt{6}i}{6720}$ | 0                           |
|     |                                      | $\frac{9\sqrt{5}i}{80}$                                    | 0                          | $\frac{\sqrt{2}i}{16}$    | 0                          | $\frac{3i}{112}$          | 0                        | 0                           | $-\frac{\sqrt{30}i}{320}$  | 0                         | $-\frac{\sqrt{6}i}{192}$    | 0                           | $-\frac{\sqrt{10}i}{448}$ | 0                          | $-\frac{\sqrt{210}i}{6720}$ |
| 602 | symmetry                             | $\frac{z(15x^4+30x^2y^2-40x^2z^2+15y^4-40y^2z^2+8z^4)}{8}$ |                            |                           |                            |                           |                          |                             |                            |                           |                             |                             |                           |                            |                             |

continued ...

Table 9

| No. | multipole                            | matrix  |                           |                           |                           |                           |                          |                           |                              |                             |                             |                            |                             |                               |                          |
|-----|--------------------------------------|---|---------------------------|---------------------------|---------------------------|---------------------------|--------------------------|---------------------------|------------------------------|-----------------------------|-----------------------------|----------------------------|-----------------------------|-------------------------------|--------------------------|
|     | $\mathbb{Q}_{5,2}^{(1,0;a)}(T_1, 1)$ | 0   | 0                         | 0                         | 0                         | 0                         | 0                        | 0                         | 0                            | $\frac{\sqrt{2}}{10}$       | 0                           | 0                          | 0                           | 0                             | 0                        |
|     |                                      | 0   | 0                         | 0                         | 0                         | 0                         | 0                        | 0                         | 0                            | 0                           | $-\frac{\sqrt{10}}{10}$     | 0                          | 0                           | 0                             | 0                        |
|     |                                      | 0   | 0                         | 0                         | 0                         | 0                         | 0                        | 0                         | 0                            | 0                           | 0                           | $\frac{\sqrt{10}}{10}$     | 0                           | 0                             | 0                        |
|     |                                      | 0   | 0                         | 0                         | 0                         | 0                         | 0                        | 0                         | 0                            | 0                           | 0                           | 0                          | $-\frac{\sqrt{2}}{10}$      | 0                             | 0                        |
|     |                                      | $\frac{\sqrt{5}}{70}$                             | 0                         | 0                         | 0                         | 0                         | 0                        | 0                         | $\frac{\sqrt{30}}{420}$      | 0                           | 0                           | 0                          | 0                           | 0                             | 0                        |
|     |                                      | 0   | $-\frac{\sqrt{5}}{14}$    | 0                         | 0                         | 0                         | 0                        | 0                         | 0                            | $-\frac{3\sqrt{2}}{140}$    | 0                           | 0                          | 0                           | 0                             | 0                        |
|     |                                      | 0   | 0                         | $\frac{\sqrt{5}}{7}$      | 0                         | 0                         | 0                        | 0                         | 0                            | 0                           | $\frac{\sqrt{15}}{210}$     | 0                          | 0                           | 0                             | 0                        |
|     |                                      | 0   | 0                         | 0                         | $-\frac{\sqrt{5}}{7}$     | 0                         | 0                        | 0                         | 0                            | 0                           | 0                           | $\frac{\sqrt{15}}{210}$    | 0                           | 0                             | 0                        |
|     |                                      | 0   | 0                         | 0                         | 0                         | $\frac{\sqrt{5}}{14}$     | 0                        | 0                         | 0                            | 0                           | 0                           | 0                          | $-\frac{3\sqrt{2}}{140}$    | 0                             | 0                        |
|     |                                      | 0   | 0                         | 0                         | 0                         | 0                         | $-\frac{\sqrt{5}}{70}$   | 0                         | 0                            | 0                           | 0                           | 0                          | 0                           | $\frac{\sqrt{30}}{420}$       | 0                        |
| 603 | symmetry                             | $\frac{3\sqrt{35}x(y^2-2yz-z^2)(y^2+2yz-z^2)}{8}$ |                           |                           |                           |                           |                          |                           |                              |                             |                             |                            |                             |                               |                          |
|     | $\mathbb{Q}_{5,0}^{(1,0;a)}(T_1, 2)$ | 0   | 0                         | 0                         | 0                         | 0                         | 0                        | 0                         | $-\frac{\sqrt{210}}{400}$    | 0                           | $\frac{\sqrt{42}}{80}$      | 0                          | $\frac{9\sqrt{70}}{400}$    | 0                             | $\frac{\sqrt{30}}{80}$   |
|     |                                      | 0   | 0                         | 0                         | 0                         | 0                         | 0                        | $\frac{9\sqrt{10}}{400}$  | 0                            | $\frac{3\sqrt{210}}{400}$   | 0                           | $-\frac{3\sqrt{14}}{80}$   | 0                           | $-\frac{9\sqrt{70}}{400}$     | 0                        |
|     |                                      | 0   | 0                         | 0                         | 0                         | 0                         | 0                        | 0                         | $-\frac{9\sqrt{70}}{400}$    | 0                           | $-\frac{3\sqrt{14}}{80}$    | 0                          | $\frac{3\sqrt{210}}{400}$   | 0                             | $\frac{9\sqrt{10}}{400}$ |
|     |                                      | 0   | 0                         | 0                         | 0                         | 0                         | 0                        | $\frac{\sqrt{30}}{80}$    | 0                            | $\frac{9\sqrt{70}}{400}$    | 0                           | $\frac{\sqrt{42}}{80}$     | 0                           | $-\frac{\sqrt{210}}{400}$     | 0                        |
|     |                                      | 0   | $\frac{3\sqrt{35}}{560}$  | 0                         | $\frac{9\sqrt{70}}{560}$  | 0                         | $\frac{3\sqrt{7}}{112}$  | $-\frac{\sqrt{6}}{960}$   | 0                            | $\frac{\sqrt{14}}{448}$     | 0                           | $\frac{3\sqrt{210}}{2240}$ | 0                           | $\frac{\sqrt{42}}{1344}$      | 0                        |
|     |                                      | $\frac{3\sqrt{35}}{560}$                          | 0                         | $-\frac{3\sqrt{14}}{112}$ | 0                         | $-\frac{9\sqrt{7}}{112}$  | 0                        | 0                         | $\frac{23\sqrt{210}}{33600}$ | 0                           | $-\frac{13\sqrt{42}}{6720}$ | 0                          | $-\frac{9\sqrt{70}}{11200}$ | 0                             | $\frac{\sqrt{30}}{960}$  |
|     |                                      | 0   | $-\frac{3\sqrt{14}}{112}$ | 0                         | $\frac{3\sqrt{7}}{56}$    | 0                         | $\frac{9\sqrt{70}}{560}$ | $-\frac{3\sqrt{15}}{800}$ | 0                            | $-\frac{11\sqrt{35}}{5600}$ | 0                           | $\frac{\sqrt{21}}{3360}$   | 0                           | $-\frac{9\sqrt{105}}{5600}$   | 0                        |
|     |                                      | $\frac{9\sqrt{70}}{560}$                          | 0                         | $\frac{3\sqrt{7}}{56}$    | 0                         | $-\frac{3\sqrt{14}}{112}$ | 0                        | 0                         | $\frac{9\sqrt{105}}{5600}$   | 0                           | $-\frac{\sqrt{21}}{3360}$   | 0                          | $\frac{11\sqrt{35}}{5600}$  | 0                             | $\frac{3\sqrt{15}}{800}$ |
|     |                                      | 0   | $-\frac{9\sqrt{7}}{112}$  | 0                         | $-\frac{3\sqrt{14}}{112}$ | 0                         | $\frac{3\sqrt{35}}{560}$ | $-\frac{\sqrt{30}}{960}$  | 0                            | $\frac{9\sqrt{70}}{11200}$  | 0                           | $\frac{13\sqrt{42}}{6720}$ | 0                           | $-\frac{23\sqrt{210}}{33600}$ | 0                        |
|     |                                      | $\frac{3\sqrt{7}}{112}$                           | 0                         | $\frac{9\sqrt{70}}{560}$  | 0                         | $\frac{3\sqrt{35}}{560}$  | 0                        | 0                         | $-\frac{\sqrt{42}}{1344}$    | 0                           | $-\frac{3\sqrt{210}}{2240}$ | 0                          | $-\frac{\sqrt{14}}{448}$    | 0                             | $\frac{\sqrt{6}}{960}$   |
| 604 | symmetry                             | $\frac{3\sqrt{35}y(x^2-2xz-z^2)(x^2+2xz-z^2)}{8}$ |                           |                           |                           |                           |                          |                           |                              |                             |                             |                            |                             |                               |                          |

*continued ...*

Table 9

| No. | multipole                            | matrix  |                            |                            |                            |                           |                            |                            |                               |                              |                             |                             |                              |                               |                           |
|-----|--------------------------------------|---|----------------------------|----------------------------|----------------------------|---------------------------|----------------------------|----------------------------|-------------------------------|------------------------------|-----------------------------|-----------------------------|------------------------------|-------------------------------|---------------------------|
| 605 | $\mathbb{Q}_{5,1}^{(1,0;a)}(T_1, 2)$ | 0   | 0                          | 0                          | 0                          | 0                         | 0                          | 0                          | $-\frac{\sqrt{210}i}{400}$    | 0                            | $-\frac{\sqrt{42}i}{80}$    | 0                           | $\frac{9\sqrt{70}i}{400}$    | 0                             | $-\frac{\sqrt{30}i}{80}$  |
|     |                                      | 0   | 0                          | 0                          | 0                          | 0                         | 0                          | $-\frac{9\sqrt{10}i}{400}$ | 0                             | $\frac{3\sqrt{210}i}{400}$   | 0                           | $\frac{3\sqrt{14}i}{80}$    | 0                            | $-\frac{9\sqrt{70}i}{400}$    | 0                         |
|     |                                      | 0   | 0                          | 0                          | 0                          | 0                         | 0                          | 0                          | $\frac{9\sqrt{70}i}{400}$     | 0                            | $-\frac{3\sqrt{14}i}{80}$   | 0                           | $-\frac{3\sqrt{210}i}{400}$  | 0                             | $\frac{9\sqrt{10}i}{400}$ |
|     |                                      | 0   | 0                          | 0                          | 0                          | 0                         | 0                          | $\frac{\sqrt{30}i}{80}$    | 0                             | $-\frac{9\sqrt{70}i}{400}$   | 0                           | $\frac{\sqrt{42}i}{80}$     | 0                            | $\frac{\sqrt{210}i}{400}$     | 0                         |
|     |                                      | 0   | $-\frac{3\sqrt{35}i}{560}$ | 0                          | $\frac{9\sqrt{70}i}{560}$  | 0                         | $-\frac{3\sqrt{7}i}{112}$  | $-\frac{\sqrt{6}i}{960}$   | 0                             | $-\frac{\sqrt{14}i}{448}$    | 0                           | $\frac{3\sqrt{210}i}{2240}$ | 0                            | $-\frac{\sqrt{42}i}{1344}$    | 0                         |
|     |                                      | $\frac{3\sqrt{35}i}{560}$                         | 0                          | $\frac{3\sqrt{14}i}{112}$  | 0                          | $-\frac{9\sqrt{7}i}{112}$ | 0                          | 0                          | $\frac{23\sqrt{210}i}{33600}$ | 0                            | $\frac{13\sqrt{42}i}{6720}$ | 0                           | $-\frac{9\sqrt{70}i}{11200}$ | 0                             | $-\frac{\sqrt{30}i}{960}$ |
|     |                                      | 0   | $-\frac{3\sqrt{14}i}{112}$ | 0                          | $-\frac{3\sqrt{7}i}{56}$   | 0                         | $\frac{9\sqrt{70}i}{560}$  | $\frac{3\sqrt{15}i}{800}$  | 0                             | $-\frac{11\sqrt{35}i}{5600}$ | 0                           | $-\frac{\sqrt{21}i}{3360}$  | 0                            | $-\frac{9\sqrt{105}i}{5600}$  | 0                         |
|     |                                      | $-\frac{9\sqrt{70}i}{560}$                        | 0                          | $\frac{3\sqrt{7}i}{56}$    | 0                          | $\frac{3\sqrt{14}i}{112}$ | 0                          | 0                          | $-\frac{9\sqrt{105}i}{5600}$  | 0                            | $-\frac{\sqrt{21}i}{3360}$  | 0                           | $-\frac{11\sqrt{35}i}{5600}$ | 0                             | $\frac{3\sqrt{15}i}{800}$ |
|     |                                      | 0   | $\frac{9\sqrt{7}i}{112}$   | 0                          | $-\frac{3\sqrt{14}i}{112}$ | 0                         | $-\frac{3\sqrt{35}i}{560}$ | $-\frac{\sqrt{30}i}{960}$  | 0                             | $-\frac{9\sqrt{70}i}{11200}$ | 0                           | $\frac{13\sqrt{42}i}{6720}$ | 0                            | $\frac{23\sqrt{210}i}{33600}$ | 0                         |
|     |                                      | $\frac{3\sqrt{7}i}{112}$                          | 0                          | $-\frac{9\sqrt{70}i}{560}$ | 0                          | $\frac{3\sqrt{35}i}{560}$ | 0                          | 0                          | $-\frac{\sqrt{42}i}{1344}$    | 0                            | $\frac{3\sqrt{210}i}{2240}$ | 0                           | $-\frac{\sqrt{14}i}{448}$    | 0                             | $-\frac{\sqrt{6}i}{960}$  |
| 605 | symmetry                             | $\frac{3\sqrt{35}z(x^2-2xy-y^2)(x^2+2xy-y^2)}{8}$ |                            |                            |                            |                           |                            |                            |                               |                              |                             |                             |                              |                               |                           |
| 606 | $\mathbb{Q}_{5,2}^{(1,0;a)}(T_1, 2)$ | 0   | 0                          | 0                          | 0                          | 0                         | 0                          | 0                          | 0                             | 0                            | 0                           | 0                           | $\frac{\sqrt{210}}{50}$      | 0                             |                           |
|     |                                      | 0   | 0                          | 0                          | 0                          | 0                         | 0                          | 0                          | 0                             | 0                            | 0                           | 0                           | 0                            | $-\frac{3\sqrt{10}}{50}$      |                           |
|     |                                      | 0   | 0                          | 0                          | 0                          | 0                         | 0                          | $\frac{3\sqrt{10}}{50}$    | 0                             | 0                            | 0                           | 0                           | 0                            | 0                             |                           |
|     |                                      | 0   | 0                          | 0                          | 0                          | 0                         | 0                          | 0                          | $-\frac{\sqrt{210}}{50}$      | 0                            | 0                           | 0                           | 0                            | 0                             |                           |
|     |                                      | 0   | 0                          | 0                          | 0                          | $\frac{3\sqrt{35}}{70}$   | 0                          | 0                          | 0                             | 0                            | 0                           | $\frac{\sqrt{14}}{140}$     | 0                            | 0                             |                           |
|     |                                      | 0   | 0                          | 0                          | 0                          | 0                         | $-\frac{3\sqrt{35}}{70}$   | 0                          | 0                             | 0                            | 0                           | 0                           | $\frac{\sqrt{210}}{2100}$    | 0                             |                           |
|     |                                      | 0   | 0                          | 0                          | 0                          | 0                         | 0                          | 0                          | 0                             | 0                            | 0                           | 0                           | 0                            | $-\frac{\sqrt{15}}{150}$      |                           |
|     |                                      | 0   | 0                          | 0                          | 0                          | 0                         | 0                          | $-\frac{\sqrt{15}}{150}$   | 0                             | 0                            | 0                           | 0                           | 0                            | 0                             |                           |
|     |                                      | $\frac{3\sqrt{35}}{70}$                           | 0                          | 0                          | 0                          | 0                         | 0                          | 0                          | $\frac{\sqrt{210}}{2100}$     | 0                            | 0                           | 0                           | 0                            | 0                             |                           |
|     |                                      | 0   | $-\frac{3\sqrt{35}}{70}$   | 0                          | 0                          | 0                         | 0                          | 0                          | 0                             | $\frac{\sqrt{14}}{140}$      | 0                           | 0                           | 0                            | 0                             |                           |
| 606 | symmetry                             | $\frac{\sqrt{105}x(y-z)(y+z)(2x^2-y^2-z^2)}{4}$   |                            |                            |                            |                           |                            |                            |                               |                              |                             |                             |                              |                               |                           |

continued ...

Table 9

| No. | multipole                         | matrix   |                           |                            |                           |                            |                           |                           |                               |                              |                              |                              |                              |                               |                           |
|-----|-----------------------------------|--|---------------------------|----------------------------|---------------------------|----------------------------|---------------------------|---------------------------|-------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|-------------------------------|---------------------------|
|     | $\mathbb{Q}_{5,0}^{(1,0;a)}(T_2)$ | 0  | 0                         | 0                          | 0                         | 0                          | 0                         | 0                         | $-\frac{\sqrt{70}}{200}$      | 0                            | $\frac{\sqrt{14}}{40}$       | 0                            | $-\frac{\sqrt{210}}{200}$    | 0                             | $-\frac{3\sqrt{10}}{40}$  |
|     |                                   | 0  | 0                         | 0                          | 0                         | 0                          | 0                         | $-\frac{\sqrt{30}}{200}$  | 0                             | $\frac{3\sqrt{70}}{200}$     | 0                            | $-\frac{\sqrt{42}}{40}$      | 0                            | $\frac{\sqrt{210}}{200}$      | 0                         |
|     |                                   | 0  | 0                         | 0                          | 0                         | 0                          | 0                         | 0                         | $\frac{\sqrt{210}}{200}$      | 0                            | $-\frac{\sqrt{42}}{40}$      | 0                            | $\frac{3\sqrt{70}}{200}$     | 0                             | $-\frac{\sqrt{30}}{200}$  |
|     |                                   | 0  | 0                         | 0                          | 0                         | 0                          | 0                         | $-\frac{3\sqrt{10}}{40}$  | 0                             | $-\frac{\sqrt{210}}{200}$    | 0                            | $\frac{\sqrt{14}}{40}$       | 0                            | $-\frac{\sqrt{70}}{200}$      | 0                         |
|     |                                   | 0  | $\frac{\sqrt{105}}{280}$  | 0                          | $-\frac{\sqrt{210}}{280}$ | 0                          | $-\frac{3\sqrt{21}}{56}$  | $-\frac{\sqrt{2}}{480}$   | 0                             | $\frac{\sqrt{42}}{672}$      | 0                            | $-\frac{\sqrt{70}}{1120}$    | 0                            | $-\frac{\sqrt{14}}{224}$      | 0                         |
|     |                                   | $\frac{\sqrt{105}}{280}$                         | 0                         | $-\frac{\sqrt{42}}{56}$    | 0                         | $\frac{\sqrt{21}}{56}$     | 0                         | 0                         | $\frac{23\sqrt{70}}{16800}$   | 0                            | $-\frac{13\sqrt{14}}{3360}$  | 0                            | $\frac{\sqrt{210}}{5600}$    | 0                             | $-\frac{\sqrt{10}}{160}$  |
|     |                                   | 0  | $-\frac{\sqrt{42}}{56}$   | 0                          | $\frac{\sqrt{21}}{28}$    | 0                          | $-\frac{\sqrt{210}}{280}$ | $\frac{\sqrt{5}}{400}$    | 0                             | $-\frac{11\sqrt{105}}{8400}$ | 0                            | $\frac{\sqrt{7}}{1680}$      | 0                            | $\frac{3\sqrt{35}}{2800}$     | 0                         |
|     |                                   | $-\frac{\sqrt{210}}{280}$                        | 0                         | $\frac{\sqrt{21}}{28}$     | 0                         | $-\frac{\sqrt{42}}{56}$    | 0                         | 0                         | $-\frac{3\sqrt{35}}{2800}$    | 0                            | $-\frac{\sqrt{7}}{1680}$     | 0                            | $\frac{11\sqrt{105}}{8400}$  | 0                             | $-\frac{\sqrt{5}}{400}$   |
|     |                                   | 0  | $\frac{\sqrt{21}}{56}$    | 0                          | $-\frac{\sqrt{42}}{56}$   | 0                          | $\frac{\sqrt{105}}{280}$  | $\frac{\sqrt{10}}{160}$   | 0                             | $-\frac{\sqrt{210}}{5600}$   | 0                            | $\frac{13\sqrt{14}}{3360}$   | 0                            | $-\frac{23\sqrt{70}}{16800}$  | 0                         |
|     |                                   | $-\frac{3\sqrt{21}}{56}$                         | 0                         | $-\frac{\sqrt{210}}{280}$  | 0                         | $\frac{\sqrt{105}}{280}$   | 0                         | 0                         | $\frac{\sqrt{14}}{224}$       | 0                            | $\frac{\sqrt{70}}{1120}$     | 0                            | $-\frac{\sqrt{42}}{672}$     | 0                             | $\frac{\sqrt{2}}{480}$    |
| 607 | symmetry                          | $\frac{\sqrt{105}y(x-z)(x+z)(x^2-2y^2+z^2)}{4}$  |                           |                            |                           |                            |                           |                           |                               |                              |                              |                              |                              |                               |                           |
|     | $\mathbb{Q}_{5,1}^{(1,0;a)}(T_2)$ | 0  | 0                         | 0                          | 0                         | 0                          | 0                         | 0                         | $\frac{\sqrt{70}i}{200}$      | 0                            | $\frac{\sqrt{14}i}{40}$      | 0                            | $\frac{\sqrt{210}i}{200}$    | 0                             | $-\frac{3\sqrt{10}i}{40}$ |
|     |                                   | 0  | 0                         | 0                          | 0                         | 0                          | 0                         | $-\frac{\sqrt{30}i}{200}$ | 0                             | $-\frac{3\sqrt{70}i}{200}$   | 0                            | $-\frac{\sqrt{42}i}{40}$     | 0                            | $-\frac{\sqrt{210}i}{200}$    | 0                         |
|     |                                   | 0  | 0                         | 0                          | 0                         | 0                          | 0                         | 0                         | $\frac{\sqrt{210}i}{200}$     | 0                            | $\frac{\sqrt{42}i}{40}$      | 0                            | $\frac{3\sqrt{70}i}{200}$    | 0                             | $\frac{\sqrt{30}i}{200}$  |
|     |                                   | 0  | 0                         | 0                          | 0                         | 0                          | 0                         | $\frac{3\sqrt{10}i}{40}$  | 0                             | $-\frac{\sqrt{210}i}{200}$   | 0                            | $-\frac{\sqrt{14}i}{40}$     | 0                            | $-\frac{\sqrt{70}i}{200}$     | 0                         |
|     |                                   | 0  | $\frac{\sqrt{105}i}{280}$ | 0                          | $\frac{\sqrt{210}i}{280}$ | 0                          | $-\frac{3\sqrt{21}i}{56}$ | $\frac{\sqrt{2}i}{480}$   | 0                             | $\frac{\sqrt{42}i}{672}$     | 0                            | $\frac{\sqrt{70}i}{1120}$    | 0                            | $-\frac{\sqrt{14}i}{224}$     | 0                         |
|     |                                   | $-\frac{\sqrt{105}i}{280}$                       | 0                         | $-\frac{\sqrt{42}i}{56}$   | 0                         | $-\frac{\sqrt{21}i}{56}$   | 0                         | 0                         | $-\frac{23\sqrt{70}i}{16800}$ | 0                            | $-\frac{13\sqrt{14}i}{3360}$ | 0                            | $-\frac{\sqrt{210}i}{5600}$  | 0                             | $-\frac{\sqrt{10}i}{160}$ |
|     |                                   | 0  | $\frac{\sqrt{42}i}{56}$   | 0                          | $\frac{\sqrt{21}i}{28}$   | 0                          | $\frac{\sqrt{210}i}{280}$ | $\frac{\sqrt{5}i}{400}$   | 0                             | $\frac{11\sqrt{105}i}{8400}$ | 0                            | $\frac{\sqrt{7}i}{1680}$     | 0                            | $-\frac{3\sqrt{35}i}{2800}$   | 0                         |
|     |                                   | $-\frac{\sqrt{210}i}{280}$                       | 0                         | $-\frac{\sqrt{21}i}{28}$   | 0                         | $-\frac{\sqrt{42}i}{56}$   | 0                         | 0                         | $-\frac{3\sqrt{35}i}{2800}$   | 0                            | $\frac{\sqrt{7}i}{1680}$     | 0                            | $\frac{11\sqrt{105}i}{8400}$ | 0                             | $\frac{\sqrt{5}i}{400}$   |
|     |                                   | 0  | $\frac{\sqrt{21}i}{56}$   | 0                          | $\frac{\sqrt{42}i}{56}$   | 0                          | $\frac{\sqrt{105}i}{280}$ | $-\frac{\sqrt{10}i}{160}$ | 0                             | $-\frac{\sqrt{210}i}{5600}$  | 0                            | $-\frac{13\sqrt{14}i}{3360}$ | 0                            | $-\frac{23\sqrt{70}i}{16800}$ | 0                         |
|     |                                   | $\frac{3\sqrt{21}i}{56}$                         | 0                         | $-\frac{\sqrt{210}i}{280}$ | 0                         | $-\frac{\sqrt{105}i}{280}$ | 0                         | 0                         | $-\frac{\sqrt{14}i}{224}$     | 0                            | $\frac{\sqrt{70}i}{1120}$    | 0                            | $\frac{\sqrt{42}i}{672}$     | 0                             | $\frac{\sqrt{2}i}{480}$   |
| 608 | symmetry                          | $-\frac{\sqrt{105}z(x-y)(x+y)(x^2+y^2-2z^2)}{4}$ |                           |                            |                           |                            |                           |                           |                               |                              |                              |                              |                              |                               |                           |

continued ...



Table 9

| No. | multipole                         | matrix                   |                         |                          |                           |                         |                           |                           |                          |                            |                         |                           |                            |                          |                          |
|-----|-----------------------------------|--------------------------|-------------------------|--------------------------|---------------------------|-------------------------|---------------------------|---------------------------|--------------------------|----------------------------|-------------------------|---------------------------|----------------------------|--------------------------|--------------------------|
|     | $\mathbb{Q}_{5,2}^{(1,0;a)}(T_2)$ | 0                        | 0                       | 0                        | 0                         | 0                       | 0                         | $\frac{\sqrt{10}}{100}$   | 0                        | 0                          | 0                       | $\frac{\sqrt{14}}{20}$    | 0                          | 0                        | 0                        |
|     |                                   | 0                        | 0                       | 0                        | 0                         | 0                       | 0                         | $-\frac{\sqrt{210}}{100}$ | 0                        | 0                          | 0                       | $-\frac{3\sqrt{70}}{100}$ | 0                          | 0                        | 0                        |
|     |                                   | 0                        | 0                       | 0                        | 0                         | 0                       | 0                         | 0                         | $\frac{3\sqrt{70}}{100}$ | 0                          | 0                       | 0                         | $\frac{\sqrt{210}}{100}$   | 0                        | 0                        |
|     |                                   | 0                        | 0                       | 0                        | 0                         | 0                       | 0                         | 0                         | 0                        | $-\frac{\sqrt{14}}{20}$    | 0                       | 0                         | 0                          | 0                        | $-\frac{\sqrt{10}}{100}$ |
|     |                                   | 0                        | 0                       | $\frac{\sqrt{210}}{140}$ | 0                         | 0                       | 0                         | 0                         | 0                        | $\frac{\sqrt{70}}{420}$    | 0                       | 0                         | 0                          | 0                        | 0                        |
|     |                                   | 0                        | 0                       | 0                        | $-\frac{\sqrt{42}}{28}$   | 0                       | 0                         | $-\frac{\sqrt{10}}{300}$  | 0                        | 0                          | 0                       | $-\frac{\sqrt{14}}{210}$  | 0                          | 0                        | 0                        |
|     |                                   | $\frac{\sqrt{210}}{140}$ | 0                       | 0                        | 0                         | $\frac{\sqrt{42}}{28}$  | 0                         | 0                         | $\frac{2\sqrt{35}}{525}$ | 0                          | 0                       | 0                         | $-\frac{\sqrt{105}}{1050}$ | 0                        | 0                        |
|     |                                   | 0                        | $-\frac{\sqrt{42}}{28}$ | 0                        | 0                         | 0                       | $-\frac{\sqrt{210}}{140}$ | 0                         | 0                        | $-\frac{\sqrt{105}}{1050}$ | 0                       | 0                         | 0                          | $\frac{2\sqrt{35}}{525}$ | 0                        |
|     |                                   | 0                        | 0                       | $\frac{\sqrt{42}}{28}$   | 0                         | 0                       | 0                         | 0                         | 0                        | $-\frac{\sqrt{14}}{210}$   | 0                       | 0                         | 0                          | 0                        | $-\frac{\sqrt{10}}{300}$ |
|     |                                   | 0                        | 0                       | 0                        | $-\frac{\sqrt{210}}{140}$ | 0                       | 0                         | 0                         | 0                        | 0                          | $\frac{\sqrt{70}}{420}$ | 0                         | 0                          | 0                        | 0                        |
| 609 | symmetry                          | $x$                      |                         |                          |                           |                         |                           |                           |                          |                            |                         |                           |                            |                          |                          |
|     | $\mathbb{Q}_{1,0}^{(1,1;a)}(T_1)$ | $\frac{\sqrt{5}}{10}$    | 0                       | $-\frac{\sqrt{2}}{20}$   | 0                         | 0                       | 0                         | 0                         | 0                        | 0                          | 0                       | 0                         | 0                          | 0                        | 0                        |
|     |                                   | 0                        | $\frac{\sqrt{3}}{10}$   | 0                        | $-\frac{\sqrt{6}}{20}$    | 0                       | 0                         | 0                         | 0                        | 0                          | 0                       | 0                         | 0                          | 0                        | 0                        |
|     |                                   | 0                        | 0                       | $\frac{\sqrt{6}}{20}$    | 0                         | $-\frac{\sqrt{3}}{10}$  | 0                         | 0                         | 0                        | 0                          | 0                       | 0                         | 0                          | 0                        | 0                        |
|     |                                   | 0                        | 0                       | 0                        | $\frac{\sqrt{2}}{20}$     | 0                       | $-\frac{\sqrt{5}}{10}$    | 0                         | 0                        | 0                          | 0                       | 0                         | 0                          | 0                        | 0                        |
|     |                                   | 0                        | $-\frac{2\sqrt{5}}{35}$ | 0                        | 0                         | 0                       | 0                         | $-\frac{\sqrt{42}}{56}$   | 0                        | $\frac{\sqrt{2}}{56}$      | 0                       | 0                         | 0                          | 0                        | 0                        |
|     |                                   | $-\frac{2\sqrt{5}}{35}$  | 0                       | $-\frac{4\sqrt{2}}{35}$  | 0                         | 0                       | 0                         | 0                         | $-\frac{\sqrt{30}}{56}$  | 0                          | $\frac{\sqrt{6}}{56}$   | 0                         | 0                          | 0                        | 0                        |
|     |                                   | 0                        | $-\frac{4\sqrt{2}}{35}$ | 0                        | $-\frac{6}{35}$           | 0                       | 0                         | 0                         | 0                        | $-\frac{\sqrt{5}}{28}$     | 0                       | $\frac{\sqrt{3}}{28}$     | 0                          | 0                        | 0                        |
|     |                                   | 0                        | 0                       | $-\frac{6}{35}$          | 0                         | $-\frac{4\sqrt{2}}{35}$ | 0                         | 0                         | 0                        | 0                          | $-\frac{\sqrt{3}}{28}$  | 0                         | $\frac{\sqrt{5}}{28}$      | 0                        | 0                        |
|     |                                   | 0                        | 0                       | 0                        | $-\frac{4\sqrt{2}}{35}$   | 0                       | $-\frac{2\sqrt{5}}{35}$   | 0                         | 0                        | 0                          | 0                       | $-\frac{\sqrt{6}}{56}$    | 0                          | $\frac{\sqrt{30}}{56}$   | 0                        |
|     |                                   | 0                        | 0                       | 0                        | 0                         | $-\frac{2\sqrt{5}}{35}$ | 0                         | 0                         | 0                        | 0                          | 0                       | 0                         | $-\frac{\sqrt{2}}{56}$     | 0                        | $\frac{\sqrt{42}}{56}$   |
| 610 | symmetry                          | $y$                      |                         |                          |                           |                         |                           |                           |                          |                            |                         |                           |                            |                          |                          |

*continued ...*

Table 9

| No. | multipole                         | matrix  |                          |                         |                          |                          |                         |                          |                          |                         |                         |                         |                         |                          |  |
|-----|-----------------------------------|---|--------------------------|-------------------------|--------------------------|--------------------------|-------------------------|--------------------------|--------------------------|-------------------------|-------------------------|-------------------------|-------------------------|--------------------------|--|
|     | $\mathbb{Q}_{1,1}^{(1,1;a)}(T_1)$ | $\frac{\sqrt{5}i}{10}$  | 0                        | $\frac{\sqrt{2}i}{20}$  | 0                        | 0                        | 0                       | 0                        | 0                        | 0                       | 0                       | 0                       | 0                       | 0                        |  |
|     |                                   | 0   | $\frac{\sqrt{3}i}{10}$   | 0                       | $\frac{\sqrt{6}i}{20}$   | 0                        | 0                       | 0                        | 0                        | 0                       | 0                       | 0                       | 0                       | 0                        |  |
|     |                                   | 0   | 0                        | $\frac{\sqrt{6}i}{20}$  | 0                        | $\frac{\sqrt{3}i}{10}$   | 0                       | 0                        | 0                        | 0                       | 0                       | 0                       | 0                       | 0                        |  |
|     |                                   | 0   | 0                        | 0                       | $\frac{\sqrt{2}i}{20}$   | 0                        | $\frac{\sqrt{5}i}{10}$  | 0                        | 0                        | 0                       | 0                       | 0                       | 0                       | 0                        |  |
|     |                                   | 0   | $\frac{2\sqrt{5}i}{35}$  | 0                       | 0                        | 0                        | 0                       | $-\frac{\sqrt{42}i}{56}$ | 0                        | $-\frac{\sqrt{2}i}{56}$ | 0                       | 0                       | 0                       | 0                        |  |
|     |                                   | $-\frac{2\sqrt{5}i}{35}$  | 0                        | $\frac{4\sqrt{2}i}{35}$ | 0                        | 0                        | 0                       | 0                        | $-\frac{\sqrt{30}i}{56}$ | 0                       | $-\frac{\sqrt{6}i}{56}$ | 0                       | 0                       | 0                        |  |
|     |                                   | 0   | $-\frac{4\sqrt{2}i}{35}$ | 0                       | $\frac{6i}{35}$          | 0                        | 0                       | 0                        | 0                        | $-\frac{\sqrt{5}i}{28}$ | 0                       | $-\frac{\sqrt{3}i}{28}$ | 0                       | 0                        |  |
|     |                                   | 0   | 0                        | $-\frac{6i}{35}$        | 0                        | $\frac{4\sqrt{2}i}{35}$  | 0                       | 0                        | 0                        | 0                       | $-\frac{\sqrt{3}i}{28}$ | 0                       | $-\frac{\sqrt{5}i}{28}$ | 0                        |  |
|     |                                   | 0   | 0                        | 0                       | $-\frac{4\sqrt{2}i}{35}$ | 0                        | $\frac{2\sqrt{5}i}{35}$ | 0                        | 0                        | 0                       | 0                       | $-\frac{\sqrt{6}i}{56}$ | 0                       | $-\frac{\sqrt{30}i}{56}$ |  |
|     |                                   | 0   | 0                        | 0                       | 0                        | $-\frac{2\sqrt{5}i}{35}$ | 0                       | 0                        | 0                        | 0                       | 0                       | 0                       | $-\frac{\sqrt{2}i}{56}$ | $-\frac{\sqrt{42}i}{56}$ |  |
| 611 | symmetry                          | $z$   |                          |                         |                          |                          |                         |                          |                          |                         |                         |                         |                         |                          |  |
|     | $\mathbb{Q}_{1,2}^{(1,1;a)}(T_1)$ | $\begin{bmatrix} 0 & -\frac{1}{5} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{6}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{6}}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{1}{5} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{2}{7} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{28} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{6}{35} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{28} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{2}{35} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{14} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{2}{35} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{14} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{6}{35} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{28} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{2}{7} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{28} & 0 \end{bmatrix}$ |                          |                         |                          |                          |                         |                          |                          |                         |                         |                         |                         |                          |  |
| 612 | symmetry                          | $\sqrt{15}xyz$  |                          |                         |                          |                          |                         |                          |                          |                         |                         |                         |                         |                          |  |

*continued ...*

Table 9

| No. | multipole                         | matrix                         |                         |                           |                           |                          |                           |                          |                          |                          |                         |                          |                           |                           |                           |
|-----|-----------------------------------|--------------------------------|-------------------------|---------------------------|---------------------------|--------------------------|---------------------------|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|---------------------------|---------------------------|---------------------------|
|     | $\mathbb{Q}_3^{(1,1;a)}(A_2)$     | 0                              | 0                       | 0                         | $-\frac{3\sqrt{30}i}{56}$ | 0                        | 0                         | $-\frac{\sqrt{14}i}{56}$ | 0                        | 0                        | 0                       | $\frac{\sqrt{10}i}{56}$  | 0                         | 0                         | 0                         |
|     |                                   | $-\frac{15i}{56}$              | 0                       | 0                         | 0                         | $-\frac{3\sqrt{5}i}{56}$ | 0                         | 0                        | $\frac{\sqrt{6}i}{56}$   | 0                        | 0                       | 0                        | $\frac{3\sqrt{2}i}{56}$   | 0                         | 0                         |
|     |                                   | 0                              | $\frac{3\sqrt{5}i}{56}$ | 0                         | 0                         | 0                        | $\frac{15i}{56}$          | 0                        | 0                        | $\frac{3\sqrt{2}i}{56}$  | 0                       | 0                        | 0                         | $\frac{\sqrt{6}i}{56}$    | 0                         |
|     |                                   | 0                              | 0                       | $\frac{3\sqrt{30}i}{56}$  | 0                         | 0                        | 0                         | 0                        | 0                        | $\frac{\sqrt{10}i}{56}$  | 0                       | 0                        | 0                         | $-\frac{\sqrt{14}i}{56}$  |                           |
|     |                                   | 0                              | 0                       | $-\frac{5\sqrt{6}i}{84}$  | 0                         | 0                        | 0                         | 0                        | 0                        | $\frac{\sqrt{2}i}{28}$   | 0                       | 0                        | 0                         | 0                         |                           |
|     |                                   | 0                              | 0                       | 0                         | $-\frac{\sqrt{30}i}{84}$  | 0                        | 0                         | $\frac{\sqrt{14}i}{56}$  | 0                        | 0                        | 0                       | $\frac{\sqrt{10}i}{56}$  | 0                         | 0                         | 0                         |
|     |                                   | $\frac{5\sqrt{6}i}{84}$        | 0                       | 0                         | 0                         | $\frac{\sqrt{30}i}{84}$  | 0                         | 0                        | $\frac{i}{56}$           | 0                        | 0                       | 0                        | $\frac{\sqrt{3}i}{56}$    | 0                         | 0                         |
|     |                                   | 0                              | $\frac{\sqrt{30}i}{84}$ | 0                         | 0                         | 0                        | $\frac{5\sqrt{6}i}{84}$   | 0                        | 0                        | $-\frac{\sqrt{3}i}{56}$  | 0                       | 0                        | 0                         | $-\frac{i}{56}$           | 0                         |
|     |                                   | 0                              | 0                       | $-\frac{\sqrt{30}i}{84}$  | 0                         | 0                        | 0                         | 0                        | 0                        | $-\frac{\sqrt{10}i}{56}$ | 0                       | 0                        | 0                         | $-\frac{\sqrt{14}i}{56}$  |                           |
|     |                                   | 0                              | 0                       | 0                         | $-\frac{5\sqrt{6}i}{84}$  | 0                        | 0                         | 0                        | 0                        | 0                        | $-\frac{\sqrt{2}i}{28}$ | 0                        | 0                         | 0                         |                           |
| 613 | symmetry                          | $\frac{x(2x^2-3y^2-3z^2)}{2}$  |                         |                           |                           |                          |                           |                          |                          |                          |                         |                          |                           |                           |                           |
|     | $\mathbb{Q}_{3,0}^{(1,1;a)}(T_1)$ | $\frac{9\sqrt{5}}{224}$        | 0                       | $-\frac{27\sqrt{2}}{224}$ | 0                         | $\frac{45}{224}$         | 0                         | 0                        | $-\frac{\sqrt{30}}{112}$ | 0                        | $\frac{\sqrt{6}}{56}$   | 0                        | $-\frac{\sqrt{10}}{112}$  | 0                         | 0                         |
|     |                                   | 0                              | $-\frac{3\sqrt{3}}{32}$ | 0                         | $\frac{3\sqrt{6}}{224}$   | 0                        | $\frac{15\sqrt{15}}{224}$ | $-\frac{\sqrt{70}}{112}$ | 0                        | 0                        | 0                       | $\frac{3\sqrt{2}}{112}$  | 0                         | $-\frac{\sqrt{10}}{56}$   | 0                         |
|     |                                   | $-\frac{15\sqrt{15}}{224}$     | 0                       | $-\frac{3\sqrt{6}}{224}$  | 0                         | $\frac{3\sqrt{3}}{32}$   | 0                         | 0                        | $-\frac{\sqrt{10}}{56}$  | 0                        | $\frac{3\sqrt{2}}{112}$ | 0                        | 0                         | 0                         | $-\frac{\sqrt{70}}{112}$  |
|     |                                   | 0                              | $-\frac{45}{224}$       | 0                         | $\frac{27\sqrt{2}}{224}$  | 0                        | $-\frac{9\sqrt{5}}{224}$  | 0                        | 0                        | $-\frac{\sqrt{10}}{112}$ | 0                       | $\frac{\sqrt{6}}{56}$    | 0                         | $-\frac{\sqrt{30}}{112}$  | 0                         |
|     |                                   | 0                              | $-\frac{\sqrt{5}}{28}$  | 0                         | $\frac{5\sqrt{10}}{168}$  | 0                        | 0                         | $-\frac{\sqrt{42}}{224}$ | 0                        | $\frac{3\sqrt{2}}{112}$  | 0                       | $-\frac{\sqrt{30}}{224}$ | 0                         | 0                         | 0                         |
|     |                                   | $-\frac{\sqrt{5}}{28}$         | 0                       | $\frac{\sqrt{2}}{56}$     | 0                         | $\frac{5}{42}$           | 0                         | 0                        | $\frac{\sqrt{30}}{224}$  | 0                        | $\frac{\sqrt{6}}{112}$  | 0                        | $-\frac{3\sqrt{10}}{224}$ | 0                         | 0                         |
|     |                                   | 0                              | $\frac{\sqrt{2}}{56}$   | 0                         | $\frac{1}{14}$            | 0                        | $\frac{5\sqrt{10}}{168}$  | $\frac{\sqrt{105}}{224}$ | 0                        | $\frac{3\sqrt{5}}{224}$  | 0                       | $-\frac{\sqrt{3}}{224}$  | 0                         | $-\frac{3\sqrt{15}}{224}$ | 0                         |
|     |                                   | $\frac{5\sqrt{10}}{168}$       | 0                       | $\frac{1}{14}$            | 0                         | $\frac{\sqrt{2}}{56}$    | 0                         | 0                        | $\frac{3\sqrt{15}}{224}$ | 0                        | $\frac{\sqrt{3}}{224}$  | 0                        | $-\frac{3\sqrt{5}}{224}$  | 0                         | $-\frac{\sqrt{105}}{224}$ |
|     |                                   | 0                              | $\frac{5}{42}$          | 0                         | $\frac{\sqrt{2}}{56}$     | 0                        | $-\frac{\sqrt{5}}{28}$    | 0                        | 0                        | $\frac{3\sqrt{10}}{224}$ | 0                       | $-\frac{\sqrt{6}}{112}$  | 0                         | $-\frac{\sqrt{30}}{224}$  | 0                         |
|     |                                   | 0                              | 0                       | $\frac{5\sqrt{10}}{168}$  | 0                         | $-\frac{\sqrt{5}}{28}$   | 0                         | 0                        | 0                        | $\frac{\sqrt{30}}{224}$  | 0                       | $-\frac{3\sqrt{2}}{112}$ | 0                         | $\frac{\sqrt{42}}{224}$   |                           |
| 614 | symmetry                          | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ |                         |                           |                           |                          |                           |                          |                          |                          |                         |                          |                           |                           |                           |

continued ...

Table 9

| No. | multipole                         | matrix  |                          |                            |                           |                          |                            |                            |                            |                            |                           |                           |                            |                            |                            |
|-----|-----------------------------------|---|--------------------------|----------------------------|---------------------------|--------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|---------------------------|----------------------------|----------------------------|----------------------------|
|     | $\mathbb{Q}_{3,1}^{(1,1;a)}(T_1)$ | $\frac{9\sqrt{5}i}{224}$  | 0                        | $\frac{27\sqrt{2}i}{224}$  | 0                         | $\frac{45i}{224}$        | 0                          | 0                          | $-\frac{\sqrt{30}i}{112}$  | 0                          | $-\frac{\sqrt{6}i}{56}$   | 0                         | $-\frac{\sqrt{10}i}{112}$  | 0                          | 0                          |
|     |                                   | 0   | $-\frac{3\sqrt{3}i}{32}$ | 0                          | $-\frac{3\sqrt{6}i}{224}$ | 0                        | $\frac{15\sqrt{15}i}{224}$ | $\frac{\sqrt{70}i}{112}$   | 0                          | 0                          | 0                         | $-\frac{3\sqrt{2}i}{112}$ | 0                          | $-\frac{\sqrt{10}i}{56}$   | 0                          |
|     |                                   | $\frac{15\sqrt{15}i}{224}$  | 0                        | $-\frac{3\sqrt{6}i}{224}$  | 0                         | $-\frac{3\sqrt{3}i}{32}$ | 0                          | 0                          | $\frac{\sqrt{10}i}{56}$    | 0                          | $\frac{3\sqrt{2}i}{112}$  | 0                         | 0                          | 0                          | $-\frac{\sqrt{70}i}{112}$  |
|     |                                   | 0   | $\frac{45i}{224}$        | 0                          | $\frac{27\sqrt{2}i}{224}$ | 0                        | $\frac{9\sqrt{5}i}{224}$   | 0                          | 0                          | $\frac{\sqrt{10}i}{112}$   | 0                         | $\frac{\sqrt{6}i}{56}$    | 0                          | $\frac{\sqrt{30}i}{112}$   | 0                          |
|     |                                   | 0   | $\frac{\sqrt{5}i}{28}$   | 0                          | $\frac{5\sqrt{10}i}{168}$ | 0                        | 0                          | $-\frac{\sqrt{42}i}{224}$  | 0                          | $-\frac{3\sqrt{2}i}{112}$  | 0                         | $-\frac{\sqrt{30}i}{224}$ | 0                          | 0                          | 0                          |
|     |                                   | $-\frac{\sqrt{5}i}{28}$   | 0                        | $-\frac{\sqrt{2}i}{56}$    | 0                         | $\frac{5i}{42}$          | 0                          | 0                          | $\frac{\sqrt{30}i}{224}$   | 0                          | $-\frac{\sqrt{6}i}{112}$  | 0                         | $-\frac{3\sqrt{10}i}{224}$ | 0                          | 0                          |
|     |                                   | 0   | $\frac{\sqrt{2}i}{56}$   | 0                          | $-\frac{i}{14}$           | 0                        | $\frac{5\sqrt{10}i}{168}$  | $-\frac{\sqrt{105}i}{224}$ | 0                          | $\frac{3\sqrt{5}i}{224}$   | 0                         | $\frac{\sqrt{3}i}{224}$   | 0                          | $-\frac{3\sqrt{15}i}{224}$ | 0                          |
|     |                                   | $-\frac{5\sqrt{10}i}{168}$  | 0                        | $\frac{i}{14}$             | 0                         | $-\frac{\sqrt{2}i}{56}$  | 0                          | 0                          | $-\frac{3\sqrt{15}i}{224}$ | 0                          | $\frac{\sqrt{3}i}{224}$   | 0                         | $\frac{3\sqrt{5}i}{224}$   | 0                          | $-\frac{\sqrt{105}i}{224}$ |
|     |                                   | 0   | $-\frac{5i}{42}$         | 0                          | $\frac{\sqrt{2}i}{56}$    | 0                        | $\frac{\sqrt{5}i}{28}$     | 0                          | 0                          | $-\frac{3\sqrt{10}i}{224}$ | 0                         | $-\frac{\sqrt{6}i}{112}$  | 0                          | $\frac{\sqrt{30}i}{224}$   | 0                          |
|     |                                   | 0   | 0                        | $-\frac{5\sqrt{10}i}{168}$ | 0                         | $-\frac{\sqrt{5}i}{28}$  | 0                          | 0                          | 0                          | 0                          | $-\frac{\sqrt{30}i}{224}$ | 0                         | $-\frac{3\sqrt{2}i}{112}$  | 0                          | $-\frac{\sqrt{42}i}{224}$  |
| 615 | symmetry                          | $-\frac{z(3x^2+3y^2-2z^2)}{2}$  |                          |                            |                           |                          |                            |                            |                            |                            |                           |                           |                            |                            |                            |
|     | $\mathbb{Q}_{3,2}^{(1,1;a)}(T_1)$ | $\begin{bmatrix} 0 & \frac{9}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}}{28} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{3\sqrt{6}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{28} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{3\sqrt{6}}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{28} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{9}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{28} & 0 & 0 \\ \frac{5}{42} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{28} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{1}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{2}{21} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{28} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{2}{21} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{28} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{1}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{5}{42} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{28} & 0 \end{bmatrix}$ |                          |                            |                           |                          |                            |                            |                            |                            |                           |                           |                            |                            |                            |
| 616 | symmetry                          | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$  |                          |                            |                           |                          |                            |                            |                            |                            |                           |                           |                            |                            |                            |

continued ...

Table 9

| No. | multipole                         | matrix                            |                           |                            |                            |                           |                            |                           |                           |                           |                           |                           |                           |                           |                           |
|-----|-----------------------------------|-----------------------------------|---------------------------|----------------------------|----------------------------|---------------------------|----------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
|     | $\mathbb{Q}_{3,0}^{(1,1;a)}(T_2)$ | $\frac{15\sqrt{3}}{224}$          | 0                         | $-\frac{9\sqrt{30}}{224}$  | 0                          | $-\frac{9\sqrt{15}}{224}$ | 0                          | 0                         | $-\frac{5\sqrt{2}}{112}$  | 0                         | $\frac{\sqrt{10}}{56}$    | 0                         | $\frac{\sqrt{6}}{112}$    | 0                         | 0                         |
|     |                                   | 0                                 | $-\frac{3\sqrt{5}}{32}$   | 0                          | $\frac{3\sqrt{10}}{224}$   | 0                         | $-\frac{45}{224}$          | $\frac{\sqrt{42}}{112}$   | 0                         | 0                         | 0                         | $\frac{\sqrt{30}}{112}$   | 0                         | $\frac{\sqrt{6}}{56}$     | 0                         |
|     |                                   | $\frac{45}{224}$                  | 0                         | $-\frac{3\sqrt{10}}{224}$  | 0                          | $\frac{3\sqrt{5}}{32}$    | 0                          | 0                         | $\frac{\sqrt{6}}{56}$     | 0                         | $\frac{\sqrt{30}}{112}$   | 0                         | 0                         | 0                         | $\frac{\sqrt{42}}{112}$   |
|     |                                   | 0                                 | $\frac{9\sqrt{15}}{224}$  | 0                          | $\frac{9\sqrt{30}}{224}$   | 0                         | $-\frac{15\sqrt{3}}{224}$  | 0                         | 0                         | $\frac{\sqrt{6}}{112}$    | 0                         | $\frac{\sqrt{10}}{56}$    | 0                         | $-\frac{5\sqrt{2}}{112}$  | 0                         |
|     |                                   | 0                                 | $-\frac{5\sqrt{3}}{84}$   | 0                          | $-\frac{5\sqrt{6}}{168}$   | 0                         | 0                          | $-\frac{\sqrt{70}}{224}$  | 0                         | $\frac{\sqrt{30}}{112}$   | 0                         | $\frac{3\sqrt{2}}{224}$   | 0                         | 0                         | 0                         |
|     |                                   | $-\frac{5\sqrt{3}}{84}$           | 0                         | $\frac{\sqrt{30}}{168}$    | 0                          | $-\frac{\sqrt{15}}{42}$   | 0                          | 0                         | $\frac{5\sqrt{2}}{224}$   | 0                         | $\frac{\sqrt{10}}{112}$   | 0                         | $\frac{3\sqrt{6}}{224}$   | 0                         | 0                         |
|     |                                   | 0                                 | $\frac{\sqrt{30}}{168}$   | 0                          | $\frac{\sqrt{15}}{42}$     | 0                         | $-\frac{5\sqrt{6}}{168}$   | $-\frac{3\sqrt{7}}{224}$  | 0                         | $\frac{5\sqrt{3}}{224}$   | 0                         | $-\frac{\sqrt{5}}{224}$   | 0                         | $\frac{9}{224}$           | 0                         |
|     |                                   | $-\frac{5\sqrt{6}}{168}$          | 0                         | $\frac{\sqrt{15}}{42}$     | 0                          | $\frac{\sqrt{30}}{168}$   | 0                          | 0                         | $-\frac{9}{224}$          | 0                         | $\frac{\sqrt{5}}{224}$    | 0                         | $-\frac{5\sqrt{3}}{224}$  | 0                         | $\frac{3\sqrt{7}}{224}$   |
|     |                                   | 0                                 | $-\frac{\sqrt{15}}{42}$   | 0                          | $\frac{\sqrt{30}}{168}$    | 0                         | $-\frac{5\sqrt{3}}{84}$    | 0                         | 0                         | $-\frac{3\sqrt{6}}{224}$  | 0                         | $-\frac{\sqrt{10}}{112}$  | 0                         | $-\frac{5\sqrt{2}}{224}$  | 0                         |
|     |                                   | 0                                 | 0                         | $-\frac{5\sqrt{6}}{168}$   | 0                          | $-\frac{5\sqrt{3}}{84}$   | 0                          | 0                         | 0                         | 0                         | $-\frac{3\sqrt{2}}{224}$  | 0                         | $-\frac{\sqrt{30}}{112}$  | 0                         | $\frac{\sqrt{70}}{224}$   |
| 617 | symmetry                          | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |                           |                            |                            |                           |                            |                           |                           |                           |                           |                           |                           |                           |                           |
|     | $\mathbb{Q}_{3,1}^{(1,1;a)}(T_2)$ | $-\frac{15\sqrt{3}i}{224}$        | 0                         | $-\frac{9\sqrt{30}i}{224}$ | 0                          | $\frac{9\sqrt{15}i}{224}$ | 0                          | 0                         | $\frac{5\sqrt{2}i}{112}$  | 0                         | $\frac{\sqrt{10}i}{56}$   | 0                         | $-\frac{\sqrt{6}i}{112}$  | 0                         | 0                         |
|     |                                   | 0                                 | $\frac{3\sqrt{5}i}{32}$   | 0                          | $\frac{3\sqrt{10}i}{224}$  | 0                         | $\frac{45i}{224}$          | $\frac{\sqrt{42}i}{112}$  | 0                         | 0                         | 0                         | $\frac{\sqrt{30}i}{112}$  | 0                         | $-\frac{\sqrt{6}i}{56}$   | 0                         |
|     |                                   | $\frac{45i}{224}$                 | 0                         | $\frac{3\sqrt{10}i}{224}$  | 0                          | $\frac{3\sqrt{5}i}{32}$   | 0                          | 0                         | $\frac{\sqrt{6}i}{56}$    | 0                         | $-\frac{\sqrt{30}i}{112}$ | 0                         | 0                         | 0                         | $-\frac{\sqrt{42}i}{112}$ |
|     |                                   | 0                                 | $\frac{9\sqrt{15}i}{224}$ | 0                          | $-\frac{9\sqrt{30}i}{224}$ | 0                         | $-\frac{15\sqrt{3}i}{224}$ | 0                         | 0                         | $\frac{\sqrt{6}i}{112}$   | 0                         | $-\frac{\sqrt{10}i}{56}$  | 0                         | $-\frac{5\sqrt{2}i}{112}$ | 0                         |
|     |                                   | 0                                 | $-\frac{5\sqrt{3}i}{84}$  | 0                          | $\frac{5\sqrt{6}i}{168}$   | 0                         | 0                          | $\frac{\sqrt{70}i}{224}$  | 0                         | $\frac{\sqrt{30}i}{112}$  | 0                         | $-\frac{3\sqrt{2}i}{224}$ | 0                         | 0                         | 0                         |
|     |                                   | $\frac{5\sqrt{3}i}{84}$           | 0                         | $\frac{\sqrt{30}i}{168}$   | 0                          | $\frac{\sqrt{15}i}{42}$   | 0                          | 0                         | $-\frac{5\sqrt{2}i}{224}$ | 0                         | $\frac{\sqrt{10}i}{112}$  | 0                         | $-\frac{3\sqrt{6}i}{224}$ | 0                         | 0                         |
|     |                                   | 0                                 | $-\frac{\sqrt{30}i}{168}$ | 0                          | $\frac{\sqrt{15}i}{42}$    | 0                         | $\frac{5\sqrt{6}i}{168}$   | $-\frac{3\sqrt{7}i}{224}$ | 0                         | $-\frac{5\sqrt{3}i}{224}$ | 0                         | $-\frac{\sqrt{5}i}{224}$  | 0                         | $-\frac{9i}{224}$         | 0                         |
|     |                                   | $-\frac{5\sqrt{6}i}{168}$         | 0                         | $-\frac{\sqrt{15}i}{42}$   | 0                          | $\frac{\sqrt{30}i}{168}$  | 0                          | 0                         | $-\frac{9i}{224}$         | 0                         | $-\frac{\sqrt{5}i}{224}$  | 0                         | $-\frac{5\sqrt{3}i}{224}$ | 0                         | $-\frac{3\sqrt{7}i}{224}$ |
|     |                                   | 0                                 | $-\frac{\sqrt{15}i}{42}$  | 0                          | $-\frac{\sqrt{30}i}{168}$  | 0                         | $-\frac{5\sqrt{3}i}{84}$   | 0                         | 0                         | $-\frac{3\sqrt{6}i}{224}$ | 0                         | $\frac{\sqrt{10}i}{112}$  | 0                         | $-\frac{5\sqrt{2}i}{224}$ | 0                         |
|     |                                   | 0                                 | 0                         | $-\frac{5\sqrt{6}i}{168}$  | 0                          | $\frac{5\sqrt{3}i}{84}$   | 0                          | 0                         | 0                         | 0                         | $-\frac{3\sqrt{2}i}{224}$ | 0                         | $\frac{\sqrt{30}i}{112}$  | 0                         | $\frac{\sqrt{70}i}{224}$  |
| 618 | symmetry                          | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$  |                           |                            |                            |                           |                            |                           |                           |                           |                           |                           |                           |                           |                           |

continued ...

Table 9

| No. | multipole                         | matrix                                 |                          |                         |                          |                           |                          |                         |                         |                        |                         |                          |                         |                        |                          |  |
|-----|-----------------------------------|--|--------------------------|-------------------------|--------------------------|---------------------------|--------------------------|-------------------------|-------------------------|------------------------|-------------------------|--------------------------|-------------------------|------------------------|--------------------------|--|
|     | $\mathbb{Q}_{3,2}^{(1,1;a)}(T_2)$ | 0                                      | 0                        | 0                       | $\frac{3\sqrt{30}}{56}$  | 0                         | 0                        | $-\frac{\sqrt{14}}{56}$ | 0                       | 0                      | 0                       | $-\frac{\sqrt{10}}{56}$  | 0                       | 0                      | 0                        |  |
|     |                                   | $-\frac{15}{56}$                       | 0                        | 0                       | 0                        | $\frac{3\sqrt{5}}{56}$    | 0                        | 0                       | $\frac{\sqrt{6}}{56}$   | 0                      | 0                       | 0                        | $-\frac{3\sqrt{2}}{56}$ | 0                      | 0                        |  |
|     |                                   | 0                                      | $\frac{3\sqrt{5}}{56}$   | 0                       | 0                        | 0                         | $-\frac{15}{56}$         | 0                       | 0                       | $\frac{3\sqrt{2}}{56}$ | 0                       | 0                        | 0                       | $-\frac{\sqrt{6}}{56}$ | 0                        |  |
|     |                                   | 0                                      | 0                        | $\frac{3\sqrt{30}}{56}$ | 0                        | 0                         | 0                        | 0                       | 0                       | 0                      | $\frac{\sqrt{10}}{56}$  | 0                        | 0                       | 0                      | $\frac{\sqrt{14}}{56}$   |  |
|     |                                   | 0                                      | 0                        | $\frac{5\sqrt{6}}{84}$  | 0                        | 0                         | 0                        | 0                       | 0                       | 0                      | $-\frac{\sqrt{2}}{28}$  | 0                        | 0                       | 0                      | 0                        |  |
|     |                                   | 0                                      | 0                        | 0                       | $\frac{\sqrt{30}}{84}$   | 0                         | 0                        | $\frac{\sqrt{14}}{56}$  | 0                       | 0                      | 0                       | $-\frac{\sqrt{10}}{56}$  | 0                       | 0                      | 0                        |  |
|     |                                   | $\frac{5\sqrt{6}}{84}$                 | 0                        | 0                       | 0                        | $-\frac{\sqrt{30}}{84}$   | 0                        | 0                       | $\frac{1}{56}$          | 0                      | 0                       | 0                        | $-\frac{\sqrt{3}}{56}$  | 0                      | 0                        |  |
|     |                                   | 0                                      | $\frac{\sqrt{30}}{84}$   | 0                       | 0                        | 0                         | $-\frac{5\sqrt{6}}{84}$  | 0                       | 0                       | $-\frac{\sqrt{3}}{56}$ | 0                       | 0                        | 0                       | $\frac{1}{56}$         | 0                        |  |
|     |                                   | 0                                      | 0                        | $-\frac{\sqrt{30}}{84}$ | 0                        | 0                         | 0                        | 0                       | 0                       | 0                      | $-\frac{\sqrt{10}}{56}$ | 0                        | 0                       | 0                      | $\frac{\sqrt{14}}{56}$   |  |
|     |                                   | 0                                      | 0                        | 0                       | $-\frac{5\sqrt{6}}{84}$  | 0                         | 0                        | 0                       | 0                       | 0                      | 0                       | $-\frac{\sqrt{2}}{28}$   | 0                       | 0                      | 0                        |  |
| 619 | symmetry                          | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |                          |                         |                          |                           |                          |                         |                         |                        |                         |                          |                         |                        |                          |  |
|     | $\mathbb{G}_{2,0}^{(a)}(E)$       | 0                                      | $\frac{3\sqrt{10}i}{35}$ | 0                       | 0                        | 0                         | 0                        | 0                       | 0                       | $\frac{i}{14}$         | 0                       | 0                        | 0                       | 0                      | 0                        |  |
|     |                                   | 0                                      | 0                        | $\frac{\sqrt{15}i}{35}$ | 0                        | 0                         | 0                        | 0                       | 0                       | 0                      | $\frac{3\sqrt{5}i}{70}$ | 0                        | 0                       | 0                      | 0                        |  |
|     |                                   | 0                                      | 0                        | 0                       | $-\frac{\sqrt{15}i}{35}$ | 0                         | 0                        | 0                       | 0                       | 0                      | 0                       | $\frac{3\sqrt{5}i}{70}$  | 0                       | 0                      | 0                        |  |
|     |                                   | 0                                      | 0                        | 0                       | 0                        | $-\frac{3\sqrt{10}i}{35}$ | 0                        | 0                       | 0                       | 0                      | 0                       | 0                        | $\frac{i}{14}$          | 0                      | 0                        |  |
|     |                                   | $-\frac{\sqrt{10}i}{28}$               | 0                        | 0                       | 0                        | 0                         | 0                        | 0                       | $\frac{\sqrt{15}i}{14}$ | 0                      | 0                       | 0                        | 0                       | 0                      | 0                        |  |
|     |                                   | 0                                      | $\frac{\sqrt{10}i}{140}$ | 0                       | 0                        | 0                         | 0                        | 0                       | 0                       | $\frac{3i}{14}$        | 0                       | 0                        | 0                       | 0                      | 0                        |  |
|     |                                   | 0                                      | 0                        | $\frac{\sqrt{10}i}{35}$ | 0                        | 0                         | 0                        | 0                       | 0                       | 0                      | $\frac{\sqrt{30}i}{70}$ | 0                        | 0                       | 0                      | 0                        |  |
|     |                                   | 0                                      | 0                        | 0                       | $\frac{\sqrt{10}i}{35}$  | 0                         | 0                        | 0                       | 0                       | 0                      | 0                       | $-\frac{\sqrt{30}i}{70}$ | 0                       | 0                      | 0                        |  |
|     |                                   | 0                                      | 0                        | 0                       | 0                        | $\frac{\sqrt{10}i}{140}$  | 0                        | 0                       | 0                       | 0                      | 0                       | 0                        | $-\frac{3i}{14}$        | 0                      | 0                        |  |
|     |                                   | 0                                      | 0                        | 0                       | 0                        | 0                         | $-\frac{\sqrt{10}i}{28}$ | 0                       | 0                       | 0                      | 0                       | 0                        | 0                       | 0                      | $-\frac{\sqrt{15}i}{14}$ |  |
| 620 | symmetry                          | $\frac{\sqrt{3}(x-y)(x+y)}{2}$         |                          |                         |                          |                           |                          |                         |                         |                        |                         |                          |                         |                        |                          |  |

continued ...

Table 9

| No. | multipole                     | matrix                  |                            |                            |                            |                            |                         |                         |                        |                         |                           |                         |                        |                         |                        |
|-----|-------------------------------|-------------------------|----------------------------|----------------------------|----------------------------|----------------------------|-------------------------|-------------------------|------------------------|-------------------------|---------------------------|-------------------------|------------------------|-------------------------|------------------------|
|     | $\mathbb{G}_{2,1}^{(a)}(E)$   | 0                       | 0                          | 0                          | $\frac{\sqrt{15}i}{35}$    | 0                          | 0                       | $\frac{\sqrt{7}i}{28}$  | 0                      | 0                       | 0                         | $\frac{\sqrt{5}i}{140}$ | 0                      | 0                       | 0                      |
|     |                               | $-\frac{\sqrt{2}i}{7}$  | 0                          | 0                          | 0                          | $\frac{2\sqrt{10}i}{35}$   | 0                       | 0                       | $\frac{\sqrt{3}i}{28}$ | 0                       | 0                         | 0                       | $\frac{i}{28}$         | 0                       | 0                      |
|     |                               | 0                       | $-\frac{2\sqrt{10}i}{35}$  | 0                          | 0                          | 0                          | $\frac{\sqrt{2}i}{7}$   | 0                       | 0                      | $\frac{i}{28}$          | 0                         | 0                       | 0                      | $\frac{\sqrt{3}i}{28}$  | 0                      |
|     |                               | 0                       | 0                          | $-\frac{\sqrt{15}i}{35}$   | 0                          | 0                          | 0                       | 0                       | 0                      | 0                       | $\frac{\sqrt{5}i}{140}$   | 0                       | 0                      | 0                       | $\frac{\sqrt{7}i}{28}$ |
|     |                               | 0                       | 0                          | $-\frac{\sqrt{3}i}{28}$    | 0                          | 0                          | 0                       | 0                       | 0                      | 0                       | $\frac{i}{14}$            | 0                       | 0                      | 0                       | 0                      |
|     |                               | 0                       | 0                          | 0                          | $-\frac{3\sqrt{15}i}{140}$ | 0                          | 0                       | $-\frac{\sqrt{7}i}{14}$ | 0                      | 0                       | 0                         | $\frac{2\sqrt{5}i}{35}$ | 0                      | 0                       | 0                      |
|     |                               | $-\frac{\sqrt{3}i}{28}$ | 0                          | 0                          | 0                          | $-\frac{3\sqrt{15}i}{140}$ | 0                       | 0                       | $-\frac{\sqrt{2}i}{7}$ | 0                       | 0                         | 0                       | $\frac{\sqrt{6}i}{14}$ | 0                       | 0                      |
|     |                               | 0                       | $-\frac{3\sqrt{15}i}{140}$ | 0                          | 0                          | 0                          | $-\frac{\sqrt{3}i}{28}$ | 0                       | 0                      | $-\frac{\sqrt{6}i}{14}$ | 0                         | 0                       | 0                      | $\frac{\sqrt{2}i}{7}$   | 0                      |
|     |                               | 0                       | 0                          | $-\frac{3\sqrt{15}i}{140}$ | 0                          | 0                          | 0                       | 0                       | 0                      | 0                       | $-\frac{2\sqrt{5}i}{35}$  | 0                       | 0                      | 0                       | $\frac{\sqrt{7}i}{14}$ |
|     |                               | 0                       | 0                          | 0                          | $-\frac{\sqrt{3}i}{28}$    | 0                          | 0                       | 0                       | 0                      | 0                       | 0                         | $-\frac{i}{14}$         | 0                      | 0                       | 0                      |
| 621 | symmetry                      | $\sqrt{3}yz$            |                            |                            |                            |                            |                         |                         |                        |                         |                           |                         |                        |                         |                        |
|     | $\mathbb{G}_{2,0}^{(a)}(T_2)$ | $\frac{\sqrt{6}}{14}$   | 0                          | $\frac{3\sqrt{15}}{70}$    | 0                          | 0                          | 0                       | 0                       | $\frac{1}{14}$         | 0                       | $\frac{\sqrt{5}}{70}$     | 0                       | 0                      | 0                       | 0                      |
|     |                               | 0                       | $-\frac{\sqrt{10}}{70}$    | 0                          | $\frac{\sqrt{5}}{14}$      | 0                          | 0                       | 0                       | 0                      | $\frac{1}{14}$          | 0                         | $\frac{\sqrt{15}}{70}$  | 0                      | 0                       | 0                      |
|     |                               | 0                       | 0                          | $-\frac{\sqrt{5}}{14}$     | 0                          | $\frac{\sqrt{10}}{70}$     | 0                       | 0                       | 0                      | 0                       | $\frac{\sqrt{15}}{70}$    | 0                       | $\frac{1}{14}$         | 0                       | 0                      |
|     |                               | 0                       | 0                          | 0                          | $-\frac{3\sqrt{15}}{70}$   | 0                          | $-\frac{\sqrt{6}}{14}$  | 0                       | 0                      | 0                       | 0                         | $\frac{\sqrt{5}}{70}$   | 0                      | $\frac{1}{14}$          | 0                      |
|     |                               | 0                       | $-\frac{\sqrt{6}}{28}$     | 0                          | 0                          | 0                          | 0                       | $\frac{\sqrt{35}}{28}$  | 0                      | $\frac{\sqrt{15}}{28}$  | 0                         | 0                       | 0                      | 0                       | 0                      |
|     |                               | $\frac{\sqrt{6}}{28}$   | 0                          | $-\frac{\sqrt{15}}{70}$    | 0                          | 0                          | 0                       | 0                       | $\frac{1}{28}$         | 0                       | $\frac{11\sqrt{5}}{140}$  | 0                       | 0                      | 0                       | 0                      |
|     |                               | 0                       | $\frac{\sqrt{15}}{70}$     | 0                          | 0                          | 0                          | 0                       | 0                       | $-\frac{\sqrt{6}}{28}$ | 0                       | $\frac{\sqrt{10}}{20}$    | 0                       | 0                      | 0                       | 0                      |
|     |                               | 0                       | 0                          | 0                          | 0                          | $\frac{\sqrt{15}}{70}$     | 0                       | 0                       | 0                      | $-\frac{\sqrt{10}}{20}$ | 0                         | $\frac{\sqrt{6}}{28}$   | 0                      | 0                       | 0                      |
|     |                               | 0                       | 0                          | 0                          | $-\frac{\sqrt{15}}{70}$    | 0                          | $\frac{\sqrt{6}}{28}$   | 0                       | 0                      | 0                       | $-\frac{11\sqrt{5}}{140}$ | 0                       | $-\frac{1}{28}$        | 0                       | 0                      |
|     |                               | 0                       | 0                          | 0                          | 0                          | $-\frac{\sqrt{6}}{28}$     | 0                       | 0                       | 0                      | 0                       | 0                         | $-\frac{\sqrt{15}}{28}$ | 0                      | $-\frac{\sqrt{35}}{28}$ | 0                      |
| 622 | symmetry                      | $\sqrt{3}xz$            |                            |                            |                            |                            |                         |                         |                        |                         |                           |                         |                        |                         |                        |

*continued ...*

Table 9

| No. | multipole                     | matrix   |                          |                          |                           |                           |                         |                          |                        |                         |                           |                           |                         |                       |                          |
|-----|-------------------------------|--|--------------------------|--------------------------|---------------------------|---------------------------|-------------------------|--------------------------|------------------------|-------------------------|---------------------------|---------------------------|-------------------------|-----------------------|--------------------------|
|     | $\mathbb{G}_{2,1}^{(a)}(T_2)$ | $-\frac{\sqrt{6}i}{14}$                                    | 0                        | $\frac{3\sqrt{15}i}{70}$ | 0                         | 0                         | 0                       | 0                        | $-\frac{i}{14}$        | 0                       | $\frac{\sqrt{5}i}{70}$    | 0                         | 0                       | 0                     | 0                        |
|     |                               | 0  | $\frac{\sqrt{10}i}{70}$  | 0                        | $\frac{\sqrt{5}i}{14}$    | 0                         | 0                       | 0                        | 0                      | $-\frac{i}{14}$         | 0                         | $\frac{\sqrt{15}i}{70}$   | 0                       | 0                     | 0                        |
|     |                               | 0  | 0                        | $\frac{\sqrt{5}i}{14}$   | 0                         | $\frac{\sqrt{10}i}{70}$   | 0                       | 0                        | 0                      | 0                       | $-\frac{\sqrt{15}i}{70}$  | 0                         | $\frac{i}{14}$          | 0                     | 0                        |
|     |                               | 0  | 0                        | 0                        | $\frac{3\sqrt{15}i}{70}$  | 0                         | $-\frac{\sqrt{6}i}{14}$ | 0                        | 0                      | 0                       | 0                         | $-\frac{\sqrt{5}i}{70}$   | 0                       | $\frac{i}{14}$        | 0                        |
|     |                               | 0  | $-\frac{\sqrt{6}i}{28}$  | 0                        | 0                         | 0                         | 0                       | $-\frac{\sqrt{35}i}{28}$ | 0                      | $\frac{\sqrt{15}i}{28}$ | 0                         | 0                         | 0                       | 0                     | 0                        |
|     |                               | $-\frac{\sqrt{6}i}{28}$                                    | 0                        | $-\frac{\sqrt{15}i}{70}$ | 0                         | 0                         | 0                       | 0                        | $-\frac{i}{28}$        | 0                       | $\frac{11\sqrt{5}i}{140}$ | 0                         | 0                       | 0                     | 0                        |
|     |                               | 0  | $-\frac{\sqrt{15}i}{70}$ | 0                        | 0                         | 0                         | 0                       | 0                        | 0                      | $\frac{\sqrt{6}i}{28}$  | 0                         | $\frac{\sqrt{10}i}{20}$   | 0                       | 0                     | 0                        |
|     |                               | 0  | 0                        | 0                        | 0                         | $\frac{\sqrt{15}i}{70}$   | 0                       | 0                        | 0                      | 0                       | $\frac{\sqrt{10}i}{20}$   | 0                         | $\frac{\sqrt{6}i}{28}$  | 0                     | 0                        |
|     |                               | 0  | 0                        | 0                        | $\frac{\sqrt{15}i}{70}$   | 0                         | $\frac{\sqrt{6}i}{28}$  | 0                        | 0                      | 0                       | 0                         | $\frac{11\sqrt{5}i}{140}$ | 0                       | $-\frac{i}{28}$       | 0                        |
|     |                               | 0  | 0                        | 0                        | 0                         | $\frac{\sqrt{6}i}{28}$    | 0                       | 0                        | 0                      | 0                       | 0                         | 0                         | $\frac{\sqrt{15}i}{28}$ | 0                     | $-\frac{\sqrt{35}i}{28}$ |
| 623 | symmetry                      | $\sqrt{3}xy$   |                          |                          |                           |                           |                         |                          |                        |                         |                           |                           |                         |                       |                          |
|     | $\mathbb{G}_{2,2}^{(a)}(T_2)$ | 0  | 0                        | 0                        | $\frac{\sqrt{15}}{35}$    | 0                         | 0                       | $-\frac{\sqrt{7}}{28}$   | 0                      | 0                       | 0                         | $\frac{\sqrt{5}}{140}$    | 0                       | 0                     | 0                        |
|     |                               | $\frac{\sqrt{2}}{7}$                                       | 0                        | 0                        | 0                         | $\frac{2\sqrt{10}}{35}$   | 0                       | 0                        | $-\frac{\sqrt{3}}{28}$ | 0                       | 0                         | 0                         | $\frac{1}{28}$          | 0                     | 0                        |
|     |                               | 0  | $\frac{2\sqrt{10}}{35}$  | 0                        | 0                         | 0                         | $\frac{\sqrt{2}}{7}$    | 0                        | 0                      | $-\frac{1}{28}$         | 0                         | 0                         | 0                       | $\frac{\sqrt{3}}{28}$ | 0                        |
|     |                               | 0  | 0                        | $\frac{\sqrt{15}}{35}$   | 0                         | 0                         | 0                       | 0                        | 0                      | 0                       | $-\frac{\sqrt{5}}{140}$   | 0                         | 0                       | 0                     | $\frac{\sqrt{7}}{28}$    |
|     |                               | 0  | 0                        | $-\frac{\sqrt{3}}{28}$   | 0                         | 0                         | 0                       | 0                        | 0                      | 0                       | $\frac{1}{14}$            | 0                         | 0                       | 0                     | 0                        |
|     |                               | 0  | 0                        | 0                        | $-\frac{3\sqrt{15}}{140}$ | 0                         | 0                       | $\frac{\sqrt{7}}{14}$    | 0                      | 0                       | 0                         | $\frac{2\sqrt{5}}{35}$    | 0                       | 0                     | 0                        |
|     |                               | $\frac{\sqrt{3}}{28}$                                      | 0                        | 0                        | 0                         | $-\frac{3\sqrt{15}}{140}$ | 0                       | 0                        | $\frac{\sqrt{2}}{7}$   | 0                       | 0                         | 0                         | $\frac{\sqrt{6}}{14}$   | 0                     | 0                        |
|     |                               | 0  | $\frac{3\sqrt{15}}{140}$ | 0                        | 0                         | 0                         | $-\frac{\sqrt{3}}{28}$  | 0                        | 0                      | $\frac{\sqrt{6}}{14}$   | 0                         | 0                         | 0                       | $\frac{\sqrt{2}}{7}$  | 0                        |
|     |                               | 0  | 0                        | $\frac{3\sqrt{15}}{140}$ | 0                         | 0                         | 0                       | 0                        | 0                      | 0                       | $\frac{2\sqrt{5}}{35}$    | 0                         | 0                       | 0                     | $\frac{\sqrt{7}}{14}$    |
|     |                               | 0  | 0                        | 0                        | $\frac{\sqrt{3}}{28}$     | 0                         | 0                       | 0                        | 0                      | 0                       | 0                         | $\frac{1}{14}$            | 0                       | 0                     | 0                        |
| 624 | symmetry                      | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$ |                          |                          |                           |                           |                         |                          |                        |                         |                           |                           |                         |                       |                          |

continued ...



Table 9

| No. | multipole                   | matrix   |                          |                         |                          |                          |                           |                          |                            |                             |                         |                         |                             |                            |                          |
|-----|-----------------------------|--|--------------------------|-------------------------|--------------------------|--------------------------|---------------------------|--------------------------|----------------------------|-----------------------------|-------------------------|-------------------------|-----------------------------|----------------------------|--------------------------|
|     | $\mathbb{G}_4^{(a)}(A_1)$   | 0  | $-\frac{\sqrt{21}i}{84}$ | 0                       | 0                        | 0                        | $-\frac{\sqrt{105}i}{84}$ | 0                        | 0                          | $-\frac{3\sqrt{210}i}{280}$ | 0                       | 0                       | 0                           | $-\frac{3\sqrt{70}i}{280}$ | 0                        |
|     |                             | 0  | 0                        | $\frac{\sqrt{14}i}{28}$ | 0                        | 0                        | 0                         | 0                        | 0                          | 0                           | $\frac{\sqrt{42}i}{56}$ | 0                       | 0                           | 0                          | $-\frac{\sqrt{30}i}{40}$ |
|     |                             | 0  | 0                        | 0                       | $-\frac{\sqrt{14}i}{28}$ | 0                        | 0                         | $-\frac{\sqrt{30}i}{40}$ | 0                          | 0                           | 0                       | $\frac{\sqrt{42}i}{56}$ | 0                           | 0                          | 0                        |
|     |                             | $\frac{\sqrt{105}i}{84}$                                       | 0                        | 0                       | 0                        | $\frac{\sqrt{21}i}{84}$  | 0                         | 0                        | $-\frac{3\sqrt{70}i}{280}$ | 0                           | 0                       | 0                       | $-\frac{3\sqrt{210}i}{280}$ | 0                          | 0                        |
|     |                             | $\frac{\sqrt{21}i}{84}$  | 0                        | 0                       | 0                        | $\frac{\sqrt{105}i}{84}$ | 0                         | 0                        | $-\frac{\sqrt{14}i}{28}$   | 0                           | 0                       | 0                       | $-\frac{\sqrt{42}i}{84}$    | 0                          | 0                        |
|     |                             | 0  | $-\frac{\sqrt{21}i}{28}$ | 0                       | 0                        | 0                        | $\frac{\sqrt{105}i}{84}$  | 0                        | 0                          | $\frac{\sqrt{210}i}{105}$   | 0                       | 0                       | 0                           | $-\frac{\sqrt{70}i}{70}$   | 0                        |
|     |                             | 0  | 0                        | $\frac{\sqrt{21}i}{42}$ | 0                        | 0                        | 0                         | 0                        | 0                          | $\frac{\sqrt{7}i}{28}$      | 0                       | 0                       | 0                           | 0                          | $-\frac{\sqrt{5}i}{20}$  |
|     |                             | 0  | 0                        | 0                       | $\frac{\sqrt{21}i}{42}$  | 0                        | 0                         | $\frac{\sqrt{5}i}{20}$   | 0                          | 0                           | 0                       | $-\frac{\sqrt{7}i}{28}$ | 0                           | 0                          | 0                        |
|     |                             | $\frac{\sqrt{105}i}{84}$                                       | 0                        | 0                       | 0                        | $-\frac{\sqrt{21}i}{28}$ | 0                         | 0                        | $\frac{\sqrt{70}i}{70}$    | 0                           | 0                       | 0                       | $-\frac{\sqrt{210}i}{105}$  | 0                          | 0                        |
|     |                             | 0  | $\frac{\sqrt{105}i}{84}$ | 0                       | 0                        | 0                        | $\frac{\sqrt{21}i}{84}$   | 0                        | 0                          | $\frac{\sqrt{42}i}{84}$     | 0                       | 0                       | 0                           | $\frac{\sqrt{14}i}{28}$    | 0                        |
| 625 | symmetry                    | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ |                          |                         |                          |                          |                           |                          |                            |                             |                         |                         |                             |                            |                          |
|     | $\mathbb{G}_{4,0}^{(a)}(E)$ | 0  | $-\frac{\sqrt{15}i}{84}$ | 0                       | 0                        | 0                        | $\frac{\sqrt{3}i}{12}$    | 0                        | 0                          | $-\frac{3\sqrt{6}i}{56}$    | 0                       | 0                       | 0                           | $\frac{3\sqrt{2}i}{40}$    | 0                        |
|     |                             | 0  | 0                        | $\frac{\sqrt{10}i}{28}$ | 0                        | 0                        | 0                         | 0                        | 0                          | 0                           | $\frac{\sqrt{30}i}{56}$ | 0                       | 0                           | 0                          | $\frac{\sqrt{42}i}{40}$  |
|     |                             | 0  | 0                        | 0                       | $-\frac{\sqrt{10}i}{28}$ | 0                        | 0                         | $\frac{\sqrt{42}i}{40}$  | 0                          | 0                           | 0                       | $\frac{\sqrt{30}i}{56}$ | 0                           | 0                          | 0                        |
|     |                             | $-\frac{\sqrt{3}i}{12}$  | 0                        | 0                       | 0                        | $\frac{\sqrt{15}i}{84}$  | 0                         | 0                        | $\frac{3\sqrt{2}i}{40}$    | 0                           | 0                       | 0                       | $-\frac{3\sqrt{6}i}{56}$    | 0                          | 0                        |
|     |                             | $\frac{\sqrt{15}i}{84}$  | 0                        | 0                       | 0                        | $-\frac{\sqrt{3}i}{12}$  | 0                         | 0                        | $-\frac{\sqrt{10}i}{28}$   | 0                           | 0                       | 0                       | $\frac{\sqrt{30}i}{60}$     | 0                          | 0                        |
|     |                             | 0  | $-\frac{\sqrt{15}i}{28}$ | 0                       | 0                        | 0                        | $-\frac{\sqrt{3}i}{12}$   | 0                        | 0                          | $\frac{\sqrt{6}i}{21}$      | 0                       | 0                       | 0                           | $\frac{\sqrt{2}i}{10}$     | 0                        |
|     |                             | 0  | 0                        | $\frac{\sqrt{15}i}{42}$ | 0                        | 0                        | 0                         | 0                        | 0                          | $\frac{\sqrt{5}i}{28}$      | 0                       | 0                       | 0                           | 0                          | $\frac{\sqrt{7}i}{20}$   |
|     |                             | 0  | 0                        | 0                       | $\frac{\sqrt{15}i}{42}$  | 0                        | 0                         | $-\frac{\sqrt{7}i}{20}$  | 0                          | 0                           | 0                       | $-\frac{\sqrt{5}i}{28}$ | 0                           | 0                          | 0                        |
|     |                             | $-\frac{\sqrt{3}i}{12}$  | 0                        | 0                       | 0                        | $-\frac{\sqrt{15}i}{28}$ | 0                         | 0                        | $-\frac{\sqrt{2}i}{10}$    | 0                           | 0                       | 0                       | $-\frac{\sqrt{6}i}{21}$     | 0                          | 0                        |
|     |                             | 0  | $-\frac{\sqrt{3}i}{12}$  | 0                       | 0                        | 0                        | $\frac{\sqrt{15}i}{84}$   | 0                        | 0                          | $-\frac{\sqrt{30}i}{60}$    | 0                       | 0                       | 0                           | $\frac{\sqrt{10}i}{28}$    | 0                        |
| 626 | symmetry                    | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$                   |                          |                         |                          |                          |                           |                          |                            |                             |                         |                         |                             |                            |                          |

continued ...

Table 9

| No. | multipole                     | matrix                             |                           |                          |                           |                          |                          |                            |                            |                           |                           |                           |                           |                            |                           |
|-----|-------------------------------|------------------------------------|---------------------------|--------------------------|---------------------------|--------------------------|--------------------------|----------------------------|----------------------------|---------------------------|---------------------------|---------------------------|---------------------------|----------------------------|---------------------------|
|     | $\mathbb{G}_{4,1}^{(a)}(E)$   | 0                                  | 0                         | 0                        | $\frac{\sqrt{10}i}{28}$   | 0                        | 0                        | $\frac{3\sqrt{42}i}{280}$  | 0                          | 0                         | 0                         | $\frac{9\sqrt{30}i}{280}$ | 0                         | 0                          | 0                         |
|     |                               | $-\frac{\sqrt{3}i}{28}$            | 0                         | 0                        | 0                         | $-\frac{\sqrt{15}i}{28}$ | 0                        | 0                          | $-\frac{33\sqrt{2}i}{280}$ | 0                         | 0                         | 0                         | $\frac{3\sqrt{6}i}{280}$  | 0                          | 0                         |
|     |                               | 0                                  | $\frac{\sqrt{15}i}{28}$   | 0                        | 0                         | 0                        | $\frac{\sqrt{3}i}{28}$   | 0                          | 0                          | $\frac{3\sqrt{6}i}{280}$  | 0                         | 0                         | 0                         | $-\frac{33\sqrt{2}i}{280}$ | 0                         |
|     |                               | 0                                  | 0                         | $-\frac{\sqrt{10}i}{28}$ | 0                         | 0                        | 0                        | 0                          | 0                          | 0                         | $\frac{9\sqrt{30}i}{280}$ | 0                         | 0                         | 0                          | $\frac{3\sqrt{42}i}{280}$ |
|     |                               | 0                                  | 0                         | $-\frac{3\sqrt{2}i}{28}$ | 0                         | 0                        | 0                        | 0                          | 0                          | 0                         | $\frac{\sqrt{6}i}{14}$    | 0                         | 0                         | 0                          | 0                         |
|     |                               | 0                                  | 0                         | 0                        | $\frac{\sqrt{10}i}{28}$   | 0                        | 0                        | $-\frac{3\sqrt{42}i}{140}$ | 0                          | 0                         | 0                         | $\frac{\sqrt{30}i}{140}$  | 0                         | 0                          | 0                         |
|     |                               | $-\frac{3\sqrt{2}i}{28}$           | 0                         | 0                        | 0                         | $\frac{\sqrt{10}i}{28}$  | 0                        | 0                          | $\frac{9\sqrt{3}i}{140}$   | 0                         | 0                         | 0                         | $-\frac{17i}{140}$        | 0                          | 0                         |
|     |                               | 0                                  | $\frac{\sqrt{10}i}{28}$   | 0                        | 0                         | 0                        | $-\frac{3\sqrt{2}i}{28}$ | 0                          | 0                          | $\frac{17i}{140}$         | 0                         | 0                         | 0                         | $-\frac{9\sqrt{3}i}{140}$  | 0                         |
|     |                               | 0                                  | 0                         | $\frac{\sqrt{10}i}{28}$  | 0                         | 0                        | 0                        | 0                          | 0                          | 0                         | $-\frac{\sqrt{30}i}{140}$ | 0                         | 0                         | 0                          | $\frac{3\sqrt{42}i}{140}$ |
|     |                               | 0                                  | 0                         | 0                        | $-\frac{3\sqrt{2}i}{28}$  | 0                        | 0                        | 0                          | 0                          | 0                         | 0                         | $-\frac{\sqrt{6}i}{14}$   | 0                         | 0                          | 0                         |
| 627 | symmetry                      | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$  |                           |                          |                           |                          |                          |                            |                            |                           |                           |                           |                           |                            |                           |
|     | $\mathbb{G}_{4,0}^{(a)}(T_1)$ | $\frac{\sqrt{7}}{112}$             | 0                         | $\frac{\sqrt{70}}{112}$  | 0                         | $\frac{\sqrt{35}}{112}$  | 0                        | 0                          | $\frac{9\sqrt{42}}{560}$   | 0                         | $\frac{3\sqrt{210}}{280}$ | 0                         | $\frac{9\sqrt{14}}{560}$  | 0                          | 0                         |
|     |                               | 0                                  | $-\frac{\sqrt{105}}{112}$ | 0                        | $-\frac{\sqrt{210}}{112}$ | 0                        | $-\frac{\sqrt{21}}{112}$ | $-\frac{3\sqrt{2}}{80}$    | 0                          | $-\frac{3\sqrt{42}}{140}$ | 0                         | $-\frac{3\sqrt{70}}{560}$ | 0                         | $\frac{3\sqrt{14}}{280}$   | 0                         |
|     |                               | $\frac{\sqrt{21}}{112}$            | 0                         | $\frac{\sqrt{210}}{112}$ | 0                         | $\frac{\sqrt{105}}{112}$ | 0                        | 0                          | $\frac{3\sqrt{14}}{280}$   | 0                         | $-\frac{3\sqrt{70}}{560}$ | 0                         | $-\frac{3\sqrt{42}}{140}$ | 0                          | $-\frac{3\sqrt{2}}{80}$   |
|     |                               | 0                                  | $-\frac{\sqrt{35}}{112}$  | 0                        | $-\frac{\sqrt{70}}{112}$  | 0                        | $-\frac{\sqrt{7}}{112}$  | 0                          | 0                          | $\frac{9\sqrt{14}}{560}$  | 0                         | $\frac{3\sqrt{210}}{280}$ | 0                         | $\frac{9\sqrt{42}}{560}$   | 0                         |
|     |                               | 0                                  | $-\frac{\sqrt{7}}{28}$    | 0                        | $-\frac{\sqrt{14}}{56}$   | 0                        | 0                        | $\frac{\sqrt{30}}{80}$     | 0                          | $\frac{\sqrt{70}}{56}$    | 0                         | $\frac{\sqrt{42}}{112}$   | 0                         | 0                          | 0                         |
|     |                               | $\frac{\sqrt{7}}{28}$              | 0                         | $\frac{\sqrt{70}}{56}$   | 0                         | 0                        | 0                        | 0                          | $-\frac{13\sqrt{42}}{560}$ | 0                         | $-\frac{\sqrt{210}}{280}$ | 0                         | $\frac{\sqrt{14}}{80}$    | 0                          | 0                         |
|     |                               | 0                                  | $-\frac{\sqrt{70}}{56}$   | 0                        | 0                         | 0                        | $\frac{\sqrt{14}}{56}$   | $\frac{3\sqrt{3}}{80}$     | 0                          | $\frac{\sqrt{7}}{560}$    | 0                         | $-\frac{\sqrt{105}}{80}$  | 0                         | $-\frac{\sqrt{21}}{560}$   | 0                         |
|     |                               | $\frac{\sqrt{14}}{56}$             | 0                         | 0                        | 0                         | $-\frac{\sqrt{70}}{56}$  | 0                        | 0                          | $\frac{\sqrt{21}}{560}$    | 0                         | $\frac{\sqrt{105}}{80}$   | 0                         | $-\frac{\sqrt{7}}{560}$   | 0                          | $-\frac{3\sqrt{3}}{80}$   |
|     |                               | 0                                  | 0                         | 0                        | $\frac{\sqrt{70}}{56}$    | 0                        | $\frac{\sqrt{7}}{28}$    | 0                          | 0                          | $-\frac{\sqrt{14}}{80}$   | 0                         | $\frac{\sqrt{210}}{280}$  | 0                         | $\frac{13\sqrt{42}}{560}$  | 0                         |
|     |                               | 0                                  | 0                         | $-\frac{\sqrt{14}}{56}$  | 0                         | $-\frac{\sqrt{7}}{28}$   | 0                        | 0                          | 0                          | 0                         | $-\frac{\sqrt{42}}{112}$  | 0                         | $-\frac{\sqrt{70}}{56}$   | 0                          | $-\frac{\sqrt{30}}{80}$   |
| 628 | symmetry                      | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ |                           |                          |                           |                          |                          |                            |                            |                           |                           |                           |                           |                            |                           |

continued ...

Table 9

| No. | multipole                     | matrix                               |                            |                           |                           |                            |                           |                          |                             |                            |                             |                            |                           |                             |                          |
|-----|-------------------------------|--------------------------------------|----------------------------|---------------------------|---------------------------|----------------------------|---------------------------|--------------------------|-----------------------------|----------------------------|-----------------------------|----------------------------|---------------------------|-----------------------------|--------------------------|
|     | $\mathbb{G}_{4,1}^{(a)}(T_1)$ | $\frac{\sqrt{7}i}{112}$              | 0                          | $-\frac{\sqrt{70}i}{112}$ | 0                         | $\frac{\sqrt{35}i}{112}$   | 0                         | 0                        | $\frac{9\sqrt{42}i}{560}$   | 0                          | $-\frac{3\sqrt{210}i}{280}$ | 0                          | $\frac{9\sqrt{14}i}{560}$ | 0                           | 0                        |
|     |                               | 0                                    | $-\frac{\sqrt{105}i}{112}$ | 0                         | $\frac{\sqrt{210}i}{112}$ | 0                          | $-\frac{\sqrt{21}i}{112}$ | $\frac{3\sqrt{2}i}{80}$  | 0                           | $-\frac{3\sqrt{42}i}{140}$ | 0                           | $\frac{3\sqrt{70}i}{560}$  | 0                         | $\frac{3\sqrt{14}i}{280}$   | 0                        |
|     |                               | $-\frac{\sqrt{21}i}{112}$            | 0                          | $\frac{\sqrt{210}i}{112}$ | 0                         | $-\frac{\sqrt{105}i}{112}$ | 0                         | 0                        | $-\frac{3\sqrt{14}i}{280}$  | 0                          | $-\frac{3\sqrt{70}i}{560}$  | 0                          | $\frac{3\sqrt{42}i}{140}$ | 0                           | $-\frac{3\sqrt{2}i}{80}$ |
|     |                               | 0                                    | $\frac{\sqrt{35}i}{112}$   | 0                         | $-\frac{\sqrt{70}i}{112}$ | 0                          | $\frac{\sqrt{7}i}{112}$   | 0                        | 0                           | $-\frac{9\sqrt{14}i}{560}$ | 0                           | $\frac{3\sqrt{210}i}{280}$ | 0                         | $-\frac{9\sqrt{42}i}{560}$  | 0                        |
|     |                               | 0                                    | $\frac{\sqrt{7}i}{28}$     | 0                         | $-\frac{\sqrt{14}i}{56}$  | 0                          | 0                         | $\frac{\sqrt{30}i}{80}$  | 0                           | $-\frac{\sqrt{70}i}{56}$   | 0                           | $\frac{\sqrt{42}i}{112}$   | 0                         | 0                           | 0                        |
|     |                               | $\frac{\sqrt{7}i}{28}$               | 0                          | $-\frac{\sqrt{70}i}{56}$  | 0                         | 0                          | 0                         | 0                        | $-\frac{13\sqrt{42}i}{560}$ | 0                          | $\frac{\sqrt{210}i}{280}$   | 0                          | $\frac{\sqrt{14}i}{80}$   | 0                           | 0                        |
|     |                               | 0                                    | $-\frac{\sqrt{70}i}{56}$   | 0                         | 0                         | 0                          | $\frac{\sqrt{14}i}{56}$   | $-\frac{3\sqrt{3}i}{80}$ | 0                           | $\frac{\sqrt{7}i}{560}$    | 0                           | $\frac{\sqrt{105}i}{80}$   | 0                         | $-\frac{\sqrt{21}i}{560}$   | 0                        |
|     |                               | $-\frac{\sqrt{14}i}{56}$             | 0                          | 0                         | 0                         | $\frac{\sqrt{70}i}{56}$    | 0                         | 0                        | $-\frac{\sqrt{21}i}{560}$   | 0                          | $\frac{\sqrt{105}i}{80}$    | 0                          | $\frac{\sqrt{7}i}{560}$   | 0                           | $-\frac{3\sqrt{3}i}{80}$ |
|     |                               | 0                                    | 0                          | 0                         | $\frac{\sqrt{70}i}{56}$   | 0                          | $-\frac{\sqrt{7}i}{28}$   | 0                        | 0                           | $\frac{\sqrt{14}i}{80}$    | 0                           | $\frac{\sqrt{210}i}{280}$  | 0                         | $-\frac{13\sqrt{42}i}{560}$ | 0                        |
|     |                               | 0                                    | 0                          | $\frac{\sqrt{14}i}{56}$   | 0                         | $-\frac{\sqrt{7}i}{28}$    | 0                         | 0                        | 0                           | $\frac{\sqrt{42}i}{112}$   | 0                           | $-\frac{\sqrt{70}i}{56}$   | 0                         | $\frac{\sqrt{30}i}{80}$     |                          |
| 629 | symmetry                      | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$    |                            |                           |                           |                            |                           |                          |                             |                            |                             |                            |                           |                             |                          |
|     | $\mathbb{G}_{4,2}^{(a)}(T_1)$ | 0                                    | 0                          | 0                         | 0                         | 0                          | $-\frac{\sqrt{7}}{14}$    | 0                        | 0                           | 0                          | 0                           | 0                          | $-\frac{3\sqrt{42}}{140}$ | 0                           |                          |
|     |                               | 0                                    | 0                          | 0                         | 0                         | 0                          | 0                         | 0                        | 0                           | 0                          | 0                           | 0                          | 0                         | $-\frac{3\sqrt{2}}{20}$     |                          |
|     |                               | 0                                    | 0                          | 0                         | 0                         | 0                          | 0                         | $\frac{3\sqrt{2}}{20}$   | 0                           | 0                          | 0                           | 0                          | 0                         | 0                           |                          |
|     |                               | $-\frac{\sqrt{7}}{14}$               | 0                          | 0                         | 0                         | 0                          | 0                         | 0                        | $\frac{3\sqrt{42}}{140}$    | 0                          | 0                           | 0                          | 0                         | 0                           |                          |
|     |                               | 0                                    | 0                          | 0                         | 0                         | $\frac{\sqrt{7}}{14}$      | 0                         | 0                        | 0                           | 0                          | 0                           | $-\frac{\sqrt{70}}{70}$    | 0                         | 0                           |                          |
|     |                               | 0                                    | 0                          | 0                         | 0                         | 0                          | $\frac{\sqrt{7}}{14}$     | 0                        | 0                           | 0                          | 0                           | 0                          | $-\frac{\sqrt{42}}{35}$   | 0                           |                          |
|     |                               | 0                                    | 0                          | 0                         | 0                         | 0                          | 0                         | 0                        | 0                           | 0                          | 0                           | 0                          | 0                         | $-\frac{\sqrt{3}}{10}$      |                          |
|     |                               | 0                                    | 0                          | 0                         | 0                         | 0                          | 0                         | $-\frac{\sqrt{3}}{10}$   | 0                           | 0                          | 0                           | 0                          | 0                         | 0                           |                          |
|     |                               | $-\frac{\sqrt{7}}{14}$               | 0                          | 0                         | 0                         | 0                          | 0                         | 0                        | $-\frac{\sqrt{42}}{35}$     | 0                          | 0                           | 0                          | 0                         | 0                           |                          |
|     |                               | 0                                    | $-\frac{\sqrt{7}}{14}$     | 0                         | 0                         | 0                          | 0                         | 0                        | 0                           | $-\frac{\sqrt{70}}{70}$    | 0                           | 0                          | 0                         | 0                           |                          |
| 630 | symmetry                      | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$ |                            |                           |                           |                            |                           |                          |                             |                            |                             |                            |                           |                             |                          |

continued ...

Table 9

| No. | multipole                     | matrix                                |                          |                           |                           |                          |                         |                            |                           |                          |                           |                            |                           |                           |                            |
|-----|-------------------------------|---------------------------------------|--------------------------|---------------------------|---------------------------|--------------------------|-------------------------|----------------------------|---------------------------|--------------------------|---------------------------|----------------------------|---------------------------|---------------------------|----------------------------|
|     | $\mathbb{G}_{4,0}^{(a)}(T_2)$ | $\frac{1}{112}$                       | 0                        | $\frac{\sqrt{10}}{112}$   | 0                         | $-\frac{\sqrt{5}}{16}$   | 0                       | 0                          | $\frac{9\sqrt{6}}{560}$   | 0                        | $\frac{3\sqrt{30}}{280}$  | 0                          | $-\frac{9\sqrt{2}}{80}$   | 0                         | 0                          |
|     |                               | 0                                     | $-\frac{\sqrt{15}}{112}$ | 0                         | $-\frac{\sqrt{30}}{112}$  | 0                        | $\frac{\sqrt{3}}{16}$   | $\frac{3\sqrt{14}}{80}$    | 0                         | $-\frac{3\sqrt{6}}{140}$ | 0                         | $-\frac{3\sqrt{10}}{560}$  | 0                         | $-\frac{3\sqrt{2}}{40}$   | 0                          |
|     |                               | $-\frac{\sqrt{3}}{16}$                | 0                        | $\frac{\sqrt{30}}{112}$   | 0                         | $\frac{\sqrt{15}}{112}$  | 0                       | 0                          | $-\frac{3\sqrt{2}}{40}$   | 0                        | $-\frac{3\sqrt{10}}{560}$ | 0                          | $-\frac{3\sqrt{6}}{140}$  | 0                         | $\frac{3\sqrt{14}}{80}$    |
|     |                               | 0                                     | $\frac{\sqrt{5}}{16}$    | 0                         | $-\frac{\sqrt{10}}{112}$  | 0                        | $-\frac{1}{112}$        | 0                          | 0                         | $-\frac{9\sqrt{2}}{80}$  | 0                         | $\frac{3\sqrt{30}}{280}$   | 0                         | $\frac{9\sqrt{6}}{560}$   | 0                          |
|     |                               | 0                                     | $-\frac{1}{28}$          | 0                         | $\frac{\sqrt{2}}{8}$      | 0                        | 0                       | $\frac{\sqrt{210}}{560}$   | 0                         | $\frac{\sqrt{10}}{56}$   | 0                         | $-\frac{\sqrt{6}}{16}$     | 0                         | 0                         | 0                          |
|     |                               | $\frac{1}{28}$                        | 0                        | $\frac{\sqrt{10}}{56}$    | 0                         | 0                        | 0                       | 0                          | $-\frac{13\sqrt{6}}{560}$ | 0                        | $-\frac{\sqrt{30}}{280}$  | 0                          | $-\frac{7\sqrt{2}}{80}$   | 0                         | 0                          |
|     |                               | 0                                     | $-\frac{\sqrt{10}}{56}$  | 0                         | 0                         | 0                        | $-\frac{\sqrt{2}}{8}$   | $-\frac{3\sqrt{21}}{80}$   | 0                         | $\frac{1}{560}$          | 0                         | $-\frac{\sqrt{15}}{80}$    | 0                         | $\frac{\sqrt{3}}{80}$     | 0                          |
|     |                               | $-\frac{\sqrt{2}}{8}$                 | 0                        | 0                         | 0                         | $-\frac{\sqrt{10}}{56}$  | 0                       | 0                          | $-\frac{\sqrt{3}}{80}$    | 0                        | $\frac{\sqrt{15}}{80}$    | 0                          | $-\frac{1}{560}$          | 0                         | $\frac{3\sqrt{21}}{80}$    |
|     |                               | 0                                     | 0                        | 0                         | $\frac{\sqrt{10}}{56}$    | 0                        | $\frac{1}{28}$          | 0                          | 0                         | $\frac{7\sqrt{2}}{80}$   | 0                         | $\frac{\sqrt{30}}{280}$    | 0                         | $\frac{13\sqrt{6}}{560}$  | 0                          |
|     |                               | 0                                     | 0                        | $\frac{\sqrt{2}}{8}$      | 0                         | $-\frac{1}{28}$          | 0                       | 0                          | 0                         | 0                        | $\frac{\sqrt{6}}{16}$     | 0                          | $-\frac{\sqrt{10}}{56}$   | 0                         | $-\frac{\sqrt{210}}{560}$  |
| 631 | symmetry                      | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ |                          |                           |                           |                          |                         |                            |                           |                          |                           |                            |                           |                           |                            |
|     | $\mathbb{G}_{4,1}^{(a)}(T_2)$ | $-\frac{i}{112}$                      | 0                        | $\frac{\sqrt{10}i}{112}$  | 0                         | $\frac{\sqrt{5}i}{16}$   | 0                       | 0                          | $-\frac{9\sqrt{6}i}{560}$ | 0                        | $\frac{3\sqrt{30}i}{280}$ | 0                          | $\frac{9\sqrt{2}i}{80}$   | 0                         | 0                          |
|     |                               | 0                                     | $\frac{\sqrt{15}i}{112}$ | 0                         | $-\frac{\sqrt{30}i}{112}$ | 0                        | $-\frac{\sqrt{3}i}{16}$ | $\frac{3\sqrt{14}i}{80}$   | 0                         | $\frac{3\sqrt{6}i}{140}$ | 0                         | $-\frac{3\sqrt{10}i}{560}$ | 0                         | $\frac{3\sqrt{2}i}{40}$   | 0                          |
|     |                               | $-\frac{\sqrt{3}i}{16}$               | 0                        | $-\frac{\sqrt{30}i}{112}$ | 0                         | $\frac{\sqrt{15}i}{112}$ | 0                       | 0                          | $-\frac{3\sqrt{2}i}{40}$  | 0                        | $\frac{3\sqrt{10}i}{560}$ | 0                          | $-\frac{3\sqrt{6}i}{140}$ | 0                         | $-\frac{3\sqrt{14}i}{80}$  |
|     |                               | 0                                     | $\frac{\sqrt{5}i}{16}$   | 0                         | $\frac{\sqrt{10}i}{112}$  | 0                        | $-\frac{i}{112}$        | 0                          | 0                         | $-\frac{9\sqrt{2}i}{80}$ | 0                         | $-\frac{3\sqrt{30}i}{280}$ | 0                         | $\frac{9\sqrt{6}i}{560}$  | 0                          |
|     |                               | 0                                     | $-\frac{i}{28}$          | 0                         | $-\frac{\sqrt{2}i}{8}$    | 0                        | 0                       | $-\frac{\sqrt{210}i}{560}$ | 0                         | $\frac{\sqrt{10}i}{56}$  | 0                         | $\frac{\sqrt{6}i}{16}$     | 0                         | 0                         | 0                          |
|     |                               | $-\frac{i}{28}$                       | 0                        | $\frac{\sqrt{10}i}{56}$   | 0                         | 0                        | 0                       | 0                          | $\frac{13\sqrt{6}i}{560}$ | 0                        | $-\frac{\sqrt{30}i}{280}$ | 0                          | $\frac{7\sqrt{2}i}{80}$   | 0                         | 0                          |
|     |                               | 0                                     | $\frac{\sqrt{10}i}{56}$  | 0                         | 0                         | 0                        | $\frac{\sqrt{2}i}{8}$   | $-\frac{3\sqrt{21}i}{80}$  | 0                         | $-\frac{i}{560}$         | 0                         | $-\frac{\sqrt{15}i}{80}$   | 0                         | $-\frac{\sqrt{3}i}{80}$   | 0                          |
|     |                               | $-\frac{\sqrt{2}i}{8}$                | 0                        | 0                         | 0                         | $-\frac{\sqrt{10}i}{56}$ | 0                       | 0                          | $-\frac{\sqrt{3}i}{80}$   | 0                        | $-\frac{\sqrt{15}i}{80}$  | 0                          | $-\frac{i}{560}$          | 0                         | $-\frac{3\sqrt{21}i}{80}$  |
|     |                               | 0                                     | 0                        | 0                         | $-\frac{\sqrt{10}i}{56}$  | 0                        | $\frac{i}{28}$          | 0                          | 0                         | $\frac{7\sqrt{2}i}{80}$  | 0                         | $-\frac{\sqrt{30}i}{280}$  | 0                         | $\frac{13\sqrt{6}i}{560}$ | 0                          |
|     |                               | 0                                     | 0                        | $\frac{\sqrt{2}i}{8}$     | 0                         | $\frac{i}{28}$           | 0                       | 0                          | 0                         | 0                        | $\frac{\sqrt{6}i}{16}$    | 0                          | $\frac{\sqrt{10}i}{56}$   | 0                         | $-\frac{\sqrt{210}i}{560}$ |
| 632 | symmetry                      | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ |                          |                           |                           |                          |                         |                            |                           |                          |                           |                            |                           |                           |                            |

continued ...

Table 9

| No. | multipole                        | matrix                                 |                          |                           |                           |                          |                        |                           |                           |                          |                          |                           |                          |                          |                           |
|-----|----------------------------------|--|--------------------------|---------------------------|---------------------------|--------------------------|------------------------|---------------------------|---------------------------|--------------------------|--------------------------|---------------------------|--------------------------|--------------------------|---------------------------|
|     | $\mathbb{G}_{4,2}^{(a)}(T_2)$    | 0                                      | 0                        | 0                         | $-\frac{\sqrt{10}}{28}$   | 0                        | 0                      | $\frac{3\sqrt{42}}{280}$  | 0                         | 0                        | 0                        | $-\frac{9\sqrt{30}}{280}$ | 0                        | 0                        | 0                         |
|     |                                  | $-\frac{\sqrt{3}}{28}$                 | 0                        | 0                         | 0                         | $\frac{\sqrt{15}}{28}$   | 0                      | 0                         | $-\frac{33\sqrt{2}}{280}$ | 0                        | 0                        | 0                         | $-\frac{3\sqrt{6}}{280}$ | 0                        | 0                         |
|     |                                  | 0                                      | $\frac{\sqrt{15}}{28}$   | 0                         | 0                         | 0                        | $-\frac{\sqrt{3}}{28}$ | 0                         | 0                         | $\frac{3\sqrt{6}}{280}$  | 0                        | 0                         | 0                        | $\frac{33\sqrt{2}}{280}$ | 0                         |
|     |                                  | 0                                      | 0                        | $-\frac{\sqrt{10}}{28}$   | 0                         | 0                        | 0                      | 0                         | 0                         | $\frac{9\sqrt{30}}{280}$ | 0                        | 0                         | 0                        | 0                        | $-\frac{3\sqrt{42}}{280}$ |
|     |                                  | 0                                      | 0                        | $\frac{3\sqrt{2}}{28}$    | 0                         | 0                        | 0                      | 0                         | 0                         | $-\frac{\sqrt{6}}{14}$   | 0                        | 0                         | 0                        | 0                        | 0                         |
|     |                                  | 0                                      | 0                        | 0                         | $-\frac{\sqrt{10}}{28}$   | 0                        | 0                      | $-\frac{3\sqrt{42}}{140}$ | 0                         | 0                        | 0                        | $-\frac{\sqrt{30}}{140}$  | 0                        | 0                        | 0                         |
|     |                                  | $-\frac{3\sqrt{2}}{28}$                | 0                        | 0                         | 0                         | $-\frac{\sqrt{10}}{28}$  | 0                      | 0                         | $\frac{9\sqrt{3}}{140}$   | 0                        | 0                        | 0                         | $\frac{17}{140}$         | 0                        | 0                         |
|     |                                  | 0                                      | $\frac{\sqrt{10}}{28}$   | 0                         | 0                         | 0                        | $\frac{3\sqrt{2}}{28}$ | 0                         | 0                         | $\frac{17}{140}$         | 0                        | 0                         | 0                        | $\frac{9\sqrt{3}}{140}$  | 0                         |
|     |                                  | 0                                      | 0                        | $\frac{\sqrt{10}}{28}$    | 0                         | 0                        | 0                      | 0                         | 0                         | $-\frac{\sqrt{30}}{140}$ | 0                        | 0                         | 0                        | 0                        | $-\frac{3\sqrt{42}}{140}$ |
|     |                                  | 0                                      | 0                        | 0                         | $-\frac{3\sqrt{2}}{28}$   | 0                        | 0                      | 0                         | 0                         | 0                        | 0                        | $-\frac{\sqrt{6}}{14}$    | 0                        | 0                        | 0                         |
| 633 | symmetry                         | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |                          |                           |                           |                          |                        |                           |                           |                          |                          |                           |                          |                          |                           |
|     | $\mathbb{G}_{2,0}^{(1,-1;a)}(E)$ | 0                                      | $-\frac{3\sqrt{6}i}{70}$ | 0                         | 0                         | 0                        | 0                      | 0                         | $-\frac{2\sqrt{15}i}{35}$ | 0                        | 0                        | 0                         | 0                        | 0                        | 0                         |
|     |                                  | 0                                      | 0                        | $-\frac{3i}{70}$          | 0                         | 0                        | 0                      | 0                         | 0                         | $-\frac{6\sqrt{3}i}{35}$ | 0                        | 0                         | 0                        | 0                        | 0                         |
|     |                                  | 0                                      | 0                        | 0                         | $\frac{3i}{70}$           | 0                        | 0                      | 0                         | 0                         | 0                        | $-\frac{6\sqrt{3}i}{35}$ | 0                         | 0                        | 0                        | 0                         |
|     |                                  | 0                                      | 0                        | 0                         | 0                         | $\frac{3\sqrt{6}i}{70}$  | 0                      | 0                         | 0                         | 0                        | 0                        | $-\frac{2\sqrt{15}i}{35}$ | 0                        | 0                        | 0                         |
|     |                                  | $\frac{\sqrt{6}i}{21}$                 | 0                        | 0                         | 0                         | 0                        | 0                      | 0                         | $\frac{3i}{14}$           | 0                        | 0                        | 0                         | 0                        | 0                        | 0                         |
|     |                                  | 0                                      | $-\frac{\sqrt{6}i}{105}$ | 0                         | 0                         | 0                        | 0                      | 0                         | $\frac{3\sqrt{15}i}{70}$  | 0                        | 0                        | 0                         | 0                        | 0                        | 0                         |
|     |                                  | 0                                      | 0                        | $-\frac{4\sqrt{6}i}{105}$ | 0                         | 0                        | 0                      | 0                         | 0                         | $\frac{3\sqrt{2}i}{70}$  | 0                        | 0                         | 0                        | 0                        | 0                         |
|     |                                  | 0                                      | 0                        | 0                         | $-\frac{4\sqrt{6}i}{105}$ | 0                        | 0                      | 0                         | 0                         | 0                        | $-\frac{3\sqrt{2}i}{70}$ | 0                         | 0                        | 0                        | 0                         |
|     |                                  | 0                                      | 0                        | 0                         | 0                         | $-\frac{\sqrt{6}i}{105}$ | 0                      | 0                         | 0                         | 0                        | 0                        | $-\frac{3\sqrt{15}i}{70}$ | 0                        | 0                        | 0                         |
|     |                                  | 0                                      | 0                        | 0                         | 0                         | 0                        | $\frac{\sqrt{6}i}{21}$ | 0                         | 0                         | 0                        | 0                        | 0                         | 0                        | $-\frac{3i}{14}$         | 0                         |
| 634 | symmetry                         | $\frac{\sqrt{3}(x-y)(x+y)}{2}$         |                          |                           |                           |                          |                        |                           |                           |                          |                          |                           |                          |                          |                           |

continued ...

Table 9

| No. | multipole                          | matrix                    |                        |                        |                        |                         |                          |                           |                          |                           |                          |                           |                          |                          |                           |
|-----|------------------------------------|---------------------------|------------------------|------------------------|------------------------|-------------------------|--------------------------|---------------------------|--------------------------|---------------------------|--------------------------|---------------------------|--------------------------|--------------------------|---------------------------|
|     | $\mathbb{G}_{2,1}^{(1,-1;a)}(E)$   | 0                         | 0                      | 0                      | $-\frac{3i}{70}$       | 0                       | 0                        | $-\frac{\sqrt{105}i}{35}$ | 0                        | 0                         | 0                        | $-\frac{\sqrt{3}i}{35}$   | 0                        | 0                        | 0                         |
|     |                                    | $\frac{\sqrt{30}i}{70}$   | 0                      | 0                      | 0                      | $-\frac{\sqrt{6}i}{35}$ | 0                        | 0                         | $-\frac{3\sqrt{5}i}{35}$ | 0                         | 0                        | 0                         | $-\frac{\sqrt{15}i}{35}$ | 0                        | 0                         |
|     |                                    | 0                         | $\frac{\sqrt{6}i}{35}$ | 0                      | 0                      | 0                       | $-\frac{\sqrt{30}i}{70}$ | 0                         | 0                        | $-\frac{\sqrt{15}i}{35}$  | 0                        | 0                         | 0                        | $-\frac{3\sqrt{5}i}{35}$ | 0                         |
|     |                                    | 0                         | 0                      | $\frac{3i}{70}$        | 0                      | 0                       | 0                        | 0                         | 0                        | $-\frac{\sqrt{3}i}{35}$   | 0                        | 0                         | 0                        | 0                        | $-\frac{\sqrt{105}i}{35}$ |
|     |                                    | 0                         | 0                      | $\frac{\sqrt{5}i}{35}$ | 0                      | 0                       | 0                        | 0                         | 0                        | $\frac{\sqrt{15}i}{70}$   | 0                        | 0                         | 0                        | 0                        | 0                         |
|     |                                    | 0                         | 0                      | 0                      | $\frac{3i}{35}$        | 0                       | 0                        | $-\frac{\sqrt{105}i}{70}$ | 0                        | 0                         | 0                        | $\frac{2\sqrt{3}i}{35}$   | 0                        | 0                        | 0                         |
|     |                                    | $\frac{\sqrt{5}i}{35}$    | 0                      | 0                      | 0                      | $\frac{3i}{35}$         | 0                        | 0                         | $-\frac{\sqrt{30}i}{35}$ | 0                         | 0                        | 0                         | $\frac{3\sqrt{10}i}{70}$ | 0                        | 0                         |
|     |                                    | 0                         | $\frac{3i}{35}$        | 0                      | 0                      | 0                       | $\frac{\sqrt{5}i}{35}$   | 0                         | 0                        | $-\frac{3\sqrt{10}i}{70}$ | 0                        | 0                         | 0                        | $\frac{\sqrt{30}i}{35}$  | 0                         |
|     |                                    | 0                         | 0                      | $\frac{3i}{35}$        | 0                      | 0                       | 0                        | 0                         | 0                        | $-\frac{2\sqrt{3}i}{35}$  | 0                        | 0                         | 0                        | 0                        | $\frac{\sqrt{105}i}{70}$  |
|     |                                    | 0                         | 0                      | 0                      | $\frac{\sqrt{5}i}{35}$ | 0                       | 0                        | 0                         | 0                        | 0                         | $-\frac{\sqrt{15}i}{70}$ | 0                         | 0                        | 0                        | 0                         |
| 635 | symmetry                           | $\sqrt{3}yz$              |                        |                        |                        |                         |                          |                           |                          |                           |                          |                           |                          |                          |                           |
|     | $\mathbb{G}_{2,0}^{(1,-1;a)}(T_2)$ | $-\frac{3\sqrt{10}}{140}$ | 0                      | $-\frac{9}{140}$       | 0                      | 0                       | 0                        | 0                         | $-\frac{2\sqrt{15}}{35}$ | 0                         | $-\frac{2\sqrt{3}}{35}$  | 0                         | 0                        | 0                        | 0                         |
|     |                                    | 0                         | $\frac{\sqrt{6}}{140}$ | 0                      | $-\frac{\sqrt{3}}{28}$ | 0                       | 0                        | 0                         | 0                        | $-\frac{2\sqrt{15}}{35}$  | 0                        | $-\frac{6}{35}$           | 0                        | 0                        | 0                         |
|     |                                    | 0                         | 0                      | $\frac{\sqrt{3}}{28}$  | 0                      | $-\frac{\sqrt{6}}{140}$ | 0                        | 0                         | 0                        | 0                         | $-\frac{6}{35}$          | 0                         | $-\frac{2\sqrt{15}}{35}$ | 0                        | 0                         |
|     |                                    | 0                         | 0                      | 0                      | $\frac{9}{140}$        | 0                       | $\frac{3\sqrt{10}}{140}$ | 0                         | 0                        | 0                         | $-\frac{2\sqrt{3}}{35}$  | 0                         | $-\frac{2\sqrt{15}}{35}$ | 0                        | 0                         |
|     |                                    | 0                         | $\frac{\sqrt{10}}{35}$ | 0                      | 0                      | 0                       | 0                        | $\frac{\sqrt{21}}{28}$    | 0                        | $\frac{3}{28}$            | 0                        | 0                         | 0                        | 0                        | 0                         |
|     |                                    | $-\frac{\sqrt{10}}{35}$   | 0                      | $\frac{2}{35}$         | 0                      | 0                       | 0                        | 0                         | $\frac{\sqrt{15}}{140}$  | 0                         | $\frac{11\sqrt{3}}{140}$ | 0                         | 0                        | 0                        | 0                         |
|     |                                    | 0                         | $-\frac{2}{35}$        | 0                      | 0                      | 0                       | 0                        | 0                         | 0                        | $-\frac{3\sqrt{10}}{140}$ | 0                        | $\frac{\sqrt{6}}{20}$     | 0                        | 0                        | 0                         |
|     |                                    | 0                         | 0                      | 0                      | 0                      | $-\frac{2}{35}$         | 0                        | 0                         | 0                        | 0                         | $-\frac{\sqrt{6}}{20}$   | 0                         | $\frac{3\sqrt{10}}{140}$ | 0                        | 0                         |
|     |                                    | 0                         | 0                      | 0                      | $\frac{2}{35}$         | 0                       | $-\frac{\sqrt{10}}{35}$  | 0                         | 0                        | 0                         | 0                        | $-\frac{11\sqrt{3}}{140}$ | 0                        | $-\frac{\sqrt{15}}{140}$ | 0                         |
|     |                                    | 0                         | 0                      | 0                      | 0                      | $\frac{\sqrt{10}}{35}$  | 0                        | 0                         | 0                        | 0                         | 0                        | 0                         | $-\frac{3}{28}$          | 0                        | $-\frac{\sqrt{21}}{28}$   |
| 636 | symmetry                           | $\sqrt{3}xz$              |                        |                        |                        |                         |                          |                           |                          |                           |                          |                           |                          |                          |                           |

*continued ...*

Table 9

| No. | multipole                          | matrix   |                          |                         |                         |                          |                           |                          |                           |                           |                           |                           |                           |                           |                          |
|-----|------------------------------------|--|--------------------------|-------------------------|-------------------------|--------------------------|---------------------------|--------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|--------------------------|
|     | $\mathbb{G}_{2,1}^{(1,-1;a)}(T_2)$ | $\frac{3\sqrt{10}i}{140}$                                  | 0                        | $-\frac{9i}{140}$       | 0                       | 0                        | 0                         | 0                        | $\frac{2\sqrt{15}i}{35}$  | 0                         | $-\frac{2\sqrt{3}i}{35}$  | 0                         | 0                         | 0                         | 0                        |
|     |                                    | 0  | $-\frac{\sqrt{6}i}{140}$ | 0                       | $-\frac{\sqrt{3}i}{28}$ | 0                        | 0                         | 0                        | 0                         | $\frac{2\sqrt{15}i}{35}$  | 0                         | $-\frac{6i}{35}$          | 0                         | 0                         | 0                        |
|     |                                    | 0  | 0                        | $-\frac{\sqrt{3}i}{28}$ | 0                       | $-\frac{\sqrt{6}i}{140}$ | 0                         | 0                        | 0                         | 0                         | $\frac{6i}{35}$           | 0                         | $-\frac{2\sqrt{15}i}{35}$ | 0                         | 0                        |
|     |                                    | 0  | 0                        | 0                       | $-\frac{9i}{140}$       | 0                        | $\frac{3\sqrt{10}i}{140}$ | 0                        | 0                         | 0                         | 0                         | $\frac{2\sqrt{3}i}{35}$   | 0                         | $-\frac{2\sqrt{15}i}{35}$ | 0                        |
|     |                                    | 0  | $\frac{\sqrt{10}i}{35}$  | 0                       | 0                       | 0                        | 0                         | $-\frac{\sqrt{21}i}{28}$ | 0                         | $\frac{3i}{28}$           | 0                         | 0                         | 0                         | 0                         | 0                        |
|     |                                    | $\frac{\sqrt{10}i}{35}$                                    | 0                        | $\frac{2i}{35}$         | 0                       | 0                        | 0                         | 0                        | $-\frac{\sqrt{15}i}{140}$ | 0                         | $\frac{11\sqrt{3}i}{140}$ | 0                         | 0                         | 0                         | 0                        |
|     |                                    | 0  | $\frac{2i}{35}$          | 0                       | 0                       | 0                        | 0                         | 0                        | 0                         | $\frac{3\sqrt{10}i}{140}$ | 0                         | $\frac{\sqrt{6}i}{20}$    | 0                         | 0                         | 0                        |
|     |                                    | 0  | 0                        | 0                       | 0                       | $-\frac{2i}{35}$         | 0                         | 0                        | 0                         | 0                         | $\frac{\sqrt{6}i}{20}$    | 0                         | $\frac{3\sqrt{10}i}{140}$ | 0                         | 0                        |
|     |                                    | 0  | 0                        | 0                       | $-\frac{2i}{35}$        | 0                        | $-\frac{\sqrt{10}i}{35}$  | 0                        | 0                         | 0                         | 0                         | $\frac{11\sqrt{3}i}{140}$ | 0                         | $-\frac{\sqrt{15}i}{140}$ | 0                        |
|     |                                    | 0  | 0                        | 0                       | 0                       | $-\frac{\sqrt{10}i}{35}$ | 0                         | 0                        | 0                         | 0                         | 0                         | 0                         | $\frac{3i}{28}$           | 0                         | $-\frac{\sqrt{21}i}{28}$ |
| 637 | symmetry                           | $\sqrt{3}xy$   |                          |                         |                         |                          |                           |                          |                           |                           |                           |                           |                           |                           |                          |
|     | $\mathbb{G}_{2,2}^{(1,-1;a)}(T_2)$ | 0  | 0                        | 0                       | $-\frac{3}{70}$         | 0                        | 0                         | $\frac{\sqrt{105}}{35}$  | 0                         | 0                         | 0                         | $-\frac{\sqrt{3}}{35}$    | 0                         | 0                         | 0                        |
|     |                                    | $-\frac{\sqrt{30}}{70}$                                    | 0                        | 0                       | 0                       | $-\frac{\sqrt{6}}{35}$   | 0                         | 0                        | $\frac{3\sqrt{5}}{35}$    | 0                         | 0                         | 0                         | $-\frac{\sqrt{15}}{35}$   | 0                         | 0                        |
|     |                                    | 0  | $-\frac{\sqrt{6}}{35}$   | 0                       | 0                       | 0                        | $-\frac{\sqrt{30}}{70}$   | 0                        | 0                         | $\frac{\sqrt{15}}{35}$    | 0                         | 0                         | 0                         | $-\frac{3\sqrt{5}}{35}$   | 0                        |
|     |                                    | 0  | 0                        | $-\frac{3}{70}$         | 0                       | 0                        | 0                         | 0                        | 0                         | 0                         | $\frac{\sqrt{3}}{35}$     | 0                         | 0                         | 0                         | $-\frac{\sqrt{105}}{35}$ |
|     |                                    | 0  | 0                        | $\frac{\sqrt{5}}{35}$   | 0                       | 0                        | 0                         | 0                        | 0                         | 0                         | $\frac{\sqrt{15}}{70}$    | 0                         | 0                         | 0                         | 0                        |
|     |                                    | 0  | 0                        | 0                       | $\frac{3}{35}$          | 0                        | 0                         | $\frac{\sqrt{105}}{70}$  | 0                         | 0                         | 0                         | $\frac{2\sqrt{3}}{35}$    | 0                         | 0                         | 0                        |
|     |                                    | $-\frac{\sqrt{5}}{35}$                                     | 0                        | 0                       | 0                       | $\frac{3}{35}$           | 0                         | 0                        | $\frac{\sqrt{30}}{35}$    | 0                         | 0                         | 0                         | $\frac{3\sqrt{10}}{70}$   | 0                         | 0                        |
|     |                                    | 0  | $-\frac{3}{35}$          | 0                       | 0                       | 0                        | $\frac{\sqrt{5}}{35}$     | 0                        | 0                         | $\frac{3\sqrt{10}}{70}$   | 0                         | 0                         | 0                         | $\frac{\sqrt{30}}{35}$    | 0                        |
|     |                                    | 0  | 0                        | $-\frac{3}{35}$         | 0                       | 0                        | 0                         | 0                        | 0                         | 0                         | $\frac{2\sqrt{3}}{35}$    | 0                         | 0                         | 0                         | $\frac{\sqrt{105}}{70}$  |
|     |                                    | 0  | 0                        | 0                       | $-\frac{\sqrt{5}}{35}$  | 0                        | 0                         | 0                        | 0                         | 0                         | 0                         | $\frac{\sqrt{15}}{70}$    | 0                         | 0                         | 0                        |
| 638 | symmetry                           | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$ |                          |                         |                         |                          |                           |                          |                           |                           |                           |                           |                           |                           |                          |

continued ...

Table 9

| No. | multipole                        | matrix   |                          |                           |                          |                          |                          |                          |                            |                            |                            |                            |                            |                           |   |
|-----|----------------------------------|--|--------------------------|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|---|
|     | $\mathbb{G}_4^{(1,-1;a)}(A_1)$   | 0  | $\frac{\sqrt{7}i}{168}$  | 0                         | 0                        | 0                        | $\frac{\sqrt{35}i}{168}$ | 0                        | 0                          | $\frac{\sqrt{70}i}{56}$    | 0                          | 0                          | 0                          | $\frac{\sqrt{210}i}{168}$ | 0 |
|     |                                  | 0  | 0                        | $-\frac{\sqrt{42}i}{168}$ | 0                        | 0                        | 0                        | 0                        | 0                          | $-\frac{5\sqrt{14}i}{168}$ | 0                          | 0                          | 0                          | $\frac{\sqrt{10}i}{24}$   |   |
|     |                                  | 0  | 0                        | 0                         | $\frac{\sqrt{42}i}{168}$ | 0                        | 0                        | $\frac{\sqrt{10}i}{24}$  | 0                          | 0                          | $-\frac{5\sqrt{14}i}{168}$ | 0                          | 0                          | 0                         |   |
|     |                                  | $-\frac{\sqrt{35}i}{168}$                                      | 0                        | 0                         | 0                        | $-\frac{\sqrt{7}i}{168}$ | 0                        | 0                        | $\frac{\sqrt{210}i}{168}$  | 0                          | 0                          | 0                          | $\frac{\sqrt{70}i}{56}$    | 0                         | 0 |
|     |                                  | $-\frac{\sqrt{7}i}{84}$  | 0                        | 0                         | 0                        | $-\frac{\sqrt{35}i}{84}$ | 0                        | 0                        | $-\frac{5\sqrt{42}i}{168}$ | 0                          | 0                          | 0                          | $-\frac{5\sqrt{14}i}{168}$ | 0                         | 0 |
|     |                                  | 0  | $\frac{\sqrt{7}i}{28}$   | 0                         | 0                        | 0                        | $-\frac{\sqrt{35}i}{84}$ | 0                        | 0                          | $\frac{\sqrt{70}i}{42}$    | 0                          | 0                          | 0                          | $-\frac{\sqrt{210}i}{84}$ | 0 |
|     |                                  | 0  | 0                        | $-\frac{\sqrt{7}i}{42}$   | 0                        | 0                        | 0                        | 0                        | 0                          | $\frac{5\sqrt{21}i}{168}$  | 0                          | 0                          | 0                          | $-\frac{\sqrt{15}i}{24}$  |   |
|     |                                  | 0  | 0                        | 0                         | $-\frac{\sqrt{7}i}{42}$  | 0                        | 0                        | $\frac{\sqrt{15}i}{24}$  | 0                          | 0                          | 0                          | $-\frac{5\sqrt{21}i}{168}$ | 0                          | 0                         | 0 |
|     |                                  | $-\frac{\sqrt{35}i}{84}$                                       | 0                        | 0                         | 0                        | $\frac{\sqrt{7}i}{28}$   | 0                        | 0                        | $\frac{\sqrt{210}i}{84}$   | 0                          | 0                          | 0                          | $-\frac{\sqrt{70}i}{42}$   | 0                         | 0 |
|     |                                  | 0  | $-\frac{\sqrt{35}i}{84}$ | 0                         | 0                        | 0                        | $-\frac{\sqrt{7}i}{84}$  | 0                        | 0                          | $\frac{5\sqrt{14}i}{168}$  | 0                          | 0                          | 0                          | $\frac{5\sqrt{42}i}{168}$ | 0 |
| 639 | symmetry                         | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ |                          |                           |                          |                          |                          |                          |                            |                            |                            |                            |                            |                           |   |
|     | $\mathbb{G}_{4,0}^{(1,-1;a)}(E)$ | 0  | $\frac{\sqrt{5}i}{168}$  | 0                         | 0                        | 0                        | $-\frac{i}{24}$          | 0                        | 0                          | $\frac{5\sqrt{2}i}{56}$    | 0                          | 0                          | 0                          | $-\frac{\sqrt{6}i}{24}$   | 0 |
|     |                                  | 0  | 0                        | $-\frac{\sqrt{30}i}{168}$ | 0                        | 0                        | 0                        | 0                        | 0                          | $-\frac{5\sqrt{10}i}{168}$ | 0                          | 0                          | 0                          | $-\frac{\sqrt{14}i}{24}$  |   |
|     |                                  | 0  | 0                        | 0                         | $\frac{\sqrt{30}i}{168}$ | 0                        | 0                        | $-\frac{\sqrt{14}i}{24}$ | 0                          | 0                          | 0                          | $-\frac{5\sqrt{10}i}{168}$ | 0                          | 0                         | 0 |
|     |                                  | $\frac{i}{24}$   | 0                        | 0                         | 0                        | $-\frac{\sqrt{5}i}{168}$ | 0                        | 0                        | $-\frac{\sqrt{6}i}{24}$    | 0                          | 0                          | 0                          | $\frac{5\sqrt{2}i}{56}$    | 0                         | 0 |
|     |                                  | $-\frac{\sqrt{5}i}{84}$  | 0                        | 0                         | 0                        | $\frac{i}{12}$           | 0                        | 0                        | $-\frac{5\sqrt{30}i}{168}$ | 0                          | 0                          | 0                          | $\frac{\sqrt{10}i}{24}$    | 0                         | 0 |
|     |                                  | 0  | $\frac{\sqrt{5}i}{28}$   | 0                         | 0                        | 0                        | $\frac{i}{12}$           | 0                        | 0                          | $\frac{5\sqrt{2}i}{42}$    | 0                          | 0                          | 0                          | $\frac{\sqrt{6}i}{12}$    | 0 |
|     |                                  | 0  | 0                        | $-\frac{\sqrt{5}i}{42}$   | 0                        | 0                        | 0                        | 0                        | 0                          | $\frac{5\sqrt{15}i}{168}$  | 0                          | 0                          | 0                          | $\frac{\sqrt{21}i}{24}$   |   |
|     |                                  | 0  | 0                        | 0                         | $-\frac{\sqrt{5}i}{42}$  | 0                        | 0                        | $-\frac{\sqrt{21}i}{24}$ | 0                          | 0                          | 0                          | $-\frac{5\sqrt{15}i}{168}$ | 0                          | 0                         | 0 |
|     |                                  | $\frac{i}{12}$   | 0                        | 0                         | 0                        | $\frac{\sqrt{5}i}{28}$   | 0                        | 0                        | $-\frac{\sqrt{6}i}{12}$    | 0                          | 0                          | 0                          | $-\frac{5\sqrt{2}i}{42}$   | 0                         | 0 |
|     |                                  | 0  | $\frac{i}{12}$           | 0                         | 0                        | 0                        | $-\frac{\sqrt{5}i}{84}$  | 0                        | 0                          | $-\frac{\sqrt{10}i}{24}$   | 0                          | 0                          | 0                          | $\frac{5\sqrt{30}i}{168}$ | 0 |
| 640 | symmetry                         | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$                   |                          |                           |                          |                          |                          |                          |                            |                            |                            |                            |                            |                           |   |

continued ...



Table 9

| No. | multipole                          | matrix                             |                          |                           |                           |                           |                          |                           |                            |                           |                          |                            |                            |                           |                          |
|-----|------------------------------------|------------------------------------|--------------------------|---------------------------|---------------------------|---------------------------|--------------------------|---------------------------|----------------------------|---------------------------|--------------------------|----------------------------|----------------------------|---------------------------|--------------------------|
|     | $\mathbb{G}_{4,1}^{(1,-1;a)}(E)$   | 0                                  | 0                        | 0                         | $-\frac{\sqrt{30}i}{168}$ | 0                         | 0                        | $-\frac{\sqrt{14}i}{56}$  | 0                          | 0                         | 0                        | $-\frac{3\sqrt{10}i}{56}$  | 0                          | 0                         | 0                        |
|     |                                    | $\frac{i}{56}$                     | 0                        | 0                         | 0                         | $\frac{\sqrt{5}i}{56}$    | 0                        | 0                         | $\frac{11\sqrt{6}i}{168}$  | 0                         | 0                        | 0                          | $-\frac{\sqrt{2}i}{56}$    | 0                         | 0                        |
|     |                                    | 0                                  | $-\frac{\sqrt{5}i}{56}$  | 0                         | 0                         | 0                         | $-\frac{i}{56}$          | 0                         | 0                          | $-\frac{\sqrt{2}i}{56}$   | 0                        | 0                          | 0                          | $\frac{11\sqrt{6}i}{168}$ | 0                        |
|     |                                    | 0                                  | 0                        | $\frac{\sqrt{30}i}{168}$  | 0                         | 0                         | 0                        | 0                         | 0                          | $-\frac{3\sqrt{10}i}{56}$ | 0                        | 0                          | 0                          | 0                         | $-\frac{\sqrt{14}i}{56}$ |
|     |                                    | 0                                  | 0                        | $\frac{\sqrt{6}i}{28}$    | 0                         | 0                         | 0                        | 0                         | 0                          | $\frac{5\sqrt{2}i}{28}$   | 0                        | 0                          | 0                          | 0                         | 0                        |
|     |                                    | 0                                  | 0                        | 0                         | $-\frac{\sqrt{30}i}{84}$  | 0                         | 0                        | $-\frac{3\sqrt{14}i}{56}$ | 0                          | 0                         | 0                        | $\frac{\sqrt{10}i}{56}$    | 0                          | 0                         | 0                        |
|     |                                    | $\frac{\sqrt{6}i}{28}$             | 0                        | 0                         | 0                         | $-\frac{\sqrt{30}i}{84}$  | 0                        | 0                         | $\frac{9i}{56}$            | 0                         | 0                        | 0                          | $-\frac{17\sqrt{3}i}{168}$ | 0                         | 0                        |
|     |                                    | 0                                  | $-\frac{\sqrt{30}i}{84}$ | 0                         | 0                         | 0                         | $\frac{\sqrt{6}i}{28}$   | 0                         | 0                          | $\frac{17\sqrt{3}i}{168}$ | 0                        | 0                          | 0                          | $-\frac{9i}{56}$          | 0                        |
|     |                                    | 0                                  | 0                        | $-\frac{\sqrt{30}i}{84}$  | 0                         | 0                         | 0                        | 0                         | 0                          | $-\frac{\sqrt{10}i}{56}$  | 0                        | 0                          | 0                          | 0                         | $\frac{3\sqrt{14}i}{56}$ |
|     |                                    | 0                                  | 0                        | 0                         | $\frac{\sqrt{6}i}{28}$    | 0                         | 0                        | 0                         | 0                          | 0                         | $-\frac{5\sqrt{2}i}{28}$ | 0                          | 0                          | 0                         | 0                        |
| 641 | symmetry                           | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$  |                          |                           |                           |                           |                          |                           |                            |                           |                          |                            |                            |                           |                          |
|     | $\mathbb{G}_{4,0}^{(1,-1;a)}(T_1)$ | $-\frac{\sqrt{21}}{672}$           | 0                        | $-\frac{\sqrt{210}}{672}$ | 0                         | $-\frac{\sqrt{105}}{672}$ | 0                        | 0                         | $-\frac{3\sqrt{14}}{112}$  | 0                         | $-\frac{\sqrt{70}}{56}$  | 0                          | $-\frac{\sqrt{42}}{112}$   | 0                         | 0                        |
|     |                                    | 0                                  | $\frac{\sqrt{35}}{224}$  | 0                         | $\frac{\sqrt{70}}{224}$   | 0                         | $\frac{\sqrt{7}}{224}$   | $\frac{\sqrt{6}}{48}$     | 0                          | $\frac{\sqrt{14}}{28}$    | 0                        | $\frac{\sqrt{210}}{336}$   | 0                          | $-\frac{\sqrt{42}}{168}$  | 0                        |
|     |                                    | $-\frac{\sqrt{7}}{224}$            | 0                        | $-\frac{\sqrt{70}}{224}$  | 0                         | $-\frac{\sqrt{35}}{224}$  | 0                        | 0                         | $-\frac{\sqrt{42}}{168}$   | 0                         | $\frac{\sqrt{210}}{336}$ | 0                          | $\frac{\sqrt{14}}{28}$     | 0                         | $\frac{\sqrt{6}}{48}$    |
|     |                                    | 0                                  | $\frac{\sqrt{105}}{672}$ | 0                         | $\frac{\sqrt{210}}{672}$  | 0                         | $\frac{\sqrt{21}}{672}$  | 0                         | 0                          | $-\frac{\sqrt{42}}{112}$  | 0                        | $-\frac{\sqrt{70}}{56}$    | 0                          | $-\frac{3\sqrt{14}}{112}$ | 0                        |
|     |                                    | 0                                  | $\frac{\sqrt{21}}{84}$   | 0                         | $\frac{\sqrt{42}}{168}$   | 0                         | 0                        | $\frac{\sqrt{10}}{32}$    | 0                          | $\frac{5\sqrt{210}}{336}$ | 0                        | $\frac{5\sqrt{14}}{224}$   | 0                          | 0                         | 0                        |
|     |                                    | $-\frac{\sqrt{21}}{84}$            | 0                        | $-\frac{\sqrt{210}}{168}$ | 0                         | 0                         | 0                        | 0                         | $-\frac{13\sqrt{14}}{224}$ | 0                         | $-\frac{\sqrt{70}}{112}$ | 0                          | $\frac{\sqrt{42}}{96}$     | 0                         | 0                        |
|     |                                    | 0                                  | $\frac{\sqrt{210}}{168}$ | 0                         | 0                         | 0                         | $-\frac{\sqrt{42}}{168}$ | $\frac{3}{32}$            | 0                          | $\frac{\sqrt{21}}{672}$   | 0                        | $-\frac{\sqrt{35}}{32}$    | 0                          | $-\frac{\sqrt{7}}{224}$   | 0                        |
|     |                                    | $-\frac{\sqrt{42}}{168}$           | 0                        | 0                         | 0                         | $\frac{\sqrt{210}}{168}$  | 0                        | 0                         | $\frac{\sqrt{7}}{224}$     | 0                         | $\frac{\sqrt{35}}{32}$   | 0                          | $-\frac{\sqrt{21}}{672}$   | 0                         | $-\frac{3}{32}$          |
|     |                                    | 0                                  | 0                        | 0                         | $-\frac{\sqrt{210}}{168}$ | 0                         | $-\frac{\sqrt{21}}{84}$  | 0                         | 0                          | $-\frac{\sqrt{42}}{96}$   | 0                        | $\frac{\sqrt{70}}{112}$    | 0                          | $\frac{13\sqrt{14}}{224}$ | 0                        |
|     |                                    | 0                                  | 0                        | $\frac{\sqrt{42}}{168}$   | 0                         | $\frac{\sqrt{21}}{84}$    | 0                        | 0                         | 0                          | $-\frac{5\sqrt{14}}{224}$ | 0                        | $-\frac{5\sqrt{210}}{336}$ | 0                          | $-\frac{\sqrt{10}}{32}$   | 0                        |
| 642 | symmetry                           | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ |                          |                           |                           |                           |                          |                           |                            |                           |                          |                            |                            |                           |                          |

continued ...

Table 9

| No. | multipole                          | matrix                               |                            |                           |                            |                            |                           |                         |                             |                             |                           |                            |                             |                             |                         |  |
|-----|------------------------------------|--------------------------------------|----------------------------|---------------------------|----------------------------|----------------------------|---------------------------|-------------------------|-----------------------------|-----------------------------|---------------------------|----------------------------|-----------------------------|-----------------------------|-------------------------|--|
|     | $\mathbb{G}_{4,1}^{(1,-1;a)}(T_1)$ | $-\frac{\sqrt{21}i}{672}$            | 0                          | $\frac{\sqrt{210}i}{672}$ | 0                          | $-\frac{\sqrt{105}i}{672}$ | 0                         | 0                       | $-\frac{3\sqrt{14}i}{112}$  | 0                           | $\frac{\sqrt{70}i}{56}$   | 0                          | $-\frac{\sqrt{42}i}{112}$   | 0                           | 0                       |  |
|     |                                    | 0                                    | $\frac{\sqrt{35}i}{224}$   | 0                         | $-\frac{\sqrt{70}i}{224}$  | 0                          | $\frac{\sqrt{7}i}{224}$   | $-\frac{\sqrt{6}i}{48}$ | 0                           | $\frac{\sqrt{14}i}{28}$     | 0                         | $-\frac{\sqrt{210}i}{336}$ | 0                           | $-\frac{\sqrt{42}i}{168}$   | 0                       |  |
|     |                                    | $\frac{\sqrt{7}i}{224}$              | 0                          | $-\frac{\sqrt{70}i}{224}$ | 0                          | $\frac{\sqrt{35}i}{224}$   | 0                         | 0                       | $\frac{\sqrt{42}i}{168}$    | 0                           | $\frac{\sqrt{210}i}{336}$ | 0                          | $-\frac{\sqrt{14}i}{28}$    | 0                           | $\frac{\sqrt{6}i}{48}$  |  |
|     |                                    | 0                                    | $-\frac{\sqrt{105}i}{672}$ | 0                         | $\frac{\sqrt{210}i}{672}$  | 0                          | $-\frac{\sqrt{21}i}{672}$ | 0                       | 0                           | $\frac{\sqrt{42}i}{112}$    | 0                         | $-\frac{\sqrt{70}i}{56}$   | 0                           | $\frac{3\sqrt{14}i}{112}$   | 0                       |  |
|     |                                    | 0                                    | $-\frac{\sqrt{21}i}{84}$   | 0                         | $\frac{\sqrt{42}i}{168}$   | 0                          | 0                         | $\frac{\sqrt{10}i}{32}$ | 0                           | $-\frac{5\sqrt{210}i}{336}$ | 0                         | $\frac{5\sqrt{14}i}{224}$  | 0                           | 0                           | 0                       |  |
|     |                                    | $-\frac{\sqrt{21}i}{84}$             | 0                          | $\frac{\sqrt{210}i}{168}$ | 0                          | 0                          | 0                         | 0                       | $-\frac{13\sqrt{14}i}{224}$ | 0                           | $\frac{\sqrt{70}i}{112}$  | 0                          | $\frac{\sqrt{42}i}{96}$     | 0                           | 0                       |  |
|     |                                    | 0                                    | $\frac{\sqrt{210}i}{168}$  | 0                         | 0                          | 0                          | $-\frac{\sqrt{42}i}{168}$ | $-\frac{3i}{32}$        | 0                           | $\frac{\sqrt{21}i}{672}$    | 0                         | $\frac{\sqrt{35}i}{32}$    | 0                           | $-\frac{\sqrt{7}i}{224}$    | 0                       |  |
|     |                                    | $\frac{\sqrt{42}i}{168}$             | 0                          | 0                         | 0                          | $-\frac{\sqrt{210}i}{168}$ | 0                         | 0                       | $-\frac{\sqrt{7}i}{224}$    | 0                           | $\frac{\sqrt{35}i}{32}$   | 0                          | $\frac{\sqrt{21}i}{672}$    | 0                           | $-\frac{3i}{32}$        |  |
|     |                                    | 0                                    | 0                          | 0                         | $-\frac{\sqrt{210}i}{168}$ | 0                          | $\frac{\sqrt{21}i}{84}$   | 0                       | 0                           | $\frac{\sqrt{42}i}{96}$     | 0                         | $\frac{\sqrt{70}i}{112}$   | 0                           | $-\frac{13\sqrt{14}i}{224}$ | 0                       |  |
|     |                                    | 0                                    | 0                          | $-\frac{\sqrt{42}i}{168}$ | 0                          | $\frac{\sqrt{21}i}{84}$    | 0                         | 0                       | 0                           | 0                           | $\frac{5\sqrt{14}i}{224}$ | 0                          | $-\frac{5\sqrt{210}i}{336}$ | 0                           | $\frac{\sqrt{10}i}{32}$ |  |
| 643 | symmetry                           | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$    |                            |                           |                            |                            |                           |                         |                             |                             |                           |                            |                             |                             |                         |  |
|     | $\mathbb{G}_{4,2}^{(1,-1;a)}(T_1)$ | 0                                    | 0                          | 0                         | 0                          | 0                          | $\frac{\sqrt{21}}{84}$    | 0                       | 0                           | 0                           | 0                         | 0                          | 0                           | $\frac{\sqrt{14}}{28}$      | 0                       |  |
|     |                                    | 0                                    | 0                          | 0                         | 0                          | 0                          | 0                         | 0                       | 0                           | 0                           | 0                         | 0                          | 0                           | 0                           | $\frac{\sqrt{6}}{12}$   |  |
|     |                                    | 0                                    | 0                          | 0                         | 0                          | 0                          | 0                         | $-\frac{\sqrt{6}}{12}$  | 0                           | 0                           | 0                         | 0                          | 0                           | 0                           | 0                       |  |
|     |                                    | $\frac{\sqrt{21}}{84}$               | 0                          | 0                         | 0                          | 0                          | 0                         | 0                       | $-\frac{\sqrt{14}}{28}$     | 0                           | 0                         | 0                          | 0                           | 0                           | 0                       |  |
|     |                                    | 0                                    | 0                          | 0                         | 0                          | $-\frac{\sqrt{21}}{42}$    | 0                         | 0                       | 0                           | 0                           | 0                         | 0                          | $-\frac{\sqrt{210}}{84}$    | 0                           | 0                       |  |
|     |                                    | 0                                    | 0                          | 0                         | 0                          | 0                          | $-\frac{\sqrt{21}}{42}$   | 0                       | 0                           | 0                           | 0                         | 0                          | 0                           | $-\frac{\sqrt{14}}{14}$     | 0                       |  |
|     |                                    | 0                                    | 0                          | 0                         | 0                          | 0                          | 0                         | 0                       | 0                           | 0                           | 0                         | 0                          | 0                           | 0                           | $-\frac{1}{4}$          |  |
|     |                                    | 0                                    | 0                          | 0                         | 0                          | 0                          | 0                         | $-\frac{1}{4}$          | 0                           | 0                           | 0                         | 0                          | 0                           | 0                           | 0                       |  |
|     |                                    | $\frac{\sqrt{21}}{42}$               | 0                          | 0                         | 0                          | 0                          | 0                         | 0                       | $-\frac{\sqrt{14}}{14}$     | 0                           | 0                         | 0                          | 0                           | 0                           | 0                       |  |
|     |                                    | 0                                    | $\frac{\sqrt{21}}{42}$     | 0                         | 0                          | 0                          | 0                         | 0                       | 0                           | $-\frac{\sqrt{210}}{84}$    | 0                         | 0                          | 0                           | 0                           | 0                       |  |
| 644 | symmetry                           | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$ |                            |                           |                            |                            |                           |                         |                             |                             |                           |                            |                             |                             |                         |  |

continued ...

Table 9

| No. | multipole                          | matrix                                |                           |                           |                           |                          |                         |                           |                           |                           |                           |                           |                           |                           |                           |
|-----|------------------------------------|---------------------------------------|---------------------------|---------------------------|---------------------------|--------------------------|-------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
|     | $\mathbb{G}_{4,0}^{(1,-1;a)}(T_2)$ | $-\frac{\sqrt{3}}{672}$               | 0                         | $-\frac{\sqrt{30}}{672}$  | 0                         | $\frac{\sqrt{15}}{96}$   | 0                       | 0                         | $-\frac{3\sqrt{2}}{112}$  | 0                         | $-\frac{\sqrt{10}}{56}$   | 0                         | $\frac{\sqrt{6}}{16}$     | 0                         | 0                         |
|     |                                    | 0                                     | $\frac{\sqrt{5}}{224}$    | 0                         | $\frac{\sqrt{10}}{224}$   | 0                        | $-\frac{1}{32}$         | $-\frac{\sqrt{42}}{48}$   | 0                         | $\frac{\sqrt{2}}{28}$     | 0                         | $\frac{\sqrt{30}}{336}$   | 0                         | $\frac{\sqrt{6}}{24}$     | 0                         |
|     |                                    | $\frac{1}{32}$                        | 0                         | $-\frac{\sqrt{10}}{224}$  | 0                         | $-\frac{\sqrt{5}}{224}$  | 0                       | 0                         | $\frac{\sqrt{6}}{24}$     | 0                         | $\frac{\sqrt{30}}{336}$   | 0                         | $\frac{\sqrt{2}}{28}$     | 0                         | $-\frac{\sqrt{42}}{48}$   |
|     |                                    | 0                                     | $-\frac{\sqrt{15}}{96}$   | 0                         | $\frac{\sqrt{30}}{672}$   | 0                        | $\frac{\sqrt{3}}{672}$  | 0                         | 0                         | $\frac{\sqrt{6}}{16}$     | 0                         | $-\frac{\sqrt{10}}{56}$   | 0                         | $-\frac{3\sqrt{2}}{112}$  | 0                         |
|     |                                    | 0                                     | $\frac{\sqrt{3}}{84}$     | 0                         | $-\frac{\sqrt{6}}{24}$    | 0                        | 0                       | $\frac{\sqrt{70}}{224}$   | 0                         | $\frac{5\sqrt{30}}{336}$  | 0                         | $-\frac{5\sqrt{2}}{32}$   | 0                         | 0                         | 0                         |
|     |                                    | $-\frac{\sqrt{3}}{84}$                | 0                         | $-\frac{\sqrt{30}}{168}$  | 0                         | 0                        | 0                       | 0                         | $-\frac{13\sqrt{2}}{224}$ | 0                         | $-\frac{\sqrt{10}}{112}$  | 0                         | $-\frac{7\sqrt{6}}{96}$   | 0                         | 0                         |
|     |                                    | 0                                     | $\frac{\sqrt{30}}{168}$   | 0                         | 0                         | 0                        | $\frac{\sqrt{6}}{24}$   | $-\frac{3\sqrt{7}}{32}$   | 0                         | $\frac{\sqrt{3}}{672}$    | 0                         | $-\frac{\sqrt{5}}{32}$    | 0                         | $\frac{1}{32}$            | 0                         |
|     |                                    | $\frac{\sqrt{6}}{24}$                 | 0                         | 0                         | 0                         | $\frac{\sqrt{30}}{168}$  | 0                       | 0                         | $-\frac{1}{32}$           | 0                         | $\frac{\sqrt{5}}{32}$     | 0                         | $-\frac{\sqrt{3}}{672}$   | 0                         | $\frac{3\sqrt{7}}{32}$    |
|     |                                    | 0                                     | 0                         | 0                         | $-\frac{\sqrt{30}}{168}$  | 0                        | $-\frac{\sqrt{3}}{84}$  | 0                         | 0                         | $\frac{7\sqrt{6}}{96}$    | 0                         | $\frac{\sqrt{10}}{112}$   | 0                         | $\frac{13\sqrt{2}}{224}$  | 0                         |
|     |                                    | 0                                     | 0                         | $-\frac{\sqrt{6}}{24}$    | 0                         | $\frac{\sqrt{3}}{84}$    | 0                       | 0                         | 0                         | 0                         | $\frac{5\sqrt{2}}{32}$    | 0                         | $-\frac{5\sqrt{30}}{336}$ | 0                         | $-\frac{\sqrt{70}}{224}$  |
| 645 | symmetry                           | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ |                           |                           |                           |                          |                         |                           |                           |                           |                           |                           |                           |                           |                           |
|     | $\mathbb{G}_{4,1}^{(1,-1;a)}(T_2)$ | $\frac{\sqrt{3}i}{672}$               | 0                         | $-\frac{\sqrt{30}i}{672}$ | 0                         | $-\frac{\sqrt{15}i}{96}$ | 0                       | 0                         | $\frac{3\sqrt{2}i}{112}$  | 0                         | $-\frac{\sqrt{10}i}{56}$  | 0                         | $-\frac{\sqrt{6}i}{16}$   | 0                         | 0                         |
|     |                                    | 0                                     | $-\frac{\sqrt{5}i}{224}$  | 0                         | $\frac{\sqrt{10}i}{224}$  | 0                        | $\frac{i}{32}$          | $-\frac{\sqrt{42}i}{48}$  | 0                         | $-\frac{\sqrt{2}i}{28}$   | 0                         | $\frac{\sqrt{30}i}{336}$  | 0                         | $-\frac{\sqrt{6}i}{24}$   | 0                         |
|     |                                    | $\frac{i}{32}$                        | 0                         | $\frac{\sqrt{10}i}{224}$  | 0                         | $-\frac{\sqrt{5}i}{224}$ | 0                       | 0                         | $\frac{\sqrt{6}i}{24}$    | 0                         | $-\frac{\sqrt{30}i}{336}$ | 0                         | $\frac{\sqrt{2}i}{28}$    | 0                         | $\frac{\sqrt{42}i}{48}$   |
|     |                                    | 0                                     | $-\frac{\sqrt{15}i}{96}$  | 0                         | $-\frac{\sqrt{30}i}{672}$ | 0                        | $\frac{\sqrt{3}i}{672}$ | 0                         | 0                         | $\frac{\sqrt{6}i}{16}$    | 0                         | $\frac{\sqrt{10}i}{56}$   | 0                         | $-\frac{3\sqrt{2}i}{112}$ | 0                         |
|     |                                    | 0                                     | $\frac{\sqrt{3}i}{84}$    | 0                         | $\frac{\sqrt{6}i}{24}$    | 0                        | 0                       | $-\frac{\sqrt{70}i}{224}$ | 0                         | $\frac{5\sqrt{30}i}{336}$ | 0                         | $\frac{5\sqrt{2}i}{32}$   | 0                         | 0                         | 0                         |
|     |                                    | $\frac{\sqrt{3}i}{84}$                | 0                         | $-\frac{\sqrt{30}i}{168}$ | 0                         | 0                        | 0                       | 0                         | $\frac{13\sqrt{2}i}{224}$ | 0                         | $-\frac{\sqrt{10}i}{112}$ | 0                         | $\frac{7\sqrt{6}i}{96}$   | 0                         | 0                         |
|     |                                    | 0                                     | $-\frac{\sqrt{30}i}{168}$ | 0                         | 0                         | 0                        | $-\frac{\sqrt{6}i}{24}$ | $-\frac{3\sqrt{7}i}{32}$  | 0                         | $-\frac{\sqrt{3}i}{672}$  | 0                         | $-\frac{\sqrt{5}i}{32}$   | 0                         | $-\frac{i}{32}$           | 0                         |
|     |                                    | $\frac{\sqrt{6}i}{24}$                | 0                         | 0                         | 0                         | $\frac{\sqrt{30}i}{168}$ | 0                       | 0                         | $-\frac{i}{32}$           | 0                         | $-\frac{\sqrt{5}i}{32}$   | 0                         | $-\frac{\sqrt{3}i}{672}$  | 0                         | $-\frac{3\sqrt{7}i}{32}$  |
|     |                                    | 0                                     | 0                         | 0                         | $\frac{\sqrt{30}i}{168}$  | 0                        | $-\frac{\sqrt{3}i}{84}$ | 0                         | 0                         | $\frac{7\sqrt{6}i}{96}$   | 0                         | $-\frac{\sqrt{10}i}{112}$ | 0                         | $\frac{13\sqrt{2}i}{224}$ | 0                         |
|     |                                    | 0                                     | 0                         | $-\frac{\sqrt{6}i}{24}$   | 0                         | $-\frac{\sqrt{3}i}{84}$  | 0                       | 0                         | 0                         | 0                         | $\frac{5\sqrt{2}i}{32}$   | 0                         | $\frac{5\sqrt{30}i}{336}$ | 0                         | $-\frac{\sqrt{70}i}{224}$ |
| 646 | symmetry                           | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ |                           |                           |                           |                          |                         |                           |                           |                           |                           |                           |                           |                           |                           |

continued ...

Table 9

| No. | multipole                          | matrix  |                         |                         |                         |                        |                            |                             |                           |                          |                            |                           |                            |                             |                          |
|-----|------------------------------------|---|-------------------------|-------------------------|-------------------------|------------------------|----------------------------|-----------------------------|---------------------------|--------------------------|----------------------------|---------------------------|----------------------------|-----------------------------|--------------------------|
|     | $\mathbb{G}_{4,2}^{(1,-1;a)}(T_2)$ | 0   | 0                       | 0                       | $\frac{\sqrt{30}}{168}$ | 0                      | 0                          | $-\frac{\sqrt{14}}{56}$     | 0                         | 0                        | 0                          | $\frac{3\sqrt{10}}{56}$   | 0                          | 0                           | 0                        |
|     |                                    | $\frac{1}{56}$  | 0                       | 0                       | 0                       | $-\frac{\sqrt{5}}{56}$ | 0                          | 0                           | $\frac{11\sqrt{6}}{168}$  | 0                        | 0                          | 0                         | $\frac{\sqrt{2}}{56}$      | 0                           | 0                        |
|     |                                    | 0   | $-\frac{\sqrt{5}}{56}$  | 0                       | 0                       | 0                      | $\frac{1}{56}$             | 0                           | 0                         | $-\frac{\sqrt{2}}{56}$   | 0                          | 0                         | 0                          | $-\frac{11\sqrt{6}}{168}$   | 0                        |
|     |                                    | 0   | 0                       | $\frac{\sqrt{30}}{168}$ | 0                       | 0                      | 0                          | 0                           | 0                         | $-\frac{3\sqrt{10}}{56}$ | 0                          | 0                         | 0                          | 0                           | $\frac{\sqrt{14}}{56}$   |
|     |                                    | 0   | 0                       | $-\frac{\sqrt{6}}{28}$  | 0                       | 0                      | 0                          | 0                           | 0                         | $-\frac{5\sqrt{2}}{28}$  | 0                          | 0                         | 0                          | 0                           | 0                        |
|     |                                    | 0   | 0                       | 0                       | $\frac{\sqrt{30}}{84}$  | 0                      | 0                          | $-\frac{3\sqrt{14}}{56}$    | 0                         | 0                        | 0                          | $-\frac{\sqrt{10}}{56}$   | 0                          | 0                           | 0                        |
|     |                                    | $\frac{\sqrt{6}}{28}$   | 0                       | 0                       | 0                       | $\frac{\sqrt{30}}{84}$ | 0                          | 0                           | $\frac{9}{56}$            | 0                        | 0                          | 0                         | $\frac{17\sqrt{3}}{168}$   | 0                           | 0                        |
|     |                                    | 0   | $-\frac{\sqrt{30}}{84}$ | 0                       | 0                       | 0                      | $-\frac{\sqrt{6}}{28}$     | 0                           | 0                         | $\frac{17\sqrt{3}}{168}$ | 0                          | 0                         | 0                          | $\frac{9}{56}$              | 0                        |
|     |                                    | 0   | 0                       | $-\frac{\sqrt{30}}{84}$ | 0                       | 0                      | 0                          | 0                           | 0                         | $-\frac{\sqrt{10}}{56}$  | 0                          | 0                         | 0                          | 0                           | $-\frac{3\sqrt{14}}{56}$ |
|     |                                    | 0   | 0                       | 0                       | $\frac{\sqrt{6}}{28}$   | 0                      | 0                          | 0                           | 0                         | 0                        | $-\frac{5\sqrt{2}}{28}$    | 0                         | 0                          | 0                           | 0                        |
| 647 | symmetry                           | $\frac{\sqrt{2}(2x^6-15x^4y^2-15x^4z^2-15x^2y^4+180x^2y^2z^2-15x^2z^4+2y^6-15y^4z^2-15y^2z^4+2z^6)}{8}$ |                         |                         |                         |                        |                            |                             |                           |                          |                            |                           |                            |                             |                          |
|     | $\mathbb{G}_6^{(1,-1;a)}(A_1)$     | 0   | 0                       | 0                       | 0                       | 0                      | 0                          | 0                           | 0                         | 0                        | 0                          | 0                         | 0                          | 0                           | 0                        |
|     |                                    | 0   | 0                       | 0                       | 0                       | 0                      | 0                          | 0                           | 0                         | 0                        | 0                          | 0                         | 0                          | 0                           | 0                        |
|     |                                    | 0   | 0                       | 0                       | 0                       | 0                      | 0                          | 0                           | 0                         | 0                        | 0                          | 0                         | 0                          | 0                           | 0                        |
|     |                                    | 0   | 0                       | 0                       | 0                       | 0                      | 0                          | 0                           | 0                         | 0                        | 0                          | 0                         | 0                          | 0                           | 0                        |
|     |                                    | 0   | 0                       | 0                       | 0                       | 0                      | 0                          | $\frac{\sqrt{33}i}{264}$    | 0                         | 0                        | 0                          | $-\frac{7\sqrt{11}i}{88}$ | 0                          | 0                           | 0                        |
|     |                                    | 0   | 0                       | 0                       | 0                       | 0                      | 0                          | $-\frac{\sqrt{55}i}{88}$    | 0                         | 0                        | 0                          | 0                         | $\frac{7\sqrt{165}i}{264}$ | 0                           | 0                        |
|     |                                    | 0   | 0                       | 0                       | 0                       | 0                      | 0                          | 0                           | $\frac{5\sqrt{66}i}{264}$ | 0                        | 0                          | 0                         | 0                          | $-\frac{\sqrt{2310}i}{264}$ | 0                        |
|     |                                    | 0   | 0                       | 0                       | 0                       | 0                      | $\frac{\sqrt{2310}i}{264}$ | 0                           | 0                         | 0                        | $-\frac{5\sqrt{66}i}{264}$ | 0                         | 0                          | 0                           | 0                        |
|     |                                    | 0   | 0                       | 0                       | 0                       | 0                      | 0                          | $-\frac{7\sqrt{165}i}{264}$ | 0                         | 0                        | 0                          | $\frac{\sqrt{55}i}{88}$   | 0                          | 0                           | 0                        |
|     |                                    | 0   | 0                       | 0                       | 0                       | 0                      | 0                          | 0                           | $\frac{7\sqrt{11}i}{88}$  | 0                        | 0                          | 0                         | $-\frac{\sqrt{33}i}{264}$  | 0                           | 0                        |
| 648 | symmetry                           | $-\frac{\sqrt{2310}(x-y)(x+y)(x-z)(x+z)(y-z)(y+z)}{8}$  |                         |                         |                         |                        |                            |                             |                           |                          |                            |                           |                            |                             |                          |

continued ...

Table 9

| No. | multipole                      | matrix  |
|-----|--------------------------------|---|
|     | $\mathbb{G}_6^{(1,-1;a)}(A_2)$ | $ \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}i}{24} & 0 & 0 & 0 & \frac{\sqrt{5}i}{8} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{i}{24} & 0 & 0 & 0 & \frac{\sqrt{35}i}{24} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{14}i}{24} & 0 & 0 & 0 & -\frac{\sqrt{42}i}{24} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{42}i}{24} & 0 & 0 & 0 & \frac{\sqrt{14}i}{24} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}i}{24} & 0 & 0 & 0 & -\frac{i}{24} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{8} & 0 & 0 & 0 & \frac{\sqrt{7}i}{24} & 0 & 0 & 0 \end{bmatrix} $  |
| 649 | symmetry                       | $ -\frac{\sqrt{14}(x^6-15x^4z^2+15x^2z^4+y^6-15y^4z^2+15y^2z^4-2z^6)}{8} $ $ \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{231}i}{264} & 0 & 0 & 0 & \frac{\sqrt{77}i}{88} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{385}i}{88} & 0 & 0 & 0 & -\frac{\sqrt{1155}i}{264} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{5\sqrt{462}i}{264} & 0 & 0 & 0 & \frac{\sqrt{330}i}{264} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{330}i}{264} & 0 & 0 & 0 & -\frac{5\sqrt{462}i}{264} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{1155}i}{264} & 0 & 0 & 0 & \frac{\sqrt{385}i}{88} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{77}i}{88} & 0 & 0 & 0 & -\frac{\sqrt{231}i}{264} & 0 & 0 \end{bmatrix} $ |
| 650 | symmetry                       | $ \frac{\sqrt{42}(x-y)(x+y)(x^4-9x^2y^2-5x^2z^2+y^4-5y^2z^2+5z^4)}{8} $   |

continued ...

Table 9

| No. | multipole                          | matrix   |   |   |   |   |   |                             |                             |                             |   |                            |                            |                            |   |
|-----|------------------------------------|--|---|---|---|---|---|-----------------------------|-----------------------------|-----------------------------|---|----------------------------|----------------------------|----------------------------|---|
|     | $\mathbb{G}_{6,1}^{(1,-1;a)}(E)$   | 0  | 0 | 0 | 0 | 0 | 0 | 0                           | 0                           | 0                           | 0 | 0                          | 0                          | 0                          | 0 |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | 0                           | 0                           | 0                           | 0 | 0                          | 0                          | 0                          | 0 |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | 0                           | 0                           | 0                           | 0 | 0                          | 0                          | 0                          | 0 |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | 0                           | 0                           | 0                           | 0 | 0                          | 0                          | 0                          | 0 |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | 0                           | 0                           | $\frac{\sqrt{385}i}{264}$   | 0 | 0                          | 0                          | $\frac{\sqrt{11}i}{8}$     |   |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{55}i}{264}$   | 0                           | 0                           | 0 | $-\frac{5\sqrt{77}i}{264}$ | 0                          | 0                          | 0 |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{770}i}{264}$   | 0                           | 0                           | 0 | $\frac{\sqrt{2310}i}{264}$ | 0                          | 0                          |   |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | 0                           | $-\frac{\sqrt{2310}i}{264}$ | 0                           | 0 | 0                          | $-\frac{\sqrt{770}i}{264}$ | 0                          |   |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | 0                           | 0                           | $\frac{5\sqrt{77}i}{264}$   | 0 | 0                          | 0                          | $\frac{\sqrt{55}i}{264}$   |   |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{11}i}{8}$     | 0                           | 0                           | 0 | $-\frac{\sqrt{385}i}{264}$ | 0                          | 0                          | 0 |
| 651 | symmetry                           | $\frac{3\sqrt{7}yz(y-z)(y+z)(10x^2-y^2-z^2)}{4}$ |   |   |   |   |   |                             |                             |                             |   |                            |                            |                            |   |
|     | $\mathbb{G}_{6,0}^{(1,-1;a)}(T_1)$ | 0  | 0 | 0 | 0 | 0 | 0 | 0                           | 0                           | 0                           | 0 | 0                          | 0                          | 0                          | 0 |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | 0                           | 0                           | 0                           | 0 | 0                          | 0                          | 0                          | 0 |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | 0                           | 0                           | 0                           | 0 | 0                          | 0                          | 0                          | 0 |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | 0                           | 0                           | 0                           | 0 | 0                          | 0                          | 0                          | 0 |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{66}}{1056}$    | 0                           | $\frac{\sqrt{154}}{352}$    | 0 | $-\frac{\sqrt{2310}}{352}$ | 0                          | $-\frac{\sqrt{462}}{96}$   | 0 |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2310}}{1056}$ | 0                           | $-\frac{5\sqrt{462}}{1056}$ | 0 | $\frac{3\sqrt{770}}{352}$  | 0                          | $\frac{\sqrt{330}}{96}$    |   |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}}{176}$   | 0                           | $\frac{\sqrt{385}}{176}$    | 0 | $\frac{5\sqrt{231}}{528}$  | 0                          | $-\frac{\sqrt{1155}}{176}$ | 0 |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{1155}}{176}$   | 0                           | $-\frac{5\sqrt{231}}{528}$  | 0 | $-\frac{\sqrt{385}}{176}$  | 0                          | $\frac{\sqrt{165}}{176}$   |   |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{330}}{96}$    | 0                           | $-\frac{3\sqrt{770}}{352}$  | 0 | $\frac{5\sqrt{462}}{1056}$ | 0                          | $\frac{\sqrt{2310}}{1056}$ | 0 |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{462}}{96}$     | 0                           | $\frac{\sqrt{2310}}{352}$   | 0 | $-\frac{\sqrt{154}}{352}$  | 0                          | $-\frac{\sqrt{66}}{1056}$  |   |
| 652 | symmetry                           | $\frac{3\sqrt{7}xz(x-z)(x+z)(x^2-10y^2+z^2)}{4}$ |   |   |   |   |   |                             |                             |                             |   |                            |                            |                            |   |

continued ...

Table 9

| No. | multipole                          | matrix  |   |   |   |   |   |                              |                            |                             |   |                             |                            |                              |   |
|-----|------------------------------------|---|---|---|---|---|---|------------------------------|----------------------------|-----------------------------|---|-----------------------------|----------------------------|------------------------------|---|
|     | $\mathbb{G}_{6,1}^{(1,-1;a)}(T_1)$ | 0   | 0 | 0 | 0 | 0 | 0 | 0                            | 0                          | 0                           | 0 | 0                           | 0                          | 0                            | 0 |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | 0                            | 0                          | 0                           | 0 | 0                           | 0                          | 0                            | 0 |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | 0                            | 0                          | 0                           | 0 | 0                           | 0                          | 0                            | 0 |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | 0                            | 0                          | 0                           | 0 | 0                           | 0                          | 0                            | 0 |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{66}i}{1056}$    | 0                          | $-\frac{\sqrt{154}i}{352}$  | 0 | $-\frac{\sqrt{2310}i}{352}$ | 0                          | $\frac{\sqrt{462}i}{96}$     | 0 |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2310}i}{1056}$ | 0                          | $\frac{5\sqrt{462}i}{1056}$ | 0 | $\frac{3\sqrt{770}i}{352}$  | 0                          | $-\frac{\sqrt{330}i}{96}$    | 0 |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{165}i}{176}$    | 0                          | $\frac{\sqrt{385}i}{176}$   | 0 | $-\frac{5\sqrt{231}i}{528}$ | 0                          | $-\frac{\sqrt{1155}i}{176}$  | 0 |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155}i}{176}$  | 0                          | $-\frac{5\sqrt{231}i}{528}$ | 0 | $\frac{\sqrt{385}i}{176}$   | 0                          | $\frac{\sqrt{165}i}{176}$    | 0 |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{330}i}{96}$    | 0                          | $\frac{3\sqrt{770}i}{352}$  | 0 | $\frac{5\sqrt{462}i}{1056}$ | 0                          | $-\frac{\sqrt{2310}i}{1056}$ | 0 |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{462}i}{96}$     | 0                          | $-\frac{\sqrt{2310}i}{352}$ | 0 | $-\frac{\sqrt{154}i}{352}$  | 0                          | $\frac{\sqrt{66}i}{1056}$    | 0 |
| 653 | symmetry                           | $-\frac{3\sqrt{7}xy(x-y)(x+y)(x^2+y^2-10z^2)}{4}$ |   |   |   |   |   |                              |                            |                             |   |                             |                            |                              |   |
|     | $\mathbb{G}_{6,2}^{(1,-1;a)}(T_1)$ | 0   | 0 | 0 | 0 | 0 | 0 | 0                            | 0                          | 0                           | 0 | 0                           | 0                          | 0                            | 0 |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | 0                            | 0                          | 0                           | 0 | 0                           | 0                          | 0                            | 0 |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | 0                            | 0                          | 0                           | 0 | 0                           | 0                          | 0                            | 0 |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | 0                            | 0                          | 0                           | 0 | 0                           | 0                          | 0                            | 0 |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | 0                            | 0                          | 0                           | 0 | $\frac{\sqrt{154}}{44}$     | 0                          | 0                            | 0 |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | 0                            | 0                          | 0                           | 0 | 0                           | $-\frac{\sqrt{2310}}{132}$ | 0                            | 0 |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | 0                            | 0                          | 0                           | 0 | 0                           | 0                          | $\frac{\sqrt{165}}{66}$      | 0 |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{165}}{66}$      | 0                          | 0                           | 0 | 0                           | 0                          | 0                            | 0 |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | 0                            | $-\frac{\sqrt{2310}}{132}$ | 0                           | 0 | 0                           | 0                          | 0                            | 0 |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | 0                            | 0                          | $\frac{\sqrt{154}}{44}$     | 0 | 0                           | 0                          | 0                            | 0 |
| 654 | symmetry                           | $\frac{\sqrt{462}yz(y^2-3z^2)(3y^2-z^2)}{16}$     |   |   |   |   |   |                              |                            |                             |   |                             |                            |                              |   |

continued ...

Table 9

| No. | multipole                             | matrix   |
|-----|---------------------------------------|--|
|     | $\mathbb{G}_{6,0}^{(1,-1;a)}(T_2, 1)$ | $ \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{64} & 0 & \frac{\sqrt{21}}{64} & 0 & \frac{\sqrt{35}}{64} & 0 & \frac{\sqrt{7}}{64} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}}{64} & 0 & -\frac{5\sqrt{7}}{64} & 0 & -\frac{\sqrt{105}}{64} & 0 & -\frac{\sqrt{5}}{64} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}}{64} & 0 & \frac{\sqrt{210}}{64} & 0 & \frac{5\sqrt{14}}{64} & 0 & \frac{\sqrt{70}}{64} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}}{64} & 0 & -\frac{5\sqrt{14}}{64} & 0 & -\frac{\sqrt{210}}{64} & 0 & -\frac{\sqrt{10}}{64} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{64} & 0 & \frac{\sqrt{105}}{64} & 0 & \frac{5\sqrt{7}}{64} & 0 & \frac{\sqrt{35}}{64} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{64} & 0 & -\frac{\sqrt{35}}{64} & 0 & -\frac{\sqrt{21}}{64} & 0 & -\frac{1}{64} & 0 \end{bmatrix} $   |
| 655 | symmetry                              | $ \frac{\sqrt{462}xz(x^2-3z^2)(3x^2-z^2)}{16} $ $ \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{i}{64} & 0 & \frac{\sqrt{21}i}{64} & 0 & -\frac{\sqrt{35}i}{64} & 0 & \frac{\sqrt{7}i}{64} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{35}i}{64} & 0 & -\frac{5\sqrt{7}i}{64} & 0 & \frac{\sqrt{105}i}{64} & 0 & -\frac{\sqrt{5}i}{64} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}i}{64} & 0 & -\frac{\sqrt{210}i}{64} & 0 & \frac{5\sqrt{14}i}{64} & 0 & -\frac{\sqrt{70}i}{64} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{70}i}{64} & 0 & \frac{5\sqrt{14}i}{64} & 0 & -\frac{\sqrt{210}i}{64} & 0 & \frac{\sqrt{10}i}{64} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}i}{64} & 0 & \frac{\sqrt{105}i}{64} & 0 & -\frac{5\sqrt{7}i}{64} & 0 & \frac{\sqrt{35}i}{64} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}i}{64} & 0 & -\frac{\sqrt{35}i}{64} & 0 & \frac{\sqrt{21}i}{64} & 0 & -\frac{i}{64} & 0 \end{bmatrix} $ |
| 656 | symmetry                              | $ \frac{\sqrt{462}xy(x^2-3y^2)(3x^2-y^2)}{16} $  |

continued ...



Table 9

| No. | multipole                             | matrix  |
|-----|---------------------------------------|---|
|     | $\mathbb{G}_{6,2}^{(1,-1;a)}(T_2, 1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{2} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$   |
| 657 | symmetry                              | $\frac{\sqrt{210}yz(16x^4-16x^2y^2-16x^2z^2+y^4+2y^2z^2+z^4)}{16}$ $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{55}}{2112} & 0 & \frac{\sqrt{1155}}{2112} & 0 & -\frac{9\sqrt{77}}{704} & 0 & \frac{\sqrt{385}}{64} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{5\sqrt{77}}{2112} & 0 & -\frac{5\sqrt{385}}{2112} & 0 & \frac{9\sqrt{231}}{704} & 0 & -\frac{5\sqrt{11}}{64} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{9\sqrt{22}}{704} & 0 & \frac{5\sqrt{462}}{2112} & 0 & \frac{5\sqrt{770}}{2112} & 0 & -\frac{9\sqrt{154}}{704} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{9\sqrt{154}}{704} & 0 & -\frac{5\sqrt{770}}{2112} & 0 & -\frac{5\sqrt{462}}{2112} & 0 & \frac{9\sqrt{22}}{704} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{5\sqrt{11}}{64} & 0 & -\frac{9\sqrt{231}}{704} & 0 & \frac{5\sqrt{385}}{2112} & 0 & \frac{5\sqrt{77}}{2112} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{385}}{64} & 0 & \frac{9\sqrt{77}}{704} & 0 & -\frac{\sqrt{1155}}{2112} & 0 & -\frac{\sqrt{55}}{2112} & 0 \end{bmatrix}$ |
| 658 | symmetry                              | $\frac{\sqrt{210}xz(x^4-16x^2y^2+2x^2z^2+16y^4-16y^2z^2+z^4)}{16}$  |

continued ...

Table 9

| No. | multipole                             | matrix   |
|-----|---------------------------------------|--|
|     | $\mathbb{G}_{6,1}^{(1,-1;a)}(T_2, 2)$ | $ \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{55}i}{2112} & 0 & \frac{\sqrt{1155}i}{2112} & 0 & \frac{9\sqrt{77}i}{704} & 0 & \frac{\sqrt{385}i}{64} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{5\sqrt{77}i}{2112} & 0 & -\frac{5\sqrt{385}i}{2112} & 0 & -\frac{9\sqrt{231}i}{704} & 0 & -\frac{5\sqrt{11}i}{64} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{9\sqrt{22}i}{704} & 0 & -\frac{5\sqrt{462}i}{2112} & 0 & \frac{5\sqrt{770}i}{2112} & 0 & \frac{9\sqrt{154}i}{704} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{9\sqrt{154}i}{704} & 0 & \frac{5\sqrt{770}i}{2112} & 0 & -\frac{5\sqrt{462}i}{2112} & 0 & -\frac{9\sqrt{22}i}{704} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{5\sqrt{11}i}{64} & 0 & -\frac{9\sqrt{231}i}{704} & 0 & -\frac{5\sqrt{385}i}{2112} & 0 & \frac{5\sqrt{77}i}{2112} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{385}i}{64} & 0 & \frac{9\sqrt{77}i}{704} & 0 & \frac{\sqrt{1155}i}{2112} & 0 & -\frac{\sqrt{55}i}{2112} & 0 \end{bmatrix} $ |
| 659 | symmetry                              | $ \frac{\sqrt{210}xy(x^4+2x^2y^2-16x^2z^2+y^4-16y^2z^2+16z^4)}{16} $ $ \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{77}}{66} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{11}}{66} & 0 & 0 & 0 & -\frac{\sqrt{385}}{66} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{154}}{66} & 0 & 0 & 0 & \frac{\sqrt{462}}{66} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{462}}{66} & 0 & 0 & 0 & -\frac{\sqrt{154}}{66} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{385}}{66} & 0 & 0 & 0 & \frac{\sqrt{11}}{66} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{77}}{66} & 0 & 0 & 0 & 0 \end{bmatrix} $  |
| 660 | symmetry                              | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$   |

continued ...

Table 9

| No. | multipole                       | matrix                         |                            |                            |                            |                            |                          |                          |                          |                           |                           |                           |                         |                          |                          |
|-----|---------------------------------|--------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|--------------------------|--------------------------|--------------------------|---------------------------|---------------------------|---------------------------|-------------------------|--------------------------|--------------------------|
|     | $\mathbb{G}_{2,0}^{(1,0;a)}(E)$ | 0                              | $\frac{\sqrt{15}i}{35}$    | 0                          | 0                          | 0                          | 0                        | 0                        | 0                        | $-\frac{\sqrt{6}i}{14}$   | 0                         | 0                         | 0                       | 0                        | 0                        |
|     |                                 | 0                              | 0                          | $\frac{\sqrt{10}i}{70}$    | 0                          | 0                          | 0                        | 0                        | 0                        | $-\frac{3\sqrt{30}i}{70}$ | 0                         | 0                         | 0                       | 0                        | 0                        |
|     |                                 | 0                              | 0                          | 0                          | $-\frac{\sqrt{10}i}{70}$   | 0                          | 0                        | 0                        | 0                        | 0                         | $-\frac{3\sqrt{30}i}{70}$ | 0                         | 0                       | 0                        | 0                        |
|     |                                 | 0                              | 0                          | 0                          | 0                          | $-\frac{\sqrt{15}i}{35}$   | 0                        | 0                        | 0                        | 0                         | 0                         | $-\frac{\sqrt{6}i}{14}$   | 0                       | 0                        | 0                        |
|     |                                 | $-\frac{\sqrt{15}i}{14}$       | 0                          | 0                          | 0                          | 0                          | 0                        | 0                        | $-\frac{\sqrt{10}i}{28}$ | 0                         | 0                         | 0                         | 0                       | 0                        | 0                        |
|     |                                 | 0                              | $\frac{\sqrt{15}i}{70}$    | 0                          | 0                          | 0                          | 0                        | 0                        | $-\frac{\sqrt{6}i}{28}$  | 0                         | 0                         | 0                         | 0                       | 0                        | 0                        |
|     |                                 | 0                              | 0                          | $\frac{2\sqrt{15}i}{35}$   | 0                          | 0                          | 0                        | 0                        | 0                        | $-\frac{\sqrt{5}i}{70}$   | 0                         | 0                         | 0                       | 0                        | 0                        |
|     |                                 | 0                              | 0                          | 0                          | $\frac{2\sqrt{15}i}{35}$   | 0                          | 0                        | 0                        | 0                        | 0                         | $\frac{\sqrt{5}i}{70}$    | 0                         | 0                       | 0                        | 0                        |
|     |                                 | 0                              | 0                          | 0                          | 0                          | $\frac{\sqrt{15}i}{70}$    | 0                        | 0                        | 0                        | 0                         | 0                         | $\frac{\sqrt{6}i}{28}$    | 0                       | 0                        | 0                        |
|     |                                 | 0                              | 0                          | 0                          | 0                          | 0                          | $-\frac{\sqrt{15}i}{14}$ | 0                        | 0                        | 0                         | 0                         | 0                         | $\frac{\sqrt{10}i}{28}$ | 0                        | 0                        |
| 661 | symmetry                        | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ |                            |                            |                            |                            |                          |                          |                          |                           |                           |                           |                         |                          |                          |
|     | $\mathbb{G}_{2,1}^{(1,0;a)}(E)$ | 0                              | 0                          | 0                          | $\frac{\sqrt{10}i}{70}$    | 0                          | 0                        | $-\frac{\sqrt{42}i}{28}$ | 0                        | 0                         | 0                         | $-\frac{\sqrt{30}i}{140}$ | 0                       | 0                        | 0                        |
|     |                                 | $-\frac{\sqrt{3}i}{21}$        | 0                          | 0                          | 0                          | $\frac{2\sqrt{15}i}{105}$  | 0                        | 0                        | $-\frac{3\sqrt{2}i}{28}$ | 0                         | 0                         | 0                         | $-\frac{\sqrt{6}i}{28}$ | 0                        | 0                        |
|     |                                 | 0                              | $-\frac{2\sqrt{15}i}{105}$ | 0                          | 0                          | 0                          | $\frac{\sqrt{3}i}{21}$   | 0                        | 0                        | $-\frac{\sqrt{6}i}{28}$   | 0                         | 0                         | 0                       | $-\frac{3\sqrt{2}i}{28}$ | 0                        |
|     |                                 | 0                              | 0                          | $-\frac{\sqrt{10}i}{70}$   | 0                          | 0                          | 0                        | 0                        | 0                        | 0                         | $-\frac{\sqrt{30}i}{140}$ | 0                         | 0                       | 0                        | $-\frac{\sqrt{42}i}{28}$ |
|     |                                 | 0                              | 0                          | $-\frac{3\sqrt{2}i}{28}$   | 0                          | 0                          | 0                        | 0                        | 0                        | 0                         | $-\frac{\sqrt{6}i}{84}$   | 0                         | 0                       | 0                        | 0                        |
|     |                                 | 0                              | 0                          | 0                          | $-\frac{9\sqrt{10}i}{140}$ | 0                          | 0                        | $\frac{\sqrt{42}i}{84}$  | 0                        | 0                         | 0                         | $-\frac{\sqrt{30}i}{105}$ | 0                       | 0                        | 0                        |
|     |                                 | $-\frac{3\sqrt{2}i}{28}$       | 0                          | 0                          | 0                          | $-\frac{9\sqrt{10}i}{140}$ | 0                        | 0                        | $\frac{\sqrt{3}i}{21}$   | 0                         | 0                         | 0                         | $-\frac{i}{14}$         | 0                        | 0                        |
|     |                                 | 0                              | $-\frac{9\sqrt{10}i}{140}$ | 0                          | 0                          | 0                          | $-\frac{3\sqrt{2}i}{28}$ | 0                        | 0                        | $\frac{i}{14}$            | 0                         | 0                         | 0                       | $-\frac{\sqrt{3}i}{21}$  | 0                        |
|     |                                 | 0                              | 0                          | $-\frac{9\sqrt{10}i}{140}$ | 0                          | 0                          | 0                        | 0                        | 0                        | 0                         | $\frac{\sqrt{30}i}{105}$  | 0                         | 0                       | 0                        | $-\frac{\sqrt{42}i}{84}$ |
|     |                                 | 0                              | 0                          | 0                          | $-\frac{3\sqrt{2}i}{28}$   | 0                          | 0                        | 0                        | 0                        | 0                         | 0                         | $\frac{\sqrt{6}i}{84}$    | 0                       | 0                        | 0                        |
| 662 | symmetry                        | $\sqrt{3}yz$                   |                            |                            |                            |                            |                          |                          |                          |                           |                           |                           |                         |                          |                          |

continued ...

Table 9

| No. | multipole                         | matrix           |                           |                           |                           |                          |                 |                           |                         |                          |                             |                             |                          |                         |                           |
|-----|-----------------------------------|------------------|---------------------------|---------------------------|---------------------------|--------------------------|-----------------|---------------------------|-------------------------|--------------------------|-----------------------------|-----------------------------|--------------------------|-------------------------|---------------------------|
|     | $\mathbb{G}_{2,0}^{(1,0;a)}(T_2)$ | $\frac{1}{14}$   | 0                         | $\frac{3\sqrt{10}}{140}$  | 0                         | 0                        | 0               | 0                         | $-\frac{\sqrt{6}}{14}$  | 0                        | $-\frac{\sqrt{30}}{70}$     | 0                           | 0                        | 0                       | 0                         |
|     |                                   | 0                | $-\frac{\sqrt{15}}{210}$  | 0                         | $\frac{\sqrt{30}}{84}$    | 0                        | 0               | 0                         | 0                       | $-\frac{\sqrt{6}}{14}$   | 0                           | $-\frac{3\sqrt{10}}{70}$    | 0                        | 0                       | 0                         |
|     |                                   | 0                | 0                         | $-\frac{\sqrt{30}}{84}$   | 0                         | $\frac{\sqrt{15}}{210}$  | 0               | 0                         | 0                       | 0                        | $-\frac{3\sqrt{10}}{70}$    | 0                           | $-\frac{\sqrt{6}}{14}$   | 0                       | 0                         |
|     |                                   | 0                | 0                         | 0                         | $-\frac{3\sqrt{10}}{140}$ | 0                        | $-\frac{1}{14}$ | 0                         | 0                       | 0                        | 0                           | $-\frac{\sqrt{30}}{70}$     | 0                        | $-\frac{\sqrt{6}}{14}$  | 0                         |
|     |                                   | 0                | $-\frac{3}{14}$           | 0                         | 0                         | 0                        | 0               | $-\frac{\sqrt{210}}{168}$ | 0                       | $-\frac{\sqrt{10}}{56}$  | 0                           | 0                           | 0                        | 0                       | 0                         |
|     |                                   | $\frac{3}{14}$   | 0                         | $-\frac{3\sqrt{10}}{70}$  | 0                         | 0                        | 0               | 0                         | $-\frac{\sqrt{6}}{168}$ | 0                        | $-\frac{11\sqrt{30}}{840}$  | 0                           | 0                        | 0                       | 0                         |
|     |                                   | 0                | $\frac{3\sqrt{10}}{70}$   | 0                         | 0                         | 0                        | 0               | 0                         | 0                       | $\frac{1}{28}$           | 0                           | $-\frac{\sqrt{15}}{60}$     | 0                        | 0                       | 0                         |
|     |                                   | 0                | 0                         | 0                         | 0                         | $\frac{3\sqrt{10}}{70}$  | 0               | 0                         | 0                       | 0                        | $\frac{\sqrt{15}}{60}$      | 0                           | $-\frac{1}{28}$          | 0                       | 0                         |
|     |                                   | 0                | 0                         | 0                         | $-\frac{3\sqrt{10}}{70}$  | 0                        | $\frac{3}{14}$  | 0                         | 0                       | 0                        | 0                           | $\frac{11\sqrt{30}}{840}$   | 0                        | $\frac{\sqrt{6}}{168}$  | 0                         |
|     |                                   | 0                | 0                         | 0                         | 0                         | $-\frac{3}{14}$          | 0               | 0                         | 0                       | 0                        | 0                           | 0                           | $\frac{\sqrt{10}}{56}$   | 0                       | $\frac{\sqrt{210}}{168}$  |
| 663 | symmetry                          | $\sqrt{3}xz$     |                           |                           |                           |                          |                 |                           |                         |                          |                             |                             |                          |                         |                           |
|     | $\mathbb{G}_{2,1}^{(1,0;a)}(T_2)$ | $-\frac{i}{14}$  | 0                         | $\frac{3\sqrt{10}i}{140}$ | 0                         | 0                        | 0               | 0                         | $\frac{\sqrt{6}i}{14}$  | 0                        | $-\frac{\sqrt{30}i}{70}$    | 0                           | 0                        | 0                       | 0                         |
|     |                                   | 0                | $\frac{\sqrt{15}i}{210}$  | 0                         | $\frac{\sqrt{30}i}{84}$   | 0                        | 0               | 0                         | 0                       | $\frac{\sqrt{6}i}{14}$   | 0                           | $-\frac{3\sqrt{10}i}{70}$   | 0                        | 0                       | 0                         |
|     |                                   | 0                | 0                         | $\frac{\sqrt{30}i}{84}$   | 0                         | $\frac{\sqrt{15}i}{210}$ | 0               | 0                         | 0                       | 0                        | $\frac{3\sqrt{10}i}{70}$    | 0                           | $-\frac{\sqrt{6}i}{14}$  | 0                       | 0                         |
|     |                                   | 0                | 0                         | 0                         | $\frac{3\sqrt{10}i}{140}$ | 0                        | $-\frac{i}{14}$ | 0                         | 0                       | 0                        | 0                           | $\frac{\sqrt{30}i}{70}$     | 0                        | $-\frac{\sqrt{6}i}{14}$ | 0                         |
|     |                                   | 0                | $-\frac{3i}{14}$          | 0                         | 0                         | 0                        | 0               | $\frac{\sqrt{210}i}{168}$ | 0                       | $-\frac{\sqrt{10}i}{56}$ | 0                           | 0                           | 0                        | 0                       | 0                         |
|     |                                   | $-\frac{3i}{14}$ | 0                         | $-\frac{3\sqrt{10}i}{70}$ | 0                         | 0                        | 0               | 0                         | $\frac{\sqrt{6}i}{168}$ | 0                        | $-\frac{11\sqrt{30}i}{840}$ | 0                           | 0                        | 0                       | 0                         |
|     |                                   | 0                | $-\frac{3\sqrt{10}i}{70}$ | 0                         | 0                         | 0                        | 0               | 0                         | 0                       | $-\frac{i}{28}$          | 0                           | $-\frac{\sqrt{15}i}{60}$    | 0                        | 0                       | 0                         |
|     |                                   | 0                | 0                         | 0                         | 0                         | $\frac{3\sqrt{10}i}{70}$ | 0               | 0                         | 0                       | 0                        | $-\frac{\sqrt{15}i}{60}$    | 0                           | $-\frac{i}{28}$          | 0                       | 0                         |
|     |                                   | 0                | 0                         | 0                         | $\frac{3\sqrt{10}i}{70}$  | 0                        | $\frac{3i}{14}$ | 0                         | 0                       | 0                        | 0                           | $-\frac{11\sqrt{30}i}{840}$ | 0                        | $\frac{\sqrt{6}i}{168}$ | 0                         |
|     |                                   | 0                | 0                         | 0                         | 0                         | $\frac{3i}{14}$          | 0               | 0                         | 0                       | 0                        | 0                           | 0                           | $-\frac{\sqrt{10}i}{56}$ | 0                       | $\frac{\sqrt{210}i}{168}$ |
| 664 | symmetry                          | $\sqrt{3}xy$     |                           |                           |                           |                          |                 |                           |                         |                          |                             |                             |                          |                         |                           |

continued ...

Table 9

| No. | multipole                         | matrix   |                             |                          |                           |                             |                           |                         |                           |                             |                          |                             |                           |                           |                         |
|-----|-----------------------------------|--|-----------------------------|--------------------------|---------------------------|-----------------------------|---------------------------|-------------------------|---------------------------|-----------------------------|--------------------------|-----------------------------|---------------------------|---------------------------|-------------------------|
|     | $\mathbb{G}_{2,2}^{(1,0;a)}(T_2)$ | 0  | 0                           | 0                        | $\frac{\sqrt{10}}{70}$    | 0                           | 0                         | $\frac{\sqrt{42}}{28}$  | 0                         | 0                           | 0                        | $-\frac{\sqrt{30}}{140}$    | 0                         | 0                         | 0                       |
|     |                                   | $\frac{\sqrt{3}}{21}$  | 0                           | 0                        | 0                         | $\frac{2\sqrt{15}}{105}$    | 0                         | 0                       | $\frac{3\sqrt{2}}{28}$    | 0                           | 0                        | 0                           | $-\frac{\sqrt{6}}{28}$    | 0                         | 0                       |
|     |                                   | 0  | $\frac{2\sqrt{15}}{105}$    | 0                        | 0                         | 0                           | $\frac{\sqrt{3}}{21}$     | 0                       | 0                         | $\frac{\sqrt{6}}{28}$       | 0                        | 0                           | 0                         | $-\frac{3\sqrt{2}}{28}$   | 0                       |
|     |                                   | 0  | 0                           | $\frac{\sqrt{10}}{70}$   | 0                         | 0                           | 0                         | 0                       | 0                         | 0                           | $\frac{\sqrt{30}}{140}$  | 0                           | 0                         | 0                         | $-\frac{\sqrt{42}}{28}$ |
|     |                                   | 0  | 0                           | $-\frac{3\sqrt{2}}{28}$  | 0                         | 0                           | 0                         | 0                       | 0                         | 0                           | $-\frac{\sqrt{6}}{84}$   | 0                           | 0                         | 0                         | 0                       |
|     |                                   | 0  | 0                           | 0                        | $-\frac{9\sqrt{10}}{140}$ | 0                           | 0                         | $-\frac{\sqrt{42}}{84}$ | 0                         | 0                           | 0                        | $-\frac{\sqrt{30}}{105}$    | 0                         | 0                         | 0                       |
|     |                                   | $\frac{3\sqrt{2}}{28}$   | 0                           | 0                        | 0                         | $-\frac{9\sqrt{10}}{140}$   | 0                         | 0                       | $-\frac{\sqrt{3}}{21}$    | 0                           | 0                        | 0                           | $-\frac{1}{14}$           | 0                         | 0                       |
|     |                                   | 0  | $\frac{9\sqrt{10}}{140}$    | 0                        | 0                         | 0                           | $-\frac{3\sqrt{2}}{28}$   | 0                       | 0                         | $-\frac{1}{14}$             | 0                        | 0                           | 0                         | $-\frac{\sqrt{3}}{21}$    | 0                       |
|     |                                   | 0  | 0                           | $\frac{9\sqrt{10}}{140}$ | 0                         | 0                           | 0                         | 0                       | 0                         | 0                           | $-\frac{\sqrt{30}}{105}$ | 0                           | 0                         | 0                         | $-\frac{\sqrt{42}}{84}$ |
|     |                                   | 0  | 0                           | 0                        | $\frac{3\sqrt{2}}{28}$    | 0                           | 0                         | 0                       | 0                         | 0                           | 0                        | $-\frac{\sqrt{6}}{84}$      | 0                         | 0                         | 0                       |
| 665 | symmetry                          | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$     |                             |                          |                           |                             |                           |                         |                           |                             |                          |                             |                           |                           |                         |
|     | $\mathbb{G}_4^{(1,0;a)}(A_1)$     | 0  | $-\frac{\sqrt{105}i}{840}$  | 0                        | 0                         | 0                           | $-\frac{\sqrt{21}i}{168}$ | 0                       | 0                         | $\frac{9\sqrt{42}i}{280}$   | 0                        | 0                           | 0                         | $\frac{9\sqrt{14}i}{280}$ | 0                       |
|     |                                   | 0  | 0                           | $\frac{\sqrt{70}i}{280}$ | 0                         | 0                           | 0                         | 0                       | 0                         | $-\frac{3\sqrt{210}i}{280}$ | 0                        | 0                           | 0                         | 0                         | $\frac{3\sqrt{6}i}{40}$ |
|     |                                   | 0  | 0                           | 0                        | $-\frac{\sqrt{70}i}{280}$ | 0                           | 0                         | $\frac{3\sqrt{6}i}{40}$ | 0                         | 0                           | 0                        | $-\frac{3\sqrt{210}i}{280}$ | 0                         | 0                         | 0                       |
|     |                                   | $\frac{\sqrt{21}i}{168}$                                       | 0                           | 0                        | 0                         | $\frac{\sqrt{105}i}{840}$   | 0                         | 0                       | $\frac{9\sqrt{14}i}{280}$ | 0                           | 0                        | 0                           | $\frac{9\sqrt{42}i}{280}$ | 0                         | 0                       |
|     |                                   | $\frac{\sqrt{105}i}{140}$                                      | 0                           | 0                        | 0                         | $\frac{\sqrt{21}i}{28}$     | 0                         | 0                       | $\frac{\sqrt{70}i}{280}$  | 0                           | 0                        | 0                           | $\frac{\sqrt{210}i}{840}$ | 0                         | 0                       |
|     |                                   | 0  | $-\frac{3\sqrt{105}i}{140}$ | 0                        | 0                         | 0                           | $\frac{\sqrt{21}i}{28}$   | 0                       | 0                         | $-\frac{\sqrt{42}i}{210}$   | 0                        | 0                           | 0                         | $\frac{\sqrt{14}i}{140}$  | 0                       |
|     |                                   | 0  | 0                           | $\frac{\sqrt{105}i}{70}$ | 0                         | 0                           | 0                         | 0                       | 0                         | $-\frac{\sqrt{35}i}{280}$   | 0                        | 0                           | 0                         | 0                         | $\frac{i}{40}$          |
|     |                                   | 0  | 0                           | 0                        | $\frac{\sqrt{105}i}{70}$  | 0                           | 0                         | $-\frac{i}{40}$         | 0                         | 0                           | 0                        | $\frac{\sqrt{35}i}{280}$    | 0                         | 0                         | 0                       |
|     |                                   | $\frac{\sqrt{21}i}{28}$  | 0                           | 0                        | 0                         | $-\frac{3\sqrt{105}i}{140}$ | 0                         | 0                       | $-\frac{\sqrt{14}i}{140}$ | 0                           | 0                        | 0                           | $\frac{\sqrt{42}i}{210}$  | 0                         | 0                       |
|     |                                   | 0  | $\frac{\sqrt{21}i}{28}$     | 0                        | 0                         | 0                           | $\frac{\sqrt{105}i}{140}$ | 0                       | 0                         | $-\frac{\sqrt{210}i}{840}$  | 0                        | 0                           | 0                         | $-\frac{\sqrt{70}i}{280}$ | 0                       |
| 666 | symmetry                          | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ |                             |                          |                           |                             |                           |                         |                           |                             |                          |                             |                           |                           |                         |

continued ...

Table 9

| No. | multipole                       | matrix                                       |                          |                            |                            |                          |                            |                              |                             |                             |                            |                            |                             |                             |                              |
|-----|---------------------------------|--|--------------------------|----------------------------|----------------------------|--------------------------|----------------------------|------------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|------------------------------|
|     | $\mathbb{G}_{4,0}^{(1,0;a)}(E)$ | 0  | $-\frac{\sqrt{3}i}{168}$ | 0                          | 0                          | 0                        | $\frac{\sqrt{15}i}{120}$   | 0                            | 0                           | $\frac{9\sqrt{30}i}{280}$   | 0                          | 0                          | 0                           | $-\frac{9\sqrt{10}i}{200}$  | 0                            |
|     |                                 | 0  | 0                        | $\frac{\sqrt{2}i}{56}$     | 0                          | 0                        | 0                          | 0                            | 0                           | 0                           | $-\frac{3\sqrt{6}i}{56}$   | 0                          | 0                           | 0                           | $-\frac{3\sqrt{210}i}{200}$  |
|     |                                 | 0  | 0                        | 0                          | $-\frac{\sqrt{2}i}{56}$    | 0                        | 0                          | $-\frac{3\sqrt{210}i}{200}$  | 0                           | 0                           | 0                          | $-\frac{3\sqrt{6}i}{56}$   | 0                           | 0                           | 0                            |
|     |                                 | $-\frac{\sqrt{15}i}{120}$                    | 0                        | 0                          | 0                          | $\frac{\sqrt{3}i}{168}$  | 0                          | 0                            | $-\frac{9\sqrt{10}i}{200}$  | 0                           | 0                          | 0                          | $\frac{9\sqrt{30}i}{280}$   | 0                           | 0                            |
|     |                                 | $\frac{\sqrt{3}i}{28}$                       | 0                        | 0                          | 0                          | $-\frac{\sqrt{15}i}{20}$ | 0                          | 0                            | $\frac{\sqrt{2}i}{56}$      | 0                           | 0                          | 0                          | $-\frac{\sqrt{6}i}{120}$    | 0                           | 0                            |
|     |                                 | 0  | $-\frac{3\sqrt{3}i}{28}$ | 0                          | 0                          | 0                        | $-\frac{\sqrt{15}i}{20}$   | 0                            | 0                           | $-\frac{\sqrt{30}i}{210}$   | 0                          | 0                          | 0                           | $-\frac{\sqrt{10}i}{100}$   | 0                            |
|     |                                 | 0  | 0                        | $\frac{\sqrt{3}i}{14}$     | 0                          | 0                        | 0                          | 0                            | 0                           | 0                           | $-\frac{i}{56}$            | 0                          | 0                           | 0                           | $-\frac{\sqrt{35}i}{200}$    |
|     |                                 | 0  | 0                        | 0                          | $\frac{\sqrt{3}i}{14}$     | 0                        | 0                          | $\frac{\sqrt{35}i}{200}$     | 0                           | 0                           | 0                          | $\frac{i}{56}$             | 0                           | 0                           | 0                            |
|     |                                 | $-\frac{\sqrt{15}i}{20}$                     | 0                        | 0                          | 0                          | $-\frac{3\sqrt{3}i}{28}$ | 0                          | 0                            | $\frac{\sqrt{10}i}{100}$    | 0                           | 0                          | 0                          | $\frac{\sqrt{30}i}{210}$    | 0                           | 0                            |
|     |                                 | 0  | $-\frac{\sqrt{15}i}{20}$ | 0                          | 0                          | 0                        | $\frac{\sqrt{3}i}{28}$     | 0                            | 0                           | $\frac{\sqrt{6}i}{120}$     | 0                          | 0                          | 0                           | $-\frac{\sqrt{2}i}{56}$     | 0                            |
| 667 | symmetry                        | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ |                          |                            |                            |                          |                            |                              |                             |                             |                            |                            |                             |                             |                              |
|     | $\mathbb{G}_{4,1}^{(1,0;a)}(E)$ | 0  | 0                        | 0                          | $\frac{\sqrt{2}i}{56}$     | 0                        | 0                          | $-\frac{9\sqrt{210}i}{1400}$ | 0                           | 0                           | 0                          | $-\frac{27\sqrt{6}i}{280}$ | 0                           | 0                           | 0                            |
|     |                                 | $-\frac{\sqrt{15}i}{280}$                    | 0                        | 0                          | 0                          | $-\frac{\sqrt{3}i}{56}$  | 0                          | 0                            | $\frac{99\sqrt{10}i}{1400}$ | 0                           | 0                          | 0                          | $-\frac{9\sqrt{30}i}{1400}$ | 0                           | 0                            |
|     |                                 | 0  | $\frac{\sqrt{3}i}{56}$   | 0                          | 0                          | 0                        | $\frac{\sqrt{15}i}{280}$   | 0                            | 0                           | $-\frac{9\sqrt{30}i}{1400}$ | 0                          | 0                          | 0                           | $\frac{99\sqrt{10}i}{1400}$ | 0                            |
|     |                                 | 0  | 0                        | $-\frac{\sqrt{2}i}{56}$    | 0                          | 0                        | 0                          | 0                            | 0                           | 0                           | $-\frac{27\sqrt{6}i}{280}$ | 0                          | 0                           | 0                           | $-\frac{9\sqrt{210}i}{1400}$ |
|     |                                 | 0  | 0                        | $-\frac{9\sqrt{10}i}{140}$ | 0                          | 0                        | 0                          | 0                            | 0                           | 0                           | $-\frac{\sqrt{30}i}{140}$  | 0                          | 0                           | 0                           | 0                            |
|     |                                 | 0  | 0                        | 0                          | $\frac{3\sqrt{2}i}{28}$    | 0                        | 0                          | $\frac{3\sqrt{210}i}{1400}$  | 0                           | 0                           | 0                          | $-\frac{\sqrt{6}i}{280}$   | 0                           | 0                           | 0                            |
|     |                                 | $-\frac{9\sqrt{10}i}{140}$                   | 0                        | 0                          | 0                          | $\frac{3\sqrt{2}i}{28}$  | 0                          | 0                            | $-\frac{9\sqrt{15}i}{1400}$ | 0                           | 0                          | 0                          | $\frac{17\sqrt{5}i}{1400}$  | 0                           | 0                            |
|     |                                 | 0  | $\frac{3\sqrt{2}i}{28}$  | 0                          | 0                          | 0                        | $-\frac{9\sqrt{10}i}{140}$ | 0                            | 0                           | $-\frac{17\sqrt{5}i}{1400}$ | 0                          | 0                          | 0                           | $\frac{9\sqrt{15}i}{1400}$  | 0                            |
|     |                                 | 0  | 0                        | $\frac{3\sqrt{2}i}{28}$    | 0                          | 0                        | 0                          | 0                            | 0                           | 0                           | $\frac{\sqrt{6}i}{280}$    | 0                          | 0                           | 0                           | $-\frac{3\sqrt{210}i}{1400}$ |
|     |                                 | 0  | 0                        | 0                          | $-\frac{9\sqrt{10}i}{140}$ | 0                        | 0                          | 0                            | 0                           | 0                           | 0                          | $\frac{\sqrt{30}i}{140}$   | 0                           | 0                           | 0                            |
| 668 | symmetry                        | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$            |                          |                            |                            |                          |                            |                              |                             |                             |                            |                            |                             |                             |                              |

continued ...

Table 9

| No. | multipole                         | matrix                             |                           |                           |                            |                            |                             |                            |                               |                             |                             |                             |                              |                              |                           |
|-----|-----------------------------------|------------------------------------|---------------------------|---------------------------|----------------------------|----------------------------|-----------------------------|----------------------------|-------------------------------|-----------------------------|-----------------------------|-----------------------------|------------------------------|------------------------------|---------------------------|
|     | $\mathbb{G}_{4,0}^{(1,0;a)}(T_1)$ | $\frac{\sqrt{35}}{1120}$           | 0                         | $\frac{\sqrt{14}}{224}$   | 0                          | $\frac{\sqrt{7}}{224}$     | 0                           | 0                          | $-\frac{27\sqrt{210}}{2800}$  | 0                           | $-\frac{9\sqrt{42}}{280}$   | 0                           | $-\frac{27\sqrt{70}}{2800}$  | 0                            | 0                         |
|     |                                   | 0                                  | $-\frac{\sqrt{21}}{224}$  | 0                         | $-\frac{\sqrt{42}}{224}$   | 0                          | $-\frac{\sqrt{105}}{1120}$  | $\frac{9\sqrt{10}}{400}$   | 0                             | $\frac{9\sqrt{210}}{700}$   | 0                           | $\frac{9\sqrt{14}}{560}$    | 0                            | $-\frac{9\sqrt{70}}{1400}$   | 0                         |
|     |                                   | $\frac{\sqrt{105}}{1120}$          | 0                         | $\frac{\sqrt{42}}{224}$   | 0                          | $\frac{\sqrt{21}}{224}$    | 0                           | 0                          | $-\frac{9\sqrt{70}}{1400}$    | 0                           | $\frac{9\sqrt{14}}{560}$    | 0                           | $\frac{9\sqrt{210}}{700}$    | 0                            | $\frac{9\sqrt{10}}{400}$  |
|     |                                   | 0                                  | $-\frac{\sqrt{7}}{224}$   | 0                         | $-\frac{\sqrt{14}}{224}$   | 0                          | $-\frac{\sqrt{35}}{1120}$   | 0                          | 0                             | $-\frac{27\sqrt{70}}{2800}$ | 0                           | $-\frac{9\sqrt{42}}{280}$   | 0                            | $-\frac{27\sqrt{210}}{2800}$ | 0                         |
|     |                                   | 0                                  | $-\frac{3\sqrt{35}}{140}$ | 0                         | $-\frac{3\sqrt{70}}{280}$  | 0                          | 0                           | $-\frac{\sqrt{6}}{160}$    | 0                             | $-\frac{\sqrt{14}}{112}$    | 0                           | $-\frac{\sqrt{210}}{1120}$  | 0                            | 0                            | 0                         |
|     |                                   | $\frac{3\sqrt{35}}{140}$           | 0                         | $\frac{3\sqrt{14}}{56}$   | 0                          | 0                          | 0                           | 0                          | $\frac{13\sqrt{210}}{5600}$   | 0                           | $\frac{\sqrt{42}}{560}$     | 0                           | $-\frac{\sqrt{70}}{800}$     | 0                            | 0                         |
|     |                                   | 0                                  | $-\frac{3\sqrt{14}}{56}$  | 0                         | 0                          | 0                          | $\frac{3\sqrt{70}}{280}$    | $-\frac{3\sqrt{15}}{800}$  | 0                             | $-\frac{\sqrt{35}}{5600}$   | 0                           | $\frac{\sqrt{21}}{160}$     | 0                            | $\frac{\sqrt{105}}{5600}$    | 0                         |
|     |                                   | $\frac{3\sqrt{70}}{280}$           | 0                         | 0                         | 0                          | $-\frac{3\sqrt{14}}{56}$   | 0                           | 0                          | $-\frac{\sqrt{105}}{5600}$    | 0                           | $-\frac{\sqrt{21}}{160}$    | 0                           | $\frac{\sqrt{35}}{5600}$     | 0                            | $\frac{3\sqrt{15}}{800}$  |
|     |                                   | 0                                  | 0                         | 0                         | $\frac{3\sqrt{14}}{56}$    | 0                          | $\frac{3\sqrt{35}}{140}$    | 0                          | 0                             | $\frac{\sqrt{70}}{800}$     | 0                           | $-\frac{\sqrt{42}}{560}$    | 0                            | $-\frac{13\sqrt{210}}{5600}$ | 0                         |
|     |                                   | 0                                  | 0                         | $-\frac{3\sqrt{70}}{280}$ | 0                          | $-\frac{3\sqrt{35}}{140}$  | 0                           | 0                          | 0                             | 0                           | $\frac{\sqrt{210}}{1120}$   | 0                           | $\frac{\sqrt{14}}{112}$      | 0                            | $\frac{\sqrt{6}}{160}$    |
| 669 | symmetry                          | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ |                           |                           |                            |                            |                             |                            |                               |                             |                             |                             |                              |                              |                           |
|     | $\mathbb{G}_{4,1}^{(1,0;a)}(T_1)$ | $\frac{\sqrt{35}i}{1120}$          | 0                         | $-\frac{\sqrt{14}i}{224}$ | 0                          | $\frac{\sqrt{7}i}{224}$    | 0                           | 0                          | $-\frac{27\sqrt{210}i}{2800}$ | 0                           | $\frac{9\sqrt{42}i}{280}$   | 0                           | $-\frac{27\sqrt{70}i}{2800}$ | 0                            | 0                         |
|     |                                   | 0                                  | $-\frac{\sqrt{21}i}{224}$ | 0                         | $\frac{\sqrt{42}i}{224}$   | 0                          | $-\frac{\sqrt{105}i}{1120}$ | $-\frac{9\sqrt{10}i}{400}$ | 0                             | $\frac{9\sqrt{210}i}{700}$  | 0                           | $-\frac{9\sqrt{14}i}{560}$  | 0                            | $-\frac{9\sqrt{70}i}{1400}$  | 0                         |
|     |                                   | $-\frac{\sqrt{105}i}{1120}$        | 0                         | $\frac{\sqrt{42}i}{224}$  | 0                          | $-\frac{\sqrt{21}i}{224}$  | 0                           | 0                          | $\frac{9\sqrt{70}i}{1400}$    | 0                           | $\frac{9\sqrt{14}i}{560}$   | 0                           | $-\frac{9\sqrt{210}i}{700}$  | 0                            | $\frac{9\sqrt{10}i}{400}$ |
|     |                                   | 0                                  | $\frac{\sqrt{7}i}{224}$   | 0                         | $-\frac{\sqrt{14}i}{224}$  | 0                          | $\frac{\sqrt{35}i}{1120}$   | 0                          | 0                             | $\frac{27\sqrt{70}i}{2800}$ | 0                           | $-\frac{9\sqrt{42}i}{280}$  | 0                            | $\frac{27\sqrt{210}i}{2800}$ | 0                         |
|     |                                   | 0                                  | $\frac{3\sqrt{35}i}{140}$ | 0                         | $-\frac{3\sqrt{70}i}{280}$ | 0                          | 0                           | $-\frac{\sqrt{6}i}{160}$   | 0                             | $\frac{\sqrt{14}i}{112}$    | 0                           | $-\frac{\sqrt{210}i}{1120}$ | 0                            | 0                            | 0                         |
|     |                                   | $\frac{3\sqrt{35}i}{140}$          | 0                         | $-\frac{3\sqrt{14}i}{56}$ | 0                          | 0                          | 0                           | 0                          | $\frac{13\sqrt{210}i}{5600}$  | 0                           | $-\frac{\sqrt{42}i}{560}$   | 0                           | $-\frac{\sqrt{70}i}{800}$    | 0                            | 0                         |
|     |                                   | 0                                  | $-\frac{3\sqrt{14}i}{56}$ | 0                         | 0                          | 0                          | $\frac{3\sqrt{70}i}{280}$   | $\frac{3\sqrt{15}i}{800}$  | 0                             | $-\frac{\sqrt{35}i}{5600}$  | 0                           | $-\frac{\sqrt{21}i}{160}$   | 0                            | $\frac{\sqrt{105}i}{5600}$   | 0                         |
|     |                                   | $-\frac{3\sqrt{70}i}{280}$         | 0                         | 0                         | 0                          | $\frac{3\sqrt{14}i}{56}$   | 0                           | 0                          | $\frac{\sqrt{105}i}{5600}$    | 0                           | $-\frac{\sqrt{21}i}{160}$   | 0                           | $-\frac{\sqrt{35}i}{5600}$   | 0                            | $\frac{3\sqrt{15}i}{800}$ |
|     |                                   | 0                                  | 0                         | 0                         | $\frac{3\sqrt{14}i}{56}$   | 0                          | $-\frac{3\sqrt{35}i}{140}$  | 0                          | 0                             | $-\frac{\sqrt{70}i}{800}$   | 0                           | $-\frac{\sqrt{42}i}{560}$   | 0                            | $\frac{13\sqrt{210}i}{5600}$ | 0                         |
|     |                                   | 0                                  | 0                         | $\frac{3\sqrt{70}i}{280}$ | 0                          | $-\frac{3\sqrt{35}i}{140}$ | 0                           | 0                          | 0                             | 0                           | $-\frac{\sqrt{210}i}{1120}$ | 0                           | $\frac{\sqrt{14}i}{112}$     | 0                            | $-\frac{\sqrt{6}i}{160}$  |
| 670 | symmetry                          | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$  |                           |                           |                            |                            |                             |                            |                               |                             |                             |                             |                              |                              |                           |

continued ...

Table 9

| No. | multipole                         | matrix                                |                          |                         |                         |                          |                          |                           |                             |                           |                          |                          |                           |                             |                            |
|-----|-----------------------------------|---------------------------------------|--------------------------|-------------------------|-------------------------|--------------------------|--------------------------|---------------------------|-----------------------------|---------------------------|--------------------------|--------------------------|---------------------------|-----------------------------|----------------------------|
|     | $\mathbb{G}_{4,2}^{(1,0;a)}(T_1)$ | 0                                     | 0                        | 0                       | 0                       | 0                        | $-\frac{\sqrt{35}}{140}$ | 0                         | 0                           | 0                         | 0                        | 0                        | 0                         | $\frac{9\sqrt{210}}{700}$   | 0                          |
|     |                                   | 0                                     | 0                        | 0                       | 0                       | 0                        | 0                        | 0                         | 0                           | 0                         | 0                        | 0                        | 0                         | 0                           | $\frac{9\sqrt{10}}{100}$   |
|     |                                   | 0                                     | 0                        | 0                       | 0                       | 0                        | 0                        | $-\frac{9\sqrt{10}}{100}$ | 0                           | 0                         | 0                        | 0                        | 0                         | 0                           | 0                          |
|     |                                   | $-\frac{\sqrt{35}}{140}$              | 0                        | 0                       | 0                       | 0                        | 0                        | 0                         | $-\frac{9\sqrt{210}}{700}$  | 0                         | 0                        | 0                        | 0                         | 0                           | 0                          |
|     |                                   | 0                                     | 0                        | 0                       | 0                       | $\frac{3\sqrt{35}}{70}$  | 0                        | 0                         | 0                           | 0                         | 0                        | 0                        | $\frac{\sqrt{14}}{140}$   | 0                           | 0                          |
|     |                                   | 0                                     | 0                        | 0                       | 0                       | 0                        | $\frac{3\sqrt{35}}{70}$  | 0                         | 0                           | 0                         | 0                        | 0                        | 0                         | $\frac{\sqrt{210}}{350}$    | 0                          |
|     |                                   | 0                                     | 0                        | 0                       | 0                       | 0                        | 0                        | 0                         | 0                           | 0                         | 0                        | 0                        | 0                         | 0                           | $\frac{\sqrt{15}}{100}$    |
|     |                                   | 0                                     | 0                        | 0                       | 0                       | 0                        | 0                        | $\frac{\sqrt{15}}{100}$   | 0                           | 0                         | 0                        | 0                        | 0                         | 0                           | 0                          |
|     |                                   | $-\frac{3\sqrt{35}}{70}$              | 0                        | 0                       | 0                       | 0                        | 0                        | 0                         | $\frac{\sqrt{210}}{350}$    | 0                         | 0                        | 0                        | 0                         | 0                           | 0                          |
|     |                                   | 0                                     | $-\frac{3\sqrt{35}}{70}$ | 0                       | 0                       | 0                        | 0                        | 0                         | 0                           | $\frac{\sqrt{14}}{140}$   | 0                        | 0                        | 0                         | 0                           | 0                          |
| 671 | symmetry                          | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$  |                          |                         |                         |                          |                          |                           |                             |                           |                          |                          |                           |                             |                            |
|     | $\mathbb{G}_{4,0}^{(1,0;a)}(T_2)$ | $\frac{\sqrt{5}}{1120}$               | 0                        | $\frac{\sqrt{2}}{224}$  | 0                       | $-\frac{1}{32}$          | 0                        | 0                         | $-\frac{27\sqrt{30}}{2800}$ | 0                         | $-\frac{9\sqrt{6}}{280}$ | 0                        | $\frac{27\sqrt{10}}{400}$ | 0                           | 0                          |
|     |                                   | 0                                     | $-\frac{\sqrt{3}}{224}$  | 0                       | $-\frac{\sqrt{6}}{224}$ | 0                        | $\frac{\sqrt{15}}{160}$  | $-\frac{9\sqrt{70}}{400}$ | 0                           | $\frac{9\sqrt{30}}{700}$  | 0                        | $\frac{9\sqrt{2}}{560}$  | 0                         | $\frac{9\sqrt{10}}{200}$    | 0                          |
|     |                                   | $-\frac{\sqrt{15}}{160}$              | 0                        | $\frac{\sqrt{6}}{224}$  | 0                       | $\frac{\sqrt{3}}{224}$   | 0                        | 0                         | $\frac{9\sqrt{10}}{200}$    | 0                         | $\frac{9\sqrt{2}}{560}$  | 0                        | $\frac{9\sqrt{30}}{700}$  | 0                           | $-\frac{9\sqrt{70}}{400}$  |
|     |                                   | 0                                     | $\frac{1}{32}$           | 0                       | $-\frac{\sqrt{2}}{224}$ | 0                        | $-\frac{\sqrt{5}}{1120}$ | 0                         | 0                           | $\frac{27\sqrt{10}}{400}$ | 0                        | $-\frac{9\sqrt{6}}{280}$ | 0                         | $-\frac{27\sqrt{30}}{2800}$ | 0                          |
|     |                                   | 0                                     | $-\frac{3\sqrt{5}}{140}$ | 0                       | $\frac{3\sqrt{10}}{40}$ | 0                        | 0                        | $-\frac{\sqrt{42}}{1120}$ | 0                           | $-\frac{\sqrt{2}}{112}$   | 0                        | $\frac{\sqrt{30}}{160}$  | 0                         | 0                           | 0                          |
|     |                                   | $\frac{3\sqrt{5}}{140}$               | 0                        | $\frac{3\sqrt{2}}{56}$  | 0                       | 0                        | 0                        | 0                         | $\frac{13\sqrt{30}}{5600}$  | 0                         | $\frac{\sqrt{6}}{560}$   | 0                        | $\frac{7\sqrt{10}}{800}$  | 0                           | 0                          |
|     |                                   | 0                                     | $-\frac{3\sqrt{2}}{56}$  | 0                       | 0                       | 0                        | $-\frac{3\sqrt{10}}{40}$ | $\frac{3\sqrt{105}}{800}$ | 0                           | $-\frac{\sqrt{5}}{5600}$  | 0                        | $\frac{\sqrt{3}}{160}$   | 0                         | $-\frac{\sqrt{15}}{800}$    | 0                          |
|     |                                   | $-\frac{3\sqrt{10}}{40}$              | 0                        | 0                       | 0                       | $-\frac{3\sqrt{2}}{56}$  | 0                        | 0                         | $\frac{\sqrt{15}}{800}$     | 0                         | $-\frac{\sqrt{3}}{160}$  | 0                        | $\frac{\sqrt{5}}{5600}$   | 0                           | $-\frac{3\sqrt{105}}{800}$ |
|     |                                   | 0                                     | 0                        | 0                       | $\frac{3\sqrt{2}}{56}$  | 0                        | $\frac{3\sqrt{5}}{140}$  | 0                         | 0                           | $-\frac{7\sqrt{10}}{800}$ | 0                        | $-\frac{\sqrt{6}}{560}$  | 0                         | $-\frac{13\sqrt{30}}{5600}$ | 0                          |
|     |                                   | 0                                     | 0                        | $\frac{3\sqrt{10}}{40}$ | 0                       | $-\frac{3\sqrt{5}}{140}$ | 0                        | 0                         | 0                           | 0                         | $-\frac{\sqrt{30}}{160}$ | 0                        | $\frac{\sqrt{2}}{112}$    | 0                           | $\frac{\sqrt{42}}{1120}$   |
| 672 | symmetry                          | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ |                          |                         |                         |                          |                          |                           |                             |                           |                          |                          |                           |                             |                            |

continued ...



Table 9

| No.                               | multipole | matrix                                |                           |                          |                           |                          |                           |                             |                              |                            |                           |                           |                             |                              |                            |
|-----------------------------------|-----------|---------------------------------------|---------------------------|--------------------------|---------------------------|--------------------------|---------------------------|-----------------------------|------------------------------|----------------------------|---------------------------|---------------------------|-----------------------------|------------------------------|----------------------------|
| $\mathbb{G}_{4,1}^{(1,0;a)}(T_2)$ |           | $-\frac{\sqrt{5}i}{1120}$             | 0                         | $\frac{\sqrt{2}i}{224}$  | 0                         | $\frac{i}{32}$           | 0                         | 0                           | $\frac{27\sqrt{30}i}{2800}$  | 0                          | $-\frac{9\sqrt{6}i}{280}$ | 0                         | $-\frac{27\sqrt{10}i}{400}$ | 0                            | 0                          |
|                                   |           | 0                                     | $\frac{\sqrt{3}i}{224}$   | 0                        | $-\frac{\sqrt{6}i}{224}$  | 0                        | $-\frac{\sqrt{15}i}{160}$ | $-\frac{9\sqrt{70}i}{400}$  | 0                            | $-\frac{9\sqrt{30}i}{700}$ | 0                         | $\frac{9\sqrt{2}i}{560}$  | 0                           | $-\frac{9\sqrt{10}i}{200}$   | 0                          |
|                                   |           | $-\frac{\sqrt{15}i}{160}$             | 0                         | $-\frac{\sqrt{6}i}{224}$ | 0                         | $\frac{\sqrt{3}i}{224}$  | 0                         | 0                           | $\frac{9\sqrt{10}i}{200}$    | 0                          | $-\frac{9\sqrt{2}i}{560}$ | 0                         | $\frac{9\sqrt{30}i}{700}$   | 0                            | $\frac{9\sqrt{70}i}{400}$  |
|                                   |           | 0                                     | $\frac{i}{32}$            | 0                        | $\frac{\sqrt{2}i}{224}$   | 0                        | $-\frac{\sqrt{5}i}{1120}$ | 0                           | 0                            | $\frac{27\sqrt{10}i}{400}$ | 0                         | $\frac{9\sqrt{6}i}{280}$  | 0                           | $-\frac{27\sqrt{30}i}{2800}$ | 0                          |
|                                   |           | 0                                     | $-\frac{3\sqrt{5}i}{140}$ | 0                        | $-\frac{3\sqrt{10}i}{40}$ | 0                        | 0                         | $\frac{\sqrt{42}i}{1120}$   | 0                            | $-\frac{\sqrt{2}i}{112}$   | 0                         | $-\frac{\sqrt{30}i}{160}$ | 0                           | 0                            | 0                          |
|                                   |           | $-\frac{3\sqrt{5}i}{140}$             | 0                         | $\frac{3\sqrt{2}i}{56}$  | 0                         | 0                        | 0                         | 0                           | $-\frac{13\sqrt{30}i}{5600}$ | 0                          | $\frac{\sqrt{6}i}{560}$   | 0                         | $-\frac{7\sqrt{10}i}{800}$  | 0                            | 0                          |
|                                   |           | 0                                     | $\frac{3\sqrt{2}i}{56}$   | 0                        | 0                         | 0                        | $\frac{3\sqrt{10}i}{40}$  | $\frac{3\sqrt{105}i}{800}$  | 0                            | $\frac{\sqrt{5}i}{5600}$   | 0                         | $\frac{\sqrt{3}i}{160}$   | 0                           | $\frac{\sqrt{15}i}{800}$     | 0                          |
|                                   |           | $-\frac{3\sqrt{10}i}{40}$             | 0                         | 0                        | 0                         | $-\frac{3\sqrt{2}i}{56}$ | 0                         | 0                           | $\frac{\sqrt{15}i}{800}$     | 0                          | $\frac{\sqrt{3}i}{160}$   | 0                         | $\frac{\sqrt{5}i}{5600}$    | 0                            | $\frac{3\sqrt{105}i}{800}$ |
|                                   |           | 0                                     | 0                         | 0                        | $-\frac{3\sqrt{2}i}{56}$  | 0                        | $\frac{3\sqrt{5}i}{140}$  | 0                           | 0                            | $-\frac{7\sqrt{10}i}{800}$ | 0                         | $\frac{\sqrt{6}i}{560}$   | 0                           | $-\frac{13\sqrt{30}i}{5600}$ | 0                          |
|                                   |           | 0                                     | 0                         | $\frac{3\sqrt{10}i}{40}$ | 0                         | $\frac{3\sqrt{5}i}{140}$ | 0                         | 0                           | 0                            | $-\frac{\sqrt{30}i}{160}$  | 0                         | $-\frac{\sqrt{2}i}{112}$  | 0                           | $\frac{\sqrt{42}i}{1120}$    |                            |
| 673                               | symmetry  | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ |                           |                          |                           |                          |                           |                             |                              |                            |                           |                           |                             |                              |                            |
| $\mathbb{G}_{4,2}^{(1,0;a)}(T_2)$ |           | 0                                     | 0                         | 0                        | $-\frac{\sqrt{2}}{56}$    | 0                        | 0                         | $-\frac{9\sqrt{210}}{1400}$ | 0                            | 0                          | 0                         | $\frac{27\sqrt{6}}{280}$  | 0                           | 0                            | 0                          |
|                                   |           | $-\frac{\sqrt{15}}{280}$              | 0                         | 0                        | 0                         | $\frac{\sqrt{3}}{56}$    | 0                         | 0                           | $\frac{99\sqrt{10}}{1400}$   | 0                          | 0                         | 0                         | $\frac{9\sqrt{30}}{1400}$   | 0                            | 0                          |
|                                   |           | 0                                     | $\frac{\sqrt{3}}{56}$     | 0                        | 0                         | 0                        | $-\frac{\sqrt{15}}{280}$  | 0                           | 0                            | $-\frac{9\sqrt{30}}{1400}$ | 0                         | 0                         | 0                           | $-\frac{99\sqrt{10}}{1400}$  | 0                          |
|                                   |           | 0                                     | 0                         | $-\frac{\sqrt{2}}{56}$   | 0                         | 0                        | 0                         | 0                           | 0                            | $-\frac{27\sqrt{6}}{280}$  | 0                         | 0                         | 0                           | 0                            | $\frac{9\sqrt{210}}{1400}$ |
|                                   |           | 0                                     | 0                         | $\frac{9\sqrt{10}}{140}$ | 0                         | 0                        | 0                         | 0                           | 0                            | $\frac{\sqrt{30}}{140}$    | 0                         | 0                         | 0                           | 0                            | 0                          |
|                                   |           | 0                                     | 0                         | 0                        | $-\frac{3\sqrt{2}}{28}$   | 0                        | 0                         | $\frac{3\sqrt{210}}{1400}$  | 0                            | 0                          | 0                         | $\frac{\sqrt{6}}{280}$    | 0                           | 0                            | 0                          |
|                                   |           | $-\frac{9\sqrt{10}}{140}$             | 0                         | 0                        | 0                         | $-\frac{3\sqrt{2}}{28}$  | 0                         | 0                           | $-\frac{9\sqrt{15}}{1400}$   | 0                          | 0                         | 0                         | $-\frac{17\sqrt{5}}{1400}$  | 0                            | 0                          |
|                                   |           | 0                                     | $\frac{3\sqrt{2}}{28}$    | 0                        | 0                         | 0                        | $\frac{9\sqrt{10}}{140}$  | 0                           | 0                            | $-\frac{17\sqrt{5}}{1400}$ | 0                         | 0                         | 0                           | $-\frac{9\sqrt{15}}{1400}$   | 0                          |
|                                   |           | 0                                     | 0                         | $\frac{3\sqrt{2}}{28}$   | 0                         | 0                        | 0                         | 0                           | 0                            | $\frac{\sqrt{6}}{280}$     | 0                         | 0                         | 0                           | 0                            | $\frac{3\sqrt{210}}{1400}$ |
|                                   |           | 0                                     | 0                         | 0                        | $-\frac{9\sqrt{10}}{140}$ | 0                        | 0                         | 0                           | 0                            | 0                          | 0                         | $\frac{\sqrt{30}}{140}$   | 0                           | 0                            | 0                          |
| 674                               | symmetry  | 1                                     |                           |                          |                           |                          |                           |                             |                              |                            |                           |                           |                             |                              |                            |

continued ...

Table 9

| No. | multipole                       | matrix                                 |                        |                         |                          |                        |                        |   |                            |                           |                           |                            |                        |   |   |   |
|-----|---------------------------------|--|------------------------|-------------------------|--------------------------|------------------------|------------------------|---|----------------------------|---------------------------|---------------------------|----------------------------|------------------------|---|---|---|
|     | $\mathbb{G}_0^{(1,1;a)}(A_1)$   | 0                                      | 0                      | 0                       | 0                        | 0                      | 0                      | 0 | 0                          | 0                         | 0                         | 0                          | 0                      | 0 | 0 | 0 |
|     |                                 | 0                                      | 0                      | 0                       | 0                        | 0                      | 0                      | 0 | 0                          | 0                         | 0                         | 0                          | 0                      | 0 | 0 | 0 |
|     |                                 | 0                                      | 0                      | 0                       | 0                        | 0                      | 0                      | 0 | 0                          | 0                         | 0                         | 0                          | 0                      | 0 | 0 | 0 |
|     |                                 | 0                                      | 0                      | 0                       | 0                        | 0                      | 0                      | 0 | 0                          | 0                         | 0                         | 0                          | 0                      | 0 | 0 | 0 |
|     |                                 | $-\frac{\sqrt{3}i}{6}$                 | 0                      | 0                       | 0                        | 0                      | 0                      | 0 | 0                          | 0                         | 0                         | 0                          | 0                      | 0 | 0 | 0 |
|     |                                 | 0                                      | $-\frac{\sqrt{3}i}{6}$ | 0                       | 0                        | 0                      | 0                      | 0 | 0                          | 0                         | 0                         | 0                          | 0                      | 0 | 0 | 0 |
|     |                                 | 0                                      | 0                      | $-\frac{\sqrt{3}i}{6}$  | 0                        | 0                      | 0                      | 0 | 0                          | 0                         | 0                         | 0                          | 0                      | 0 | 0 | 0 |
|     |                                 | 0                                      | 0                      | 0                       | $-\frac{\sqrt{3}i}{6}$   | 0                      | 0                      | 0 | 0                          | 0                         | 0                         | 0                          | 0                      | 0 | 0 | 0 |
|     |                                 | 0                                      | 0                      | 0                       | 0                        | $-\frac{\sqrt{3}i}{6}$ | 0                      | 0 | 0                          | 0                         | 0                         | 0                          | 0                      | 0 | 0 | 0 |
|     |                                 | 0                                      | 0                      | 0                       | 0                        | 0                      | $-\frac{\sqrt{3}i}{6}$ | 0 | 0                          | 0                         | 0                         | 0                          | 0                      | 0 | 0 | 0 |
| 675 | symmetry                        | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |                        |                         |                          |                        |                        |   |                            |                           |                           |                            |                        |   |   |   |
|     | $\mathbb{G}_{2,0}^{(1,1;a)}(E)$ | 0                                      | $\frac{12i}{35}$       | 0                       | 0                        | 0                      | 0                      | 0 | $-\frac{3\sqrt{10}i}{140}$ | 0                         | 0                         | 0                          | 0                      | 0 | 0 | 0 |
|     |                                 | 0                                      | 0                      | $\frac{2\sqrt{6}i}{35}$ | 0                        | 0                      | 0                      | 0 | 0                          | $-\frac{9\sqrt{2}i}{140}$ | 0                         | 0                          | 0                      | 0 | 0 | 0 |
|     |                                 | 0                                      | 0                      | 0                       | $-\frac{2\sqrt{6}i}{35}$ | 0                      | 0                      | 0 | 0                          | 0                         | $-\frac{9\sqrt{2}i}{140}$ | 0                          | 0                      | 0 | 0 | 0 |
|     |                                 | 0                                      | 0                      | 0                       | 0                        | $-\frac{12i}{35}$      | 0                      | 0 | 0                          | 0                         | 0                         | $-\frac{3\sqrt{10}i}{140}$ | 0                      | 0 | 0 | 0 |
|     |                                 | $\frac{3i}{14}$                        | 0                      | 0                       | 0                        | 0                      | 0                      | 0 | $-\frac{\sqrt{6}i}{21}$    | 0                         | 0                         | 0                          | 0                      | 0 | 0 | 0 |
|     |                                 | 0                                      | $-\frac{3i}{70}$       | 0                       | 0                        | 0                      | 0                      | 0 | $-\frac{\sqrt{10}i}{35}$   | 0                         | 0                         | 0                          | 0                      | 0 | 0 | 0 |
|     |                                 | 0                                      | 0                      | $-\frac{6i}{35}$        | 0                        | 0                      | 0                      | 0 | 0                          | $-\frac{2\sqrt{3}i}{105}$ | 0                         | 0                          | 0                      | 0 | 0 | 0 |
|     |                                 | 0                                      | 0                      | 0                       | $-\frac{6i}{35}$         | 0                      | 0                      | 0 | 0                          | 0                         | $\frac{2\sqrt{3}i}{105}$  | 0                          | 0                      | 0 | 0 | 0 |
|     |                                 | 0                                      | 0                      | 0                       | 0                        | $-\frac{3i}{70}$       | 0                      | 0 | 0                          | 0                         | 0                         | $\frac{\sqrt{10}i}{35}$    | 0                      | 0 | 0 | 0 |
|     |                                 | 0                                      | 0                      | 0                       | 0                        | 0                      | $\frac{3i}{14}$        | 0 | 0                          | 0                         | 0                         | 0                          | $\frac{\sqrt{6}i}{21}$ | 0 | 0 | 0 |
| 676 | symmetry                        | $\frac{\sqrt{3}(x-y)(x+y)}{2}$         |                        |                         |                          |                        |                        |   |                            |                           |                           |                            |                        |   |   |   |

continued ...

Table 9

| No. | multipole                         | matrix                    |                          |                           |                           |                          |                           |                            |                            |                            |                           |                           |                            |                            |                            |
|-----|-----------------------------------|---------------------------|--------------------------|---------------------------|---------------------------|--------------------------|---------------------------|----------------------------|----------------------------|----------------------------|---------------------------|---------------------------|----------------------------|----------------------------|----------------------------|
|     | $\mathbb{G}_{2,1}^{(1,1;a)}(E)$   | 0                         | 0                        | 0                         | $\frac{2\sqrt{6}i}{35}$   | 0                        | 0                         | $-\frac{3\sqrt{70}i}{280}$ | 0                          | 0                          | 0                         | $-\frac{3\sqrt{2}i}{280}$ | 0                          | 0                          | 0                          |
|     |                                   | $-\frac{4\sqrt{5}i}{35}$  | 0                        | 0                         | 0                         | $\frac{8i}{35}$          | 0                         | 0                          | $-\frac{3\sqrt{30}i}{280}$ | 0                          | 0                         | 0                         | $-\frac{3\sqrt{10}i}{280}$ | 0                          | 0                          |
|     |                                   | 0                         | $-\frac{8i}{35}$         | 0                         | 0                         | 0                        | $\frac{4\sqrt{5}i}{35}$   | 0                          | 0                          | $-\frac{3\sqrt{10}i}{280}$ | 0                         | 0                         | 0                          | $-\frac{3\sqrt{30}i}{280}$ | 0                          |
|     |                                   | 0                         | 0                        | $-\frac{2\sqrt{6}i}{35}$  | 0                         | 0                        | 0                         | 0                          | 0                          | $-\frac{3\sqrt{2}i}{280}$  | 0                         | 0                         | 0                          | 0                          | $-\frac{3\sqrt{70}i}{280}$ |
|     |                                   | 0                         | 0                        | $\frac{3\sqrt{30}i}{140}$ | 0                         | 0                        | 0                         | 0                          | 0                          | $-\frac{\sqrt{10}i}{105}$  | 0                         | 0                         | 0                          | 0                          | 0                          |
|     |                                   | 0                         | 0                        | 0                         | $\frac{9\sqrt{6}i}{140}$  | 0                        | 0                         | $\frac{\sqrt{70}i}{105}$   | 0                          | 0                          | 0                         | $-\frac{4\sqrt{2}i}{105}$ | 0                          | 0                          | 0                          |
|     |                                   | $\frac{3\sqrt{30}i}{140}$ | 0                        | 0                         | 0                         | $\frac{9\sqrt{6}i}{140}$ | 0                         | 0                          | $\frac{4\sqrt{5}i}{105}$   | 0                          | 0                         | 0                         | $-\frac{2\sqrt{15}i}{105}$ | 0                          | 0                          |
|     |                                   | 0                         | $\frac{9\sqrt{6}i}{140}$ | 0                         | 0                         | 0                        | $\frac{3\sqrt{30}i}{140}$ | 0                          | 0                          | $\frac{2\sqrt{15}i}{105}$  | 0                         | 0                         | 0                          | $-\frac{4\sqrt{5}i}{105}$  | 0                          |
|     |                                   | 0                         | 0                        | $\frac{9\sqrt{6}i}{140}$  | 0                         | 0                        | 0                         | 0                          | 0                          | $\frac{4\sqrt{2}i}{105}$   | 0                         | 0                         | 0                          | 0                          | $-\frac{\sqrt{70}i}{105}$  |
|     |                                   | 0                         | 0                        | 0                         | $\frac{3\sqrt{30}i}{140}$ | 0                        | 0                         | 0                          | 0                          | 0                          | $\frac{\sqrt{10}i}{105}$  | 0                         | 0                          | 0                          | 0                          |
| 677 | symmetry                          | $\sqrt{3}yz$              |                          |                           |                           |                          |                           |                            |                            |                            |                           |                           |                            |                            |                            |
|     | $\mathbb{G}_{2,0}^{(1,1;a)}(T_2)$ | $\frac{2\sqrt{15}}{35}$   | 0                        | $\frac{3\sqrt{6}}{35}$    | 0                         | 0                        | 0                         | 0                          | $-\frac{3\sqrt{10}}{140}$  | 0                          | $-\frac{3\sqrt{2}}{140}$  | 0                         | 0                          | 0                          | 0                          |
|     |                                   | 0                         | $-\frac{2}{35}$          | 0                         | $\frac{\sqrt{2}}{7}$      | 0                        | 0                         | 0                          | 0                          | $-\frac{3\sqrt{10}}{140}$  | 0                         | $-\frac{3\sqrt{6}}{140}$  | 0                          | 0                          | 0                          |
|     |                                   | 0                         | 0                        | $-\frac{\sqrt{2}}{7}$     | 0                         | $\frac{2}{35}$           | 0                         | 0                          | 0                          | 0                          | $-\frac{3\sqrt{6}}{140}$  | 0                         | $-\frac{3\sqrt{10}}{140}$  | 0                          | 0                          |
|     |                                   | 0                         | 0                        | 0                         | $-\frac{3\sqrt{6}}{35}$   | 0                        | $-\frac{2\sqrt{15}}{35}$  | 0                          | 0                          | 0                          | 0                         | $-\frac{3\sqrt{2}}{140}$  | 0                          | $-\frac{3\sqrt{10}}{140}$  | 0                          |
|     |                                   | 0                         | $\frac{3\sqrt{15}}{70}$  | 0                         | 0                         | 0                        | 0                         | $-\frac{\sqrt{14}}{42}$    | 0                          | $-\frac{\sqrt{6}}{42}$     | 0                         | 0                         | 0                          | 0                          | 0                          |
|     |                                   | $-\frac{3\sqrt{15}}{70}$  | 0                        | $\frac{3\sqrt{6}}{70}$    | 0                         | 0                        | 0                         | 0                          | $-\frac{\sqrt{10}}{210}$   | 0                          | $-\frac{11\sqrt{2}}{210}$ | 0                         | 0                          | 0                          | 0                          |
|     |                                   | 0                         | $-\frac{3\sqrt{6}}{70}$  | 0                         | 0                         | 0                        | 0                         | 0                          | 0                          | $\frac{\sqrt{15}}{105}$    | 0                         | $-\frac{1}{15}$           | 0                          | 0                          | 0                          |
|     |                                   | 0                         | 0                        | 0                         | 0                         | $-\frac{3\sqrt{6}}{70}$  | 0                         | 0                          | 0                          | 0                          | $\frac{1}{15}$            | 0                         | $-\frac{\sqrt{15}}{105}$   | 0                          | 0                          |
|     |                                   | 0                         | 0                        | 0                         | $\frac{3\sqrt{6}}{70}$    | 0                        | $-\frac{3\sqrt{15}}{70}$  | 0                          | 0                          | 0                          | 0                         | $\frac{11\sqrt{2}}{210}$  | 0                          | $\frac{\sqrt{10}}{210}$    | 0                          |
|     |                                   | 0                         | 0                        | 0                         | 0                         | $\frac{3\sqrt{15}}{70}$  | 0                         | 0                          | 0                          | 0                          | 0                         | 0                         | $\frac{\sqrt{6}}{42}$      | 0                          | $\frac{\sqrt{14}}{42}$     |
| 678 | symmetry                          | $\sqrt{3}xz$              |                          |                           |                           |                          |                           |                            |                            |                            |                           |                           |                            |                            |                            |

continued ...

Table 9

| No. | multipole                         | matrix   |                          |                          |                           |                           |                           |                          |                           |                           |                            |                            |                            |                            |                           |
|-----|-----------------------------------|--|--------------------------|--------------------------|---------------------------|---------------------------|---------------------------|--------------------------|---------------------------|---------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|
|     | $\mathbb{G}_{2,1}^{(1,1;a)}(T_2)$ | $-\frac{2\sqrt{15}i}{35}$                                  | 0                        | $\frac{3\sqrt{6}i}{35}$  | 0                         | 0                         | 0                         | 0                        | $\frac{3\sqrt{10}i}{140}$ | 0                         | $-\frac{3\sqrt{2}i}{140}$  | 0                          | 0                          | 0                          | 0                         |
|     |                                   | 0  | $\frac{2i}{35}$          | 0                        | $\frac{\sqrt{2}i}{7}$     | 0                         | 0                         | 0                        | 0                         | $\frac{3\sqrt{10}i}{140}$ | 0                          | $-\frac{3\sqrt{6}i}{140}$  | 0                          | 0                          | 0                         |
|     |                                   | 0  | 0                        | $\frac{\sqrt{2}i}{7}$    | 0                         | $\frac{2i}{35}$           | 0                         | 0                        | 0                         | 0                         | $\frac{3\sqrt{6}i}{140}$   | 0                          | $-\frac{3\sqrt{10}i}{140}$ | 0                          | 0                         |
|     |                                   | 0  | 0                        | 0                        | $\frac{3\sqrt{6}i}{35}$   | 0                         | $-\frac{2\sqrt{15}i}{35}$ | 0                        | 0                         | 0                         | 0                          | $\frac{3\sqrt{2}i}{140}$   | 0                          | $-\frac{3\sqrt{10}i}{140}$ | 0                         |
|     |                                   | 0  | $\frac{3\sqrt{15}i}{70}$ | 0                        | 0                         | 0                         | 0                         | $\frac{\sqrt{14}i}{42}$  | 0                         | $-\frac{\sqrt{6}i}{42}$   | 0                          | 0                          | 0                          | 0                          | 0                         |
|     |                                   | $\frac{3\sqrt{15}i}{70}$                                   | 0                        | $\frac{3\sqrt{6}i}{70}$  | 0                         | 0                         | 0                         | 0                        | $\frac{\sqrt{10}i}{210}$  | 0                         | $-\frac{11\sqrt{2}i}{210}$ | 0                          | 0                          | 0                          | 0                         |
|     |                                   | 0  | $\frac{3\sqrt{6}i}{70}$  | 0                        | 0                         | 0                         | 0                         | 0                        | $-\frac{\sqrt{15}i}{105}$ | 0                         | $-\frac{i}{15}$            | 0                          | 0                          | 0                          | 0                         |
|     |                                   | 0  | 0                        | 0                        | 0                         | $-\frac{3\sqrt{6}i}{70}$  | 0                         | 0                        | 0                         | 0                         | $-\frac{i}{15}$            | 0                          | $-\frac{\sqrt{15}i}{105}$  | 0                          | 0                         |
|     |                                   | 0  | 0                        | 0                        | $-\frac{3\sqrt{6}i}{70}$  | 0                         | $-\frac{3\sqrt{15}i}{70}$ | 0                        | 0                         | 0                         | 0                          | $-\frac{11\sqrt{2}i}{210}$ | 0                          | $\frac{\sqrt{10}i}{210}$   | 0                         |
|     |                                   | 0  | 0                        | 0                        | 0                         | $-\frac{3\sqrt{15}i}{70}$ | 0                         | 0                        | 0                         | 0                         | 0                          | 0                          | $-\frac{\sqrt{6}i}{42}$    | 0                          | $\frac{\sqrt{14}i}{42}$   |
| 679 | symmetry                          | $\sqrt{3}xy$   |                          |                          |                           |                           |                           |                          |                           |                           |                            |                            |                            |                            |                           |
|     | $\mathbb{G}_{2,2}^{(1,1;a)}(T_2)$ | 0  | 0                        | 0                        | $\frac{2\sqrt{6}}{35}$    | 0                         | 0                         | $\frac{3\sqrt{70}}{280}$ | 0                         | 0                         | 0                          | $-\frac{3\sqrt{2}}{280}$   | 0                          | 0                          | 0                         |
|     |                                   | $\frac{4\sqrt{5}}{35}$                                     | 0                        | 0                        | 0                         | $\frac{8}{35}$            | 0                         | 0                        | $\frac{3\sqrt{30}}{280}$  | 0                         | 0                          | 0                          | $-\frac{3\sqrt{10}}{280}$  | 0                          | 0                         |
|     |                                   | 0  | $\frac{8}{35}$           | 0                        | 0                         | 0                         | $\frac{4\sqrt{5}}{35}$    | 0                        | 0                         | $\frac{3\sqrt{10}}{280}$  | 0                          | 0                          | 0                          | $-\frac{3\sqrt{30}}{280}$  | 0                         |
|     |                                   | 0  | 0                        | $\frac{2\sqrt{6}}{35}$   | 0                         | 0                         | 0                         | 0                        | 0                         | 0                         | $\frac{3\sqrt{2}}{280}$    | 0                          | 0                          | 0                          | $-\frac{3\sqrt{70}}{280}$ |
|     |                                   | 0  | 0                        | $\frac{3\sqrt{30}}{140}$ | 0                         | 0                         | 0                         | 0                        | 0                         | 0                         | $-\frac{\sqrt{10}}{105}$   | 0                          | 0                          | 0                          | 0                         |
|     |                                   | 0  | 0                        | 0                        | $\frac{9\sqrt{6}}{140}$   | 0                         | 0                         | $-\frac{\sqrt{70}}{105}$ | 0                         | 0                         | 0                          | $-\frac{4\sqrt{2}}{105}$   | 0                          | 0                          | 0                         |
|     |                                   | $-\frac{3\sqrt{30}}{140}$                                  | 0                        | 0                        | 0                         | $\frac{9\sqrt{6}}{140}$   | 0                         | 0                        | $-\frac{4\sqrt{5}}{105}$  | 0                         | 0                          | 0                          | $-\frac{2\sqrt{15}}{105}$  | 0                          | 0                         |
|     |                                   | 0  | $-\frac{9\sqrt{6}}{140}$ | 0                        | 0                         | 0                         | $\frac{3\sqrt{30}}{140}$  | 0                        | 0                         | $-\frac{2\sqrt{15}}{105}$ | 0                          | 0                          | 0                          | $-\frac{4\sqrt{5}}{105}$   | 0                         |
|     |                                   | 0  | 0                        | $-\frac{9\sqrt{6}}{140}$ | 0                         | 0                         | 0                         | 0                        | 0                         | 0                         | $-\frac{4\sqrt{2}}{105}$   | 0                          | 0                          | 0                          | $-\frac{\sqrt{70}}{105}$  |
|     |                                   | 0  | 0                        | 0                        | $-\frac{3\sqrt{30}}{140}$ | 0                         | 0                         | 0                        | 0                         | 0                         | 0                          | $-\frac{\sqrt{10}}{105}$   | 0                          | 0                          | 0                         |
| 680 | symmetry                          | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$ |                          |                          |                           |                           |                           |                          |                           |                           |                            |                            |                            |                            |                           |

continued ...

Table 9

| No. | multipole                       | matrix   |                            |                            |                             |                            |                            |                             |                              |                             |                              |                             |                            |                              |                              |
|-----|---------------------------------|--|----------------------------|----------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------|------------------------------|-----------------------------|------------------------------|-----------------------------|----------------------------|------------------------------|------------------------------|
|     | $\mathbb{G}_4^{(1,1;a)}(A_1)$   | 0  | $-\frac{\sqrt{770}i}{210}$ | 0                          | 0                           | 0                          | $-\frac{\sqrt{154}i}{42}$  | 0                           | 0                            | $\frac{\sqrt{77}i}{140}$    | 0                            | 0                           | 0                          | $\frac{\sqrt{231}i}{420}$    | 0                            |
|     |                                 | 0  | 0                          | $\frac{\sqrt{1155}i}{105}$ | 0                           | 0                          | 0                          | 0                           | 0                            | 0                           | $-\frac{\sqrt{385}i}{420}$   | 0                           | 0                          | 0                            | $\frac{\sqrt{11}i}{60}$      |
|     |                                 | 0  | 0                          | 0                          | $-\frac{\sqrt{1155}i}{105}$ | 0                          | 0                          | $\frac{\sqrt{11}i}{60}$     | 0                            | 0                           | 0                            | $-\frac{\sqrt{385}i}{420}$  | 0                          | 0                            | 0                            |
|     |                                 | $\frac{\sqrt{154}i}{42}$                                       | 0                          | 0                          | 0                           | $\frac{\sqrt{770}i}{210}$  | 0                          | 0                           | $\frac{\sqrt{231}i}{420}$    | 0                           | 0                            | 0                           | $\frac{\sqrt{77}i}{140}$   | 0                            | 0                            |
|     |                                 | $-\frac{\sqrt{770}i}{840}$                                     | 0                          | 0                          | 0                           | $-\frac{\sqrt{154}i}{168}$ | 0                          | 0                           | $\frac{\sqrt{1155}i}{1155}$  | 0                           | 0                            | 0                           | $\frac{\sqrt{385}i}{1155}$ | 0                            | 0                            |
|     |                                 | 0  | $\frac{\sqrt{770}i}{280}$  | 0                          | 0                           | 0                          | $-\frac{\sqrt{154}i}{168}$ | 0                           | 0                            | $-\frac{4\sqrt{77}i}{1155}$ | 0                            | 0                           | 0                          | $\frac{2\sqrt{231}i}{1155}$  | 0                            |
|     |                                 | 0  | 0                          | $-\frac{\sqrt{770}i}{420}$ | 0                           | 0                          | 0                          | 0                           | 0                            | 0                           | $-\frac{\sqrt{2310}i}{2310}$ | 0                           | 0                          | 0                            | $\frac{\sqrt{66}i}{330}$     |
|     |                                 | 0  | 0                          | 0                          | $-\frac{\sqrt{770}i}{420}$  | 0                          | 0                          | $-\frac{\sqrt{66}i}{330}$   | 0                            | 0                           | 0                            | $\frac{\sqrt{2310}i}{2310}$ | 0                          | 0                            | 0                            |
|     |                                 | $-\frac{\sqrt{154}i}{168}$                                     | 0                          | 0                          | 0                           | $\frac{\sqrt{770}i}{280}$  | 0                          | 0                           | $-\frac{2\sqrt{231}i}{1155}$ | 0                           | 0                            | 0                           | $\frac{4\sqrt{77}i}{1155}$ | 0                            | 0                            |
|     |                                 | 0  | $-\frac{\sqrt{154}i}{168}$ | 0                          | 0                           | 0                          | $-\frac{\sqrt{770}i}{840}$ | 0                           | 0                            | $-\frac{\sqrt{385}i}{1155}$ | 0                            | 0                           | 0                          | $-\frac{\sqrt{1155}i}{1155}$ | 0                            |
| 681 | symmetry                        | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ |                            |                            |                             |                            |                            |                             |                              |                             |                              |                             |                            |                              |                              |
|     | $\mathbb{G}_{4,0}^{(1,1;a)}(E)$ | 0  | $-\frac{\sqrt{22}i}{42}$   | 0                          | 0                           | 0                          | $\frac{\sqrt{110}i}{30}$   | 0                           | 0                            | $\frac{\sqrt{55}i}{140}$    | 0                            | 0                           | 0                          | $-\frac{\sqrt{165}i}{300}$   | 0                            |
|     |                                 | 0  | 0                          | $\frac{\sqrt{33}i}{21}$    | 0                           | 0                          | 0                          | 0                           | 0                            | 0                           | $-\frac{\sqrt{11}i}{84}$     | 0                           | 0                          | 0                            | $-\frac{\sqrt{385}i}{300}$   |
|     |                                 | 0  | 0                          | 0                          | $-\frac{\sqrt{33}i}{21}$    | 0                          | 0                          | $-\frac{\sqrt{385}i}{300}$  | 0                            | 0                           | 0                            | $-\frac{\sqrt{11}i}{84}$    | 0                          | 0                            | 0                            |
|     |                                 | $-\frac{\sqrt{110}i}{30}$                                      | 0                          | 0                          | 0                           | $\frac{\sqrt{22}i}{42}$    | 0                          | 0                           | $-\frac{\sqrt{165}i}{300}$   | 0                           | 0                            | 0                           | $\frac{\sqrt{55}i}{140}$   | 0                            | 0                            |
|     |                                 | $-\frac{\sqrt{22}i}{168}$                                      | 0                          | 0                          | 0                           | $\frac{\sqrt{110}i}{120}$  | 0                          | 0                           | $\frac{\sqrt{33}i}{231}$     | 0                           | 0                            | 0                           | $-\frac{\sqrt{11}i}{165}$  | 0                            | 0                            |
|     |                                 | 0  | $\frac{\sqrt{22}i}{56}$    | 0                          | 0                           | 0                          | $\frac{\sqrt{110}i}{120}$  | 0                           | 0                            | $-\frac{4\sqrt{55}i}{1155}$ | 0                            | 0                           | 0                          | $-\frac{2\sqrt{165}i}{825}$  | 0                            |
|     |                                 | 0  | 0                          | $-\frac{\sqrt{22}i}{84}$   | 0                           | 0                          | 0                          | 0                           | 0                            | $-\frac{\sqrt{66}i}{462}$   | 0                            | 0                           | 0                          | 0                            | $-\frac{\sqrt{2310}i}{1650}$ |
|     |                                 | 0  | 0                          | 0                          | $-\frac{\sqrt{22}i}{84}$    | 0                          | 0                          | $\frac{\sqrt{2310}i}{1650}$ | 0                            | 0                           | 0                            | $\frac{\sqrt{66}i}{462}$    | 0                          | 0                            | 0                            |
|     |                                 | $\frac{\sqrt{110}i}{120}$                                      | 0                          | 0                          | 0                           | $\frac{\sqrt{22}i}{56}$    | 0                          | 0                           | $\frac{2\sqrt{165}i}{825}$   | 0                           | 0                            | 0                           | $\frac{4\sqrt{55}i}{1155}$ | 0                            | 0                            |
|     |                                 | 0  | $\frac{\sqrt{110}i}{120}$  | 0                          | 0                           | 0                          | $-\frac{\sqrt{22}i}{168}$  | 0                           | 0                            | $\frac{\sqrt{11}i}{165}$    | 0                            | 0                           | 0                          | $-\frac{\sqrt{33}i}{231}$    | 0                            |
| 682 | symmetry                        | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$                   |                            |                            |                             |                            |                            |                             |                              |                             |                              |                             |                            |                              |                              |

continued ...

Table 9

| No. | multipole                         | matrix                             |                           |                           |                           |                           |                            |                             |                              |                                |                           |                            |                               |                              |                              |
|-----|-----------------------------------|------------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|----------------------------|-----------------------------|------------------------------|--------------------------------|---------------------------|----------------------------|-------------------------------|------------------------------|------------------------------|
|     | $\mathbb{G}_{4,1}^{(1,1;a)}(E)$   | 0                                  | 0                         | 0                         | $\frac{\sqrt{33}i}{21}$   | 0                         | 0                          | $-\frac{\sqrt{385}i}{700}$  | 0                            | 0                              | 0                         | $-\frac{3\sqrt{11}i}{140}$ | 0                             | 0                            | 0                            |
|     |                                   | $-\frac{\sqrt{110}i}{70}$          | 0                         | 0                         | 0                         | $-\frac{\sqrt{22}i}{14}$  | 0                          | 0                           | $\frac{11\sqrt{165}i}{2100}$ | 0                              | 0                         | 0                          | $-\frac{\sqrt{55}i}{700}$     | 0                            | 0                            |
|     |                                   | 0                                  | $\frac{\sqrt{22}i}{14}$   | 0                         | 0                         | 0                         | $\frac{\sqrt{110}i}{70}$   | 0                           | 0                            | $-\frac{\sqrt{55}i}{700}$      | 0                         | 0                          | 0                             | $\frac{11\sqrt{165}i}{2100}$ | 0                            |
|     |                                   | 0                                  | 0                         | $-\frac{\sqrt{33}i}{21}$  | 0                         | 0                         | 0                          | 0                           | 0                            | $-\frac{3\sqrt{11}i}{140}$     | 0                         | 0                          | 0                             | 0                            | $-\frac{\sqrt{385}i}{700}$   |
|     |                                   | 0                                  | 0                         | $\frac{\sqrt{165}i}{140}$ | 0                         | 0                         | 0                          | 0                           | 0                            | $-\frac{2\sqrt{55}i}{385}$     | 0                         | 0                          | 0                             | 0                            | 0                            |
|     |                                   | 0                                  | 0                         | 0                         | $-\frac{\sqrt{33}i}{84}$  | 0                         | 0                          | $\frac{3\sqrt{385}i}{1925}$ | 0                            | 0                              | 0                         | $-\frac{\sqrt{11}i}{385}$  | 0                             | 0                            | 0                            |
|     |                                   | $\frac{\sqrt{165}i}{140}$          | 0                         | 0                         | 0                         | $-\frac{\sqrt{33}i}{84}$  | 0                          | 0                           | $-\frac{9\sqrt{110}i}{3850}$ | 0                              | 0                         | 0                          | $\frac{17\sqrt{330}i}{11550}$ | 0                            | 0                            |
|     |                                   | 0                                  | $-\frac{\sqrt{33}i}{84}$  | 0                         | 0                         | 0                         | $\frac{\sqrt{165}i}{140}$  | 0                           | 0                            | $-\frac{17\sqrt{330}i}{11550}$ | 0                         | 0                          | 0                             | $\frac{9\sqrt{110}i}{3850}$  | 0                            |
|     |                                   | 0                                  | 0                         | $-\frac{\sqrt{33}i}{84}$  | 0                         | 0                         | 0                          | 0                           | 0                            | $\frac{\sqrt{11}i}{385}$       | 0                         | 0                          | 0                             | 0                            | $-\frac{3\sqrt{385}i}{1925}$ |
|     |                                   | 0                                  | 0                         | 0                         | $\frac{\sqrt{165}i}{140}$ | 0                         | 0                          | 0                           | 0                            | 0                              | $\frac{2\sqrt{55}i}{385}$ | 0                          | 0                             | 0                            | 0                            |
| 683 | symmetry                          | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$  |                           |                           |                           |                           |                            |                             |                              |                                |                           |                            |                               |                              |                              |
|     | $\mathbb{G}_{4,0}^{(1,1;a)}(T_1)$ | $\frac{\sqrt{2310}}{840}$          | 0                         | $\frac{\sqrt{231}}{84}$   | 0                         | $\frac{\sqrt{462}}{168}$  | 0                          | 0                           | $-\frac{3\sqrt{385}}{1400}$  | 0                              | $-\frac{\sqrt{77}}{140}$  | 0                          | $-\frac{\sqrt{1155}}{1400}$   | 0                            | 0                            |
|     |                                   | 0                                  | $-\frac{\sqrt{154}}{56}$  | 0                         | $-\frac{\sqrt{77}}{28}$   | 0                         | $-\frac{\sqrt{770}}{280}$  | $\frac{\sqrt{165}}{600}$    | 0                            | $\frac{\sqrt{385}}{350}$       | 0                         | $\frac{\sqrt{231}}{840}$   | 0                             | $-\frac{\sqrt{1155}}{2100}$  | 0                            |
|     |                                   | $\frac{\sqrt{770}}{280}$           | 0                         | $\frac{\sqrt{77}}{28}$    | 0                         | $\frac{\sqrt{154}}{56}$   | 0                          | 0                           | $-\frac{\sqrt{1155}}{2100}$  | 0                              | $\frac{\sqrt{231}}{840}$  | 0                          | $\frac{\sqrt{385}}{350}$      | 0                            | $\frac{\sqrt{165}}{600}$     |
|     |                                   | 0                                  | $-\frac{\sqrt{462}}{168}$ | 0                         | $-\frac{\sqrt{231}}{84}$  | 0                         | $-\frac{\sqrt{2310}}{840}$ | 0                           | 0                            | $-\frac{\sqrt{1155}}{1400}$    | 0                         | $-\frac{\sqrt{77}}{140}$   | 0                             | $-\frac{3\sqrt{385}}{1400}$  | 0                            |
|     |                                   | 0                                  | $\frac{\sqrt{2310}}{840}$ | 0                         | $\frac{\sqrt{1155}}{840}$ | 0                         | 0                          | $-\frac{\sqrt{11}}{220}$    | 0                            | $-\frac{\sqrt{231}}{462}$      | 0                         | $-\frac{\sqrt{385}}{1540}$ | 0                             | 0                            | 0                            |
|     |                                   | $-\frac{\sqrt{2310}}{840}$         | 0                         | $-\frac{\sqrt{231}}{168}$ | 0                         | 0                         | 0                          | 0                           | $\frac{13\sqrt{385}}{7700}$  | 0                              | $\frac{\sqrt{77}}{770}$   | 0                          | $-\frac{\sqrt{1155}}{3300}$   | 0                            | 0                            |
|     |                                   | 0                                  | $\frac{\sqrt{231}}{168}$  | 0                         | 0                         | 0                         | $-\frac{\sqrt{1155}}{840}$ | $-\frac{3\sqrt{110}}{2200}$ | 0                            | $-\frac{\sqrt{2310}}{46200}$   | 0                         | $\frac{\sqrt{154}}{440}$   | 0                             | $\frac{\sqrt{770}}{15400}$   | 0                            |
|     |                                   | $-\frac{\sqrt{1155}}{840}$         | 0                         | 0                         | 0                         | $\frac{\sqrt{231}}{168}$  | 0                          | 0                           | $-\frac{\sqrt{770}}{15400}$  | 0                              | $-\frac{\sqrt{154}}{440}$ | 0                          | $\frac{\sqrt{2310}}{46200}$   | 0                            | $\frac{3\sqrt{110}}{2200}$   |
|     |                                   | 0                                  | 0                         | 0                         | $-\frac{\sqrt{231}}{168}$ | 0                         | $-\frac{\sqrt{2310}}{840}$ | 0                           | 0                            | $\frac{\sqrt{1155}}{3300}$     | 0                         | $-\frac{\sqrt{77}}{770}$   | 0                             | $-\frac{13\sqrt{385}}{7700}$ | 0                            |
|     |                                   | 0                                  | 0                         | $\frac{\sqrt{1155}}{840}$ | 0                         | $\frac{\sqrt{2310}}{840}$ | 0                          | 0                           | 0                            | 0                              | $\frac{\sqrt{385}}{1540}$ | 0                          | $\frac{\sqrt{231}}{462}$      | 0                            | $\frac{\sqrt{11}}{220}$      |
| 684 | symmetry                          | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ |                           |                           |                           |                           |                            |                             |                              |                                |                           |                            |                               |                              |                              |

continued ...

Table 9

| No.                               | multipole                   | matrix                               |                             |                            |                            |                             |                             |                              |                               |                             |                             |                               |                              |                             |  |
|-----------------------------------|-----------------------------|--------------------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|------------------------------|-------------------------------|-----------------------------|-----------------------------|-------------------------------|------------------------------|-----------------------------|--|
| $\mathbb{G}_{4,1}^{(1,1;a)}(T_1)$ | $\frac{\sqrt{2310i}}{840}$  | 0                                    | $-\frac{\sqrt{231i}}{84}$   | 0                          | $\frac{\sqrt{462i}}{168}$  | 0                           | 0                           | $-\frac{3\sqrt{385i}}{1400}$ | 0                             | $\frac{\sqrt{77i}}{140}$    | 0                           | $-\frac{\sqrt{1155i}}{1400}$  | 0                            | 0                           |  |
|                                   | 0                           | $-\frac{\sqrt{154i}}{56}$            | 0                           | $\frac{\sqrt{77i}}{28}$    | 0                          | $-\frac{\sqrt{770i}}{280}$  | $-\frac{\sqrt{165i}}{600}$  | 0                            | $\frac{\sqrt{385i}}{350}$     | 0                           | $-\frac{\sqrt{231i}}{840}$  | 0                             | $-\frac{\sqrt{1155i}}{2100}$ | 0                           |  |
|                                   | $-\frac{\sqrt{770i}}{280}$  | 0                                    | $\frac{\sqrt{77i}}{28}$     | 0                          | $-\frac{\sqrt{154i}}{56}$  | 0                           | 0                           | $\frac{\sqrt{1155i}}{2100}$  | 0                             | $\frac{\sqrt{231i}}{840}$   | 0                           | $-\frac{\sqrt{385i}}{350}$    | 0                            | $\frac{\sqrt{165i}}{600}$   |  |
|                                   | 0                           | $\frac{\sqrt{462i}}{168}$            | 0                           | $-\frac{\sqrt{231i}}{84}$  | 0                          | $\frac{\sqrt{2310i}}{840}$  | 0                           | 0                            | $\frac{\sqrt{1155i}}{1400}$   | 0                           | $-\frac{\sqrt{77i}}{140}$   | 0                             | $\frac{3\sqrt{385i}}{1400}$  | 0                           |  |
|                                   | 0                           | $-\frac{\sqrt{2310i}}{840}$          | 0                           | $\frac{\sqrt{1155i}}{840}$ | 0                          | 0                           | $-\frac{\sqrt{11i}}{220}$   | 0                            | $\frac{\sqrt{231i}}{462}$     | 0                           | $-\frac{\sqrt{385i}}{1540}$ | 0                             | 0                            | 0                           |  |
|                                   | $-\frac{\sqrt{2310i}}{840}$ | 0                                    | $\frac{\sqrt{231i}}{168}$   | 0                          | 0                          | 0                           | 0                           | $\frac{13\sqrt{385i}}{7700}$ | 0                             | $-\frac{\sqrt{77i}}{770}$   | 0                           | $-\frac{\sqrt{1155i}}{3300}$  | 0                            | 0                           |  |
|                                   | 0                           | $\frac{\sqrt{231i}}{168}$            | 0                           | 0                          | 0                          | $-\frac{\sqrt{1155i}}{840}$ | $\frac{3\sqrt{110i}}{2200}$ | 0                            | $-\frac{\sqrt{2310i}}{46200}$ | 0                           | $-\frac{\sqrt{154i}}{440}$  | 0                             | $\frac{\sqrt{770i}}{15400}$  | 0                           |  |
|                                   | $\frac{\sqrt{1155i}}{840}$  | 0                                    | 0                           | 0                          | $-\frac{\sqrt{231i}}{168}$ | 0                           | 0                           | $\frac{\sqrt{770i}}{15400}$  | 0                             | $-\frac{\sqrt{154i}}{440}$  | 0                           | $-\frac{\sqrt{2310i}}{46200}$ | 0                            | $\frac{3\sqrt{110i}}{2200}$ |  |
|                                   | 0                           | 0                                    | 0                           | $-\frac{\sqrt{231i}}{168}$ | 0                          | $\frac{\sqrt{2310i}}{840}$  | 0                           | 0                            | $-\frac{\sqrt{1155i}}{3300}$  | 0                           | $-\frac{\sqrt{77i}}{770}$   | 0                             | $\frac{13\sqrt{385i}}{7700}$ | 0                           |  |
|                                   | 0                           | 0                                    | $-\frac{\sqrt{1155i}}{840}$ | 0                          | $\frac{\sqrt{2310i}}{840}$ | 0                           | 0                           | 0                            | 0                             | $-\frac{\sqrt{385i}}{1540}$ | 0                           | $\frac{\sqrt{231i}}{462}$     | 0                            | $-\frac{\sqrt{11i}}{220}$   |  |
| 685                               | symmetry                    | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$    |                             |                            |                            |                             |                             |                              |                               |                             |                             |                               |                              |                             |  |
| $\mathbb{G}_{4,2}^{(1,1;a)}(T_1)$ | 0                           | 0                                    | 0                           | 0                          | 0                          | $-\frac{\sqrt{2310}}{105}$  | 0                           | 0                            | 0                             | 0                           | 0                           | 0                             | $\frac{\sqrt{385}}{350}$     | 0                           |  |
|                                   | 0                           | 0                                    | 0                           | 0                          | 0                          | 0                           | 0                           | 0                            | 0                             | 0                           | 0                           | 0                             | 0                            | $\frac{\sqrt{165}}{150}$    |  |
|                                   | 0                           | 0                                    | 0                           | 0                          | 0                          | 0                           | $-\frac{\sqrt{165}}{150}$   | 0                            | 0                             | 0                           | 0                           | 0                             | 0                            | 0                           |  |
|                                   | $-\frac{\sqrt{2310}}{105}$  | 0                                    | 0                           | 0                          | 0                          | 0                           | 0                           | $-\frac{\sqrt{385}}{350}$    | 0                             | 0                           | 0                           | 0                             | 0                            | 0                           |  |
|                                   | 0                           | 0                                    | 0                           | 0                          | $-\frac{\sqrt{2310}}{420}$ | 0                           | 0                           | 0                            | 0                             | 0                           | 0                           | $\frac{2\sqrt{231}}{1155}$    | 0                            | 0                           |  |
|                                   | 0                           | 0                                    | 0                           | 0                          | 0                          | $-\frac{\sqrt{2310}}{420}$  | 0                           | 0                            | 0                             | 0                           | 0                           | 0                             | $\frac{4\sqrt{385}}{1925}$   | 0                           |  |
|                                   | 0                           | 0                                    | 0                           | 0                          | 0                          | 0                           | 0                           | 0                            | 0                             | 0                           | 0                           | 0                             | 0                            | $\frac{\sqrt{110}}{275}$    |  |
|                                   | 0                           | 0                                    | 0                           | 0                          | 0                          | 0                           | $\frac{\sqrt{110}}{275}$    | 0                            | 0                             | 0                           | 0                           | 0                             | 0                            | 0                           |  |
|                                   | $\frac{\sqrt{2310}}{420}$   | 0                                    | 0                           | 0                          | 0                          | 0                           | 0                           | $\frac{4\sqrt{385}}{1925}$   | 0                             | 0                           | 0                           | 0                             | 0                            | 0                           |  |
|                                   | 0                           | $\frac{\sqrt{2310}}{420}$            | 0                           | 0                          | 0                          | 0                           | 0                           | 0                            | $\frac{2\sqrt{231}}{1155}$    | 0                           | 0                           | 0                             | 0                            | 0                           |  |
| 686                               | symmetry                    | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$ |                             |                            |                            |                             |                             |                              |                               |                             |                             |                               |                              |                             |  |

continued ...

Table 9

| No. | multipole                         | matrix                                |                           |                            |                           |                            |                            |                             |                              |                              |                           |                           |                              |                              |                             |
|-----|-----------------------------------|---------------------------------------|---------------------------|----------------------------|---------------------------|----------------------------|----------------------------|-----------------------------|------------------------------|------------------------------|---------------------------|---------------------------|------------------------------|------------------------------|-----------------------------|
|     | $\mathbb{G}_{4,0}^{(1,1;a)}(T_2)$ | $\frac{\sqrt{330}}{840}$              | 0                         | $\frac{\sqrt{33}}{84}$     | 0                         | $-\frac{\sqrt{66}}{24}$    | 0                          | 0                           | $-\frac{3\sqrt{55}}{1400}$   | 0                            | $-\frac{\sqrt{11}}{140}$  | 0                         | $\frac{\sqrt{165}}{200}$     | 0                            | 0                           |
|     |                                   | 0                                     | $-\frac{\sqrt{22}}{56}$   | 0                          | $-\frac{\sqrt{11}}{28}$   | 0                          | $\frac{\sqrt{110}}{40}$    | $-\frac{\sqrt{1155}}{600}$  | 0                            | $\frac{\sqrt{55}}{350}$      | 0                         | $\frac{\sqrt{33}}{840}$   | 0                            | $\frac{\sqrt{165}}{300}$     | 0                           |
|     |                                   | $-\frac{\sqrt{110}}{40}$              | 0                         | $\frac{\sqrt{11}}{28}$     | 0                         | $\frac{\sqrt{22}}{56}$     | 0                          | 0                           | $\frac{\sqrt{165}}{300}$     | 0                            | $\frac{\sqrt{33}}{840}$   | 0                         | $\frac{\sqrt{55}}{350}$      | 0                            | $-\frac{\sqrt{1155}}{600}$  |
|     |                                   | 0                                     | $\frac{\sqrt{66}}{24}$    | 0                          | $-\frac{\sqrt{33}}{84}$   | 0                          | $-\frac{\sqrt{330}}{840}$  | 0                           | 0                            | $\frac{\sqrt{165}}{200}$     | 0                         | $-\frac{\sqrt{11}}{140}$  | 0                            | $-\frac{3\sqrt{55}}{1400}$   | 0                           |
|     |                                   | 0                                     | $\frac{\sqrt{330}}{840}$  | 0                          | $-\frac{\sqrt{165}}{120}$ | 0                          | 0                          | $-\frac{\sqrt{77}}{1540}$   | 0                            | $-\frac{\sqrt{33}}{462}$     | 0                         | $\frac{\sqrt{55}}{220}$   | 0                            | 0                            | 0                           |
|     |                                   | $-\frac{\sqrt{330}}{840}$             | 0                         | $-\frac{\sqrt{33}}{168}$   | 0                         | 0                          | 0                          | 0                           | $\frac{13\sqrt{55}}{7700}$   | 0                            | $\frac{\sqrt{11}}{770}$   | 0                         | $\frac{7\sqrt{165}}{3300}$   | 0                            | 0                           |
|     |                                   | 0                                     | $\frac{\sqrt{33}}{168}$   | 0                          | 0                         | 0                          | $\frac{\sqrt{165}}{120}$   | $\frac{3\sqrt{770}}{2200}$  | 0                            | $-\frac{\sqrt{330}}{46200}$  | 0                         | $\frac{\sqrt{22}}{440}$   | 0                            | $-\frac{\sqrt{110}}{2200}$   | 0                           |
|     |                                   | $\frac{\sqrt{165}}{120}$              | 0                         | 0                          | 0                         | $\frac{\sqrt{33}}{168}$    | 0                          | 0                           | $\frac{\sqrt{110}}{2200}$    | 0                            | $-\frac{\sqrt{22}}{440}$  | 0                         | $\frac{\sqrt{330}}{46200}$   | 0                            | $-\frac{3\sqrt{770}}{2200}$ |
|     |                                   | 0                                     | 0                         | 0                          | $-\frac{\sqrt{33}}{168}$  | 0                          | $-\frac{\sqrt{330}}{840}$  | 0                           | 0                            | $-\frac{7\sqrt{165}}{3300}$  | 0                         | $-\frac{\sqrt{11}}{770}$  | 0                            | $-\frac{13\sqrt{55}}{7700}$  | 0                           |
|     |                                   | 0                                     | 0                         | $-\frac{\sqrt{165}}{120}$  | 0                         | $\frac{\sqrt{330}}{840}$   | 0                          | 0                           | 0                            | $-\frac{\sqrt{55}}{220}$     | 0                         | $\frac{\sqrt{33}}{462}$   | 0                            | $\frac{\sqrt{77}}{1540}$     |                             |
| 687 | symmetry                          | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ |                           |                            |                           |                            |                            |                             |                              |                              |                           |                           |                              |                              |                             |
|     | $\mathbb{G}_{4,1}^{(1,1;a)}(T_2)$ | $-\frac{\sqrt{330}i}{840}$            | 0                         | $\frac{\sqrt{33}i}{84}$    | 0                         | $\frac{\sqrt{66}i}{24}$    | 0                          | 0                           | $\frac{3\sqrt{55}i}{1400}$   | 0                            | $-\frac{\sqrt{11}i}{140}$ | 0                         | $-\frac{\sqrt{165}i}{200}$   | 0                            | 0                           |
|     |                                   | 0                                     | $\frac{\sqrt{22}i}{56}$   | 0                          | $-\frac{\sqrt{11}i}{28}$  | 0                          | $-\frac{\sqrt{110}i}{40}$  | $-\frac{\sqrt{1155}i}{600}$ | 0                            | $-\frac{\sqrt{55}i}{350}$    | 0                         | $\frac{\sqrt{33}i}{840}$  | 0                            | $-\frac{\sqrt{165}i}{300}$   | 0                           |
|     |                                   | $-\frac{\sqrt{110}i}{40}$             | 0                         | $-\frac{\sqrt{11}i}{28}$   | 0                         | $\frac{\sqrt{22}i}{56}$    | 0                          | 0                           | $\frac{\sqrt{165}i}{300}$    | 0                            | $-\frac{\sqrt{33}i}{840}$ | 0                         | $\frac{\sqrt{55}i}{350}$     | 0                            | $\frac{\sqrt{1155}i}{600}$  |
|     |                                   | 0                                     | $\frac{\sqrt{66}i}{24}$   | 0                          | $\frac{\sqrt{33}i}{84}$   | 0                          | $-\frac{\sqrt{330}i}{840}$ | 0                           | 0                            | $\frac{\sqrt{165}i}{200}$    | 0                         | $\frac{\sqrt{11}i}{140}$  | 0                            | $-\frac{3\sqrt{55}i}{1400}$  | 0                           |
|     |                                   | 0                                     | $\frac{\sqrt{330}i}{840}$ | 0                          | $\frac{\sqrt{165}i}{120}$ | 0                          | 0                          | $\frac{\sqrt{77}i}{1540}$   | 0                            | $-\frac{\sqrt{33}i}{462}$    | 0                         | $-\frac{\sqrt{55}i}{220}$ | 0                            | 0                            | 0                           |
|     |                                   | $\frac{\sqrt{330}i}{840}$             | 0                         | $-\frac{\sqrt{33}i}{168}$  | 0                         | 0                          | 0                          | 0                           | $-\frac{13\sqrt{55}i}{7700}$ | 0                            | $\frac{\sqrt{11}i}{770}$  | 0                         | $-\frac{7\sqrt{165}i}{3300}$ | 0                            | 0                           |
|     |                                   | 0                                     | $-\frac{\sqrt{33}i}{168}$ | 0                          | 0                         | 0                          | $-\frac{\sqrt{165}i}{120}$ | $\frac{3\sqrt{770}i}{2200}$ | 0                            | $\frac{\sqrt{330}i}{46200}$  | 0                         | $\frac{\sqrt{22}i}{440}$  | 0                            | $\frac{\sqrt{110}i}{2200}$   | 0                           |
|     |                                   | $\frac{\sqrt{165}i}{120}$             | 0                         | 0                          | 0                         | $\frac{\sqrt{33}i}{168}$   | 0                          | 0                           | $\frac{\sqrt{110}i}{2200}$   | 0                            | $\frac{\sqrt{22}i}{440}$  | 0                         | $\frac{\sqrt{330}i}{46200}$  | 0                            | $\frac{3\sqrt{770}i}{2200}$ |
|     |                                   | 0                                     | 0                         | 0                          | $\frac{\sqrt{33}i}{168}$  | 0                          | $-\frac{\sqrt{330}i}{840}$ | 0                           | 0                            | $-\frac{7\sqrt{165}i}{3300}$ | 0                         | $\frac{\sqrt{11}i}{770}$  | 0                            | $-\frac{13\sqrt{55}i}{7700}$ | 0                           |
|     |                                   | 0                                     | 0                         | $-\frac{\sqrt{165}i}{120}$ | 0                         | $-\frac{\sqrt{330}i}{840}$ | 0                          | 0                           | 0                            | $-\frac{\sqrt{55}i}{220}$    | 0                         | $-\frac{\sqrt{33}i}{462}$ | 0                            | $\frac{\sqrt{77}i}{1540}$    |                             |
| 688 | symmetry                          | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ |                           |                            |                           |                            |                            |                             |                              |                              |                           |                           |                              |                              |                             |

continued ...



Table 9

| No. | multipole                         | matrix                   |                         |                           |                          |                         |                           |                            |                             |                               |                           |                          |                               |                              |                            |
|-----|-----------------------------------|--------------------------|-------------------------|---------------------------|--------------------------|-------------------------|---------------------------|----------------------------|-----------------------------|-------------------------------|---------------------------|--------------------------|-------------------------------|------------------------------|----------------------------|
|     | $\mathbb{G}_{4,2}^{(1,1;a)}(T_2)$ | 0                        | 0                       | 0                         | $-\frac{\sqrt{33}}{21}$  | 0                       | 0                         | $-\frac{\sqrt{385}}{700}$  | 0                           | 0                             | 0                         | $\frac{3\sqrt{11}}{140}$ | 0                             | 0                            | 0                          |
|     |                                   | $-\frac{\sqrt{110}}{70}$ | 0                       | 0                         | 0                        | $\frac{\sqrt{22}}{14}$  | 0                         | 0                          | $\frac{11\sqrt{165}}{2100}$ | 0                             | 0                         | 0                        | $\frac{\sqrt{55}}{700}$       | 0                            | 0                          |
|     |                                   | 0                        | $\frac{\sqrt{22}}{14}$  | 0                         | 0                        | 0                       | $-\frac{\sqrt{110}}{70}$  | 0                          | 0                           | $-\frac{\sqrt{55}}{700}$      | 0                         | 0                        | 0                             | $-\frac{11\sqrt{165}}{2100}$ | 0                          |
|     |                                   | 0                        | 0                       | $-\frac{\sqrt{33}}{21}$   | 0                        | 0                       | 0                         | 0                          | 0                           | 0                             | $-\frac{3\sqrt{11}}{140}$ | 0                        | 0                             | 0                            | $\frac{\sqrt{385}}{700}$   |
|     |                                   | 0                        | 0                       | $-\frac{\sqrt{165}}{140}$ | 0                        | 0                       | 0                         | 0                          | 0                           | 0                             | $\frac{2\sqrt{55}}{385}$  | 0                        | 0                             | 0                            | 0                          |
|     |                                   | 0                        | 0                       | 0                         | $\frac{\sqrt{33}}{84}$   | 0                       | 0                         | $\frac{3\sqrt{385}}{1925}$ | 0                           | 0                             | 0                         | $\frac{\sqrt{11}}{385}$  | 0                             | 0                            | 0                          |
|     |                                   | $\frac{\sqrt{165}}{140}$ | 0                       | 0                         | 0                        | $\frac{\sqrt{33}}{84}$  | 0                         | 0                          | $-\frac{9\sqrt{110}}{3850}$ | 0                             | 0                         | 0                        | $-\frac{17\sqrt{330}}{11550}$ | 0                            | 0                          |
|     |                                   | 0                        | $-\frac{\sqrt{33}}{84}$ | 0                         | 0                        | 0                       | $-\frac{\sqrt{165}}{140}$ | 0                          | 0                           | $-\frac{17\sqrt{330}}{11550}$ | 0                         | 0                        | 0                             | $-\frac{9\sqrt{110}}{3850}$  | 0                          |
|     |                                   | 0                        | 0                       | $-\frac{\sqrt{33}}{84}$   | 0                        | 0                       | 0                         | 0                          | 0                           | 0                             | $\frac{\sqrt{11}}{385}$   | 0                        | 0                             | 0                            | $\frac{3\sqrt{385}}{1925}$ |
|     |                                   | 0                        | 0                       | 0                         | $\frac{\sqrt{165}}{140}$ | 0                       | 0                         | 0                          | 0                           | 0                             | 0                         | $\frac{2\sqrt{55}}{385}$ | 0                             | 0                            | 0                          |
| 689 | symmetry                          | $x$                      |                         |                           |                          |                         |                           |                            |                             |                               |                           |                          |                               |                              |                            |
|     | $\mathbb{T}_{1,0}^{(a)}(T_1)$     | $-\frac{\sqrt{5}i}{10}$  | 0                       | $\frac{\sqrt{2}i}{20}$    | 0                        | 0                       | 0                         | 0                          | 0                           | 0                             | 0                         | 0                        | 0                             | 0                            | 0                          |
|     |                                   | 0                        | $-\frac{\sqrt{3}i}{10}$ | 0                         | $\frac{\sqrt{6}i}{20}$   | 0                       | 0                         | 0                          | 0                           | 0                             | 0                         | 0                        | 0                             | 0                            | 0                          |
|     |                                   | 0                        | 0                       | $-\frac{\sqrt{6}i}{20}$   | 0                        | $\frac{\sqrt{3}i}{10}$  | 0                         | 0                          | 0                           | 0                             | 0                         | 0                        | 0                             | 0                            | 0                          |
|     |                                   | 0                        | 0                       | 0                         | $-\frac{\sqrt{2}i}{20}$  | 0                       | $\frac{\sqrt{5}i}{10}$    | 0                          | 0                           | 0                             | 0                         | 0                        | 0                             | 0                            | 0                          |
|     |                                   | 0                        | $-\frac{\sqrt{5}i}{70}$ | 0                         | 0                        | 0                       | 0                         | $-\frac{\sqrt{42}i}{28}$   | 0                           | $\frac{\sqrt{2}i}{28}$        | 0                         | 0                        | 0                             | 0                            | 0                          |
|     |                                   | $-\frac{\sqrt{5}i}{70}$  | 0                       | $-\frac{\sqrt{2}i}{35}$   | 0                        | 0                       | 0                         | $-\frac{\sqrt{30}i}{28}$   | 0                           | $\frac{\sqrt{6}i}{28}$        | 0                         | 0                        | 0                             | 0                            | 0                          |
|     |                                   | 0                        | $-\frac{\sqrt{2}i}{35}$ | 0                         | $-\frac{3i}{70}$         | 0                       | 0                         | 0                          | 0                           | $-\frac{\sqrt{5}i}{14}$       | 0                         | $\frac{\sqrt{3}i}{14}$   | 0                             | 0                            | 0                          |
|     |                                   | 0                        | 0                       | $-\frac{3i}{70}$          | 0                        | $-\frac{\sqrt{2}i}{35}$ | 0                         | 0                          | 0                           | 0                             | $-\frac{\sqrt{3}i}{14}$   | 0                        | $\frac{\sqrt{5}i}{14}$        | 0                            | 0                          |
|     |                                   | 0                        | 0                       | 0                         | $-\frac{\sqrt{2}i}{35}$  | 0                       | $-\frac{\sqrt{5}i}{70}$   | 0                          | 0                           | 0                             | 0                         | $-\frac{\sqrt{6}i}{28}$  | 0                             | $\frac{\sqrt{30}i}{28}$      | 0                          |
|     |                                   | 0                        | 0                       | 0                         | 0                        | $-\frac{\sqrt{5}i}{70}$ | 0                         | 0                          | 0                           | 0                             | 0                         | $-\frac{\sqrt{2}i}{28}$  | 0                             | $\frac{\sqrt{42}i}{28}$      | 0                          |
| 690 | symmetry                          | $y$                      |                         |                           |                          |                         |                           |                            |                             |                               |                           |                          |                               |                              |                            |

*continued ...*

Table 9

| No. | multipole                     | matrix                |                        |                        |                        |                        |                        |                        |                         |                       |                       |                         |                       |                        |                        |
|-----|-------------------------------|-----------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|-------------------------|-----------------------|-----------------------|-------------------------|-----------------------|------------------------|------------------------|
|     | $\mathbb{T}_{1,1}^{(a)}(T_1)$ | $\frac{\sqrt{5}}{10}$ | 0                      | $\frac{\sqrt{2}}{20}$  | 0                      | 0                      | 0                      | 0                      | 0                       | 0                     | 0                     | 0                       | 0                     | 0                      | 0                      |
|     |                               | 0                     | $\frac{\sqrt{3}}{10}$  | 0                      | $\frac{\sqrt{6}}{20}$  | 0                      | 0                      | 0                      | 0                       | 0                     | 0                     | 0                       | 0                     | 0                      | 0                      |
|     |                               | 0                     | 0                      | $\frac{\sqrt{6}}{20}$  | 0                      | $\frac{\sqrt{3}}{10}$  | 0                      | 0                      | 0                       | 0                     | 0                     | 0                       | 0                     | 0                      | 0                      |
|     |                               | 0                     | 0                      | 0                      | $\frac{\sqrt{2}}{20}$  | 0                      | $\frac{\sqrt{5}}{10}$  | 0                      | 0                       | 0                     | 0                     | 0                       | 0                     | 0                      | 0                      |
|     |                               | 0                     | $-\frac{\sqrt{5}}{70}$ | 0                      | 0                      | 0                      | 0                      | $\frac{\sqrt{42}}{28}$ | 0                       | $\frac{\sqrt{2}}{28}$ | 0                     | 0                       | 0                     | 0                      | 0                      |
|     |                               | $\frac{\sqrt{5}}{70}$ | 0                      | $-\frac{\sqrt{2}}{35}$ | 0                      | 0                      | 0                      | 0                      | $\frac{\sqrt{30}}{28}$  | 0                     | $\frac{\sqrt{6}}{28}$ | 0                       | 0                     | 0                      | 0                      |
|     |                               | 0                     | $\frac{\sqrt{2}}{35}$  | 0                      | $-\frac{3}{70}$        | 0                      | 0                      | 0                      | 0                       | $\frac{\sqrt{5}}{14}$ | 0                     | $\frac{\sqrt{3}}{14}$   | 0                     | 0                      | 0                      |
|     |                               | 0                     | 0                      | $\frac{3}{70}$         | 0                      | $-\frac{\sqrt{2}}{35}$ | 0                      | 0                      | 0                       | 0                     | $\frac{\sqrt{3}}{14}$ | 0                       | $\frac{\sqrt{5}}{14}$ | 0                      | 0                      |
|     |                               | 0                     | 0                      | 0                      | $\frac{\sqrt{2}}{35}$  | 0                      | $-\frac{\sqrt{5}}{70}$ | 0                      | 0                       | 0                     | 0                     | $\frac{\sqrt{6}}{28}$   | 0                     | $\frac{\sqrt{30}}{28}$ | 0                      |
|     |                               | 0                     | 0                      | 0                      | 0                      | $\frac{\sqrt{5}}{70}$  | 0                      | 0                      | 0                       | 0                     | 0                     | 0                       | $\frac{\sqrt{2}}{28}$ | 0                      | $\frac{\sqrt{42}}{28}$ |
| 691 | symmetry                      | $z$                   |                        |                        |                        |                        |                        |                        |                         |                       |                       |                         |                       |                        |                        |
|     | $\mathbb{T}_{1,2}^{(a)}(T_1)$ | 0                     | $\frac{i}{5}$          | 0                      | 0                      | 0                      | 0                      | 0                      | 0                       | 0                     | 0                     | 0                       | 0                     | 0                      | 0                      |
|     |                               | 0                     | 0                      | $\frac{\sqrt{6}i}{10}$ | 0                      | 0                      | 0                      | 0                      | 0                       | 0                     | 0                     | 0                       | 0                     | 0                      | 0                      |
|     |                               | 0                     | 0                      | 0                      | $\frac{\sqrt{6}i}{10}$ | 0                      | 0                      | 0                      | 0                       | 0                     | 0                     | 0                       | 0                     | 0                      | 0                      |
|     |                               | 0                     | 0                      | 0                      | 0                      | $\frac{i}{5}$          | 0                      | 0                      | 0                       | 0                     | 0                     | 0                       | 0                     | 0                      | 0                      |
|     |                               | $-\frac{i}{14}$       | 0                      | 0                      | 0                      | 0                      | 0                      | $\frac{\sqrt{6}i}{14}$ | 0                       | 0                     | 0                     | 0                       | 0                     | 0                      | 0                      |
|     |                               | 0                     | $-\frac{3i}{70}$       | 0                      | 0                      | 0                      | 0                      | 0                      | $\frac{\sqrt{10}i}{14}$ | 0                     | 0                     | 0                       | 0                     | 0                      | 0                      |
|     |                               | 0                     | 0                      | $-\frac{i}{70}$        | 0                      | 0                      | 0                      | 0                      | 0                       | $\frac{\sqrt{3}i}{7}$ | 0                     | 0                       | 0                     | 0                      | 0                      |
|     |                               | 0                     | 0                      | 0                      | $\frac{i}{70}$         | 0                      | 0                      | 0                      | 0                       | 0                     | $\frac{\sqrt{3}i}{7}$ | 0                       | 0                     | 0                      | 0                      |
|     |                               | 0                     | 0                      | 0                      | 0                      | $\frac{3i}{70}$        | 0                      | 0                      | 0                       | 0                     | 0                     | $\frac{\sqrt{10}i}{14}$ | 0                     | 0                      | 0                      |
|     |                               | 0                     | 0                      | 0                      | 0                      | 0                      | $\frac{i}{14}$         | 0                      | 0                       | 0                     | 0                     | 0                       | 0                     | $\frac{\sqrt{6}i}{14}$ | 0                      |
| 692 | symmetry                      | $\sqrt{15}xyz$        |                        |                        |                        |                        |                        |                        |                         |                       |                       |                         |                       |                        |                        |

*continued ...*

Table 9

| No. | multipole            | matrix                         |                            |                           |                            |                            |                            |                          |                            |                            |                          |                           |                            |                            |                          |
|-----|----------------------|--------------------------------|----------------------------|---------------------------|----------------------------|----------------------------|----------------------------|--------------------------|----------------------------|----------------------------|--------------------------|---------------------------|----------------------------|----------------------------|--------------------------|
|     | $T_3^{(a)}(A_2)$     | 0                              | 0                          | 0                         | $-\frac{3\sqrt{70}}{140}$  | 0                          | 0                          | $\frac{\sqrt{6}}{24}$    | 0                          | 0                          | 0                        | $-\frac{\sqrt{210}}{168}$ | 0                          | 0                          | 0                        |
|     |                      | $-\frac{\sqrt{21}}{28}$        | 0                          | 0                         | 0                          | $-\frac{\sqrt{105}}{140}$  | 0                          | 0                        | $-\frac{\sqrt{14}}{56}$    | 0                          | 0                        | 0                         | $-\frac{\sqrt{42}}{56}$    | 0                          | 0                        |
|     |                      | 0                              | $\frac{\sqrt{105}}{140}$   | 0                         | 0                          | 0                          | $\frac{\sqrt{21}}{28}$     | 0                        | 0                          | $-\frac{\sqrt{42}}{56}$    | 0                        | 0                         | 0                          | $-\frac{\sqrt{14}}{56}$    | 0                        |
|     |                      | 0                              | 0                          | $\frac{3\sqrt{70}}{140}$  | 0                          | 0                          | 0                          | 0                        | 0                          | $-\frac{\sqrt{210}}{168}$  | 0                        | 0                         | 0                          | 0                          | $\frac{\sqrt{6}}{24}$    |
|     |                      | 0                              | 0                          | $\frac{\sqrt{14}}{28}$    | 0                          | 0                          | 0                          | 0                        | 0                          | $-\frac{\sqrt{42}}{42}$    | 0                        | 0                         | 0                          | 0                          | 0                        |
|     |                      | 0                              | 0                          | 0                         | $\frac{\sqrt{70}}{140}$    | 0                          | 0                          | $-\frac{\sqrt{6}}{12}$   | 0                          | 0                          | 0                        | $-\frac{\sqrt{210}}{84}$  | 0                          | 0                          | 0                        |
|     |                      | $-\frac{\sqrt{14}}{28}$        | 0                          | 0                         | 0                          | $-\frac{\sqrt{70}}{140}$   | 0                          | 0                        | $-\frac{\sqrt{21}}{84}$    | 0                          | 0                        | 0                         | $-\frac{\sqrt{7}}{28}$     | 0                          | 0                        |
|     |                      | 0                              | $-\frac{\sqrt{70}}{140}$   | 0                         | 0                          | 0                          | $-\frac{\sqrt{14}}{28}$    | 0                        | 0                          | $\frac{\sqrt{7}}{28}$      | 0                        | 0                         | 0                          | $\frac{\sqrt{21}}{84}$     | 0                        |
|     |                      | 0                              | 0                          | $\frac{\sqrt{70}}{140}$   | 0                          | 0                          | 0                          | 0                        | 0                          | $\frac{\sqrt{210}}{84}$    | 0                        | 0                         | 0                          | 0                          | $\frac{\sqrt{6}}{12}$    |
|     |                      | 0                              | 0                          | 0                         | $\frac{\sqrt{14}}{28}$     | 0                          | 0                          | 0                        | 0                          | 0                          | $\frac{\sqrt{42}}{42}$   | 0                         | 0                          | 0                          | 0                        |
| 693 | symmetry             | $\frac{x(2x^2-3y^2-3z^2)}{2}$  |                            |                           |                            |                            |                            |                          |                            |                            |                          |                           |                            |                            |                          |
|     | $T_{3,0}^{(a)}(T_1)$ | $-\frac{3\sqrt{105i}}{560}$    | 0                          | $\frac{9\sqrt{42i}}{560}$ | 0                          | $-\frac{3\sqrt{21i}}{112}$ | 0                          | 0                        | $-\frac{\sqrt{70i}}{112}$  | 0                          | $\frac{\sqrt{14i}}{56}$  | 0                         | $-\frac{\sqrt{210i}}{336}$ | 0                          | 0                        |
|     |                      | 0                              | $\frac{3\sqrt{7i}}{80}$    | 0                         | $-\frac{3\sqrt{14i}}{560}$ | 0                          | $-\frac{3\sqrt{35i}}{112}$ | $-\frac{\sqrt{30i}}{48}$ | 0                          | 0                          | 0                        | $\frac{\sqrt{42i}}{112}$  | 0                          | $-\frac{\sqrt{210i}}{168}$ | 0                        |
|     |                      | $\frac{3\sqrt{35i}}{112}$      | 0                          | $\frac{3\sqrt{14i}}{560}$ | 0                          | $-\frac{3\sqrt{7i}}{80}$   | 0                          | 0                        | $-\frac{\sqrt{210i}}{168}$ | 0                          | $\frac{\sqrt{42i}}{112}$ | 0                         | 0                          | 0                          | $-\frac{\sqrt{30i}}{48}$ |
|     |                      | 0                              | $\frac{3\sqrt{21i}}{112}$  | 0                         | $-\frac{9\sqrt{42i}}{560}$ | 0                          | $\frac{3\sqrt{105i}}{560}$ | 0                        | 0                          | $-\frac{\sqrt{210i}}{336}$ | 0                        | $\frac{\sqrt{14i}}{56}$   | 0                          | $-\frac{\sqrt{70i}}{112}$  | 0                        |
|     |                      | 0                              | $-\frac{\sqrt{105i}}{140}$ | 0                         | $\frac{\sqrt{210i}}{168}$  | 0                          | 0                          | $-\frac{\sqrt{2i}}{16}$  | 0                          | $\frac{\sqrt{42i}}{56}$    | 0                        | $-\frac{\sqrt{70i}}{112}$ | 0                          | 0                          | 0                        |
|     |                      | $-\frac{\sqrt{105i}}{140}$     | 0                          | $\frac{\sqrt{42i}}{280}$  | 0                          | $\frac{\sqrt{21i}}{42}$    | 0                          | 0                        | $\frac{\sqrt{70i}}{112}$   | 0                          | $\frac{\sqrt{14i}}{56}$  | 0                         | $-\frac{\sqrt{210i}}{112}$ | 0                          | 0                        |
|     |                      | 0                              | $\frac{\sqrt{42i}}{280}$   | 0                         | $\frac{\sqrt{21i}}{70}$    | 0                          | $\frac{\sqrt{210i}}{168}$  | $\frac{\sqrt{5i}}{16}$   | 0                          | $\frac{\sqrt{105i}}{112}$  | 0                        | $-\frac{\sqrt{7i}}{112}$  | 0                          | $-\frac{3\sqrt{35i}}{112}$ | 0                        |
|     |                      | $\frac{\sqrt{210i}}{168}$      | 0                          | $\frac{\sqrt{21i}}{70}$   | 0                          | $\frac{\sqrt{42i}}{280}$   | 0                          | 0                        | $\frac{3\sqrt{35i}}{112}$  | 0                          | $\frac{\sqrt{7i}}{112}$  | 0                         | $-\frac{\sqrt{105i}}{112}$ | 0                          | $-\frac{\sqrt{5i}}{16}$  |
|     |                      | 0                              | $\frac{\sqrt{21i}}{42}$    | 0                         | $\frac{\sqrt{42i}}{280}$   | 0                          | $-\frac{\sqrt{105i}}{140}$ | 0                        | 0                          | $\frac{\sqrt{210i}}{112}$  | 0                        | $-\frac{\sqrt{14i}}{56}$  | 0                          | $-\frac{\sqrt{70i}}{112}$  | 0                        |
|     |                      | 0                              | 0                          | $\frac{\sqrt{210i}}{168}$ | 0                          | $-\frac{\sqrt{105i}}{140}$ | 0                          | 0                        | 0                          | $\frac{\sqrt{70i}}{112}$   | 0                        | $-\frac{\sqrt{42i}}{56}$  | 0                          | $\frac{\sqrt{2i}}{16}$     |                          |
| 694 | symmetry             | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ |                            |                           |                            |                            |                            |                          |                            |                            |                          |                           |                            |                            |                          |

continued ...

Table 9

| No. | multipole                     | matrix                           |                           |                            |                           |                           |                           |                         |                           |                           |                          |                         |                           |                          |                        |
|-----|-------------------------------|----------------------------------|---------------------------|----------------------------|---------------------------|---------------------------|---------------------------|-------------------------|---------------------------|---------------------------|--------------------------|-------------------------|---------------------------|--------------------------|------------------------|
|     | $\mathbb{T}_{3,1}^{(a)}(T_1)$ | $\frac{3\sqrt{105}}{560}$        | 0                         | $\frac{9\sqrt{42}}{560}$   | 0                         | $\frac{3\sqrt{21}}{112}$  | 0                         | 0                       | $\frac{\sqrt{70}}{112}$   | 0                         | $\frac{\sqrt{14}}{56}$   | 0                       | $\frac{\sqrt{210}}{336}$  | 0                        | 0                      |
|     |                               | 0                                | $-\frac{3\sqrt{7}}{80}$   | 0                          | $-\frac{3\sqrt{14}}{560}$ | 0                         | $\frac{3\sqrt{35}}{112}$  | $-\frac{\sqrt{30}}{48}$ | 0                         | 0                         | 0                        | $\frac{\sqrt{42}}{112}$ | 0                         | $\frac{\sqrt{210}}{168}$ | 0                      |
|     |                               | $\frac{3\sqrt{35}}{112}$         | 0                         | $-\frac{3\sqrt{14}}{560}$  | 0                         | $-\frac{3\sqrt{7}}{80}$   | 0                         | 0                       | $-\frac{\sqrt{210}}{168}$ | 0                         | $-\frac{\sqrt{42}}{112}$ | 0                       | 0                         | 0                        | $\frac{\sqrt{30}}{48}$ |
|     |                               | 0                                | $\frac{3\sqrt{21}}{112}$  | 0                          | $\frac{9\sqrt{42}}{560}$  | 0                         | $\frac{3\sqrt{105}}{560}$ | 0                       | 0                         | $-\frac{\sqrt{210}}{336}$ | 0                        | $-\frac{\sqrt{14}}{56}$ | 0                         | $-\frac{\sqrt{70}}{112}$ | 0                      |
|     |                               | 0                                | $-\frac{\sqrt{105}}{140}$ | 0                          | $-\frac{\sqrt{210}}{168}$ | 0                         | 0                         | $\frac{\sqrt{2}}{16}$   | 0                         | $\frac{\sqrt{42}}{56}$    | 0                        | $\frac{\sqrt{70}}{112}$ | 0                         | 0                        | 0                      |
|     |                               | $\frac{\sqrt{105}}{140}$         | 0                         | $\frac{\sqrt{42}}{280}$    | 0                         | $-\frac{\sqrt{21}}{42}$   | 0                         | 0                       | $-\frac{\sqrt{70}}{112}$  | 0                         | $\frac{\sqrt{14}}{56}$   | 0                       | $\frac{\sqrt{210}}{112}$  | 0                        | 0                      |
|     |                               | 0                                | $-\frac{\sqrt{42}}{280}$  | 0                          | $\frac{\sqrt{21}}{70}$    | 0                         | $-\frac{\sqrt{210}}{168}$ | $\frac{\sqrt{5}}{16}$   | 0                         | $-\frac{\sqrt{105}}{112}$ | 0                        | $-\frac{\sqrt{7}}{112}$ | 0                         | $\frac{3\sqrt{35}}{112}$ | 0                      |
|     |                               | $\frac{\sqrt{210}}{168}$         | 0                         | $-\frac{\sqrt{21}}{70}$    | 0                         | $\frac{\sqrt{42}}{280}$   | 0                         | 0                       | $\frac{3\sqrt{35}}{112}$  | 0                         | $-\frac{\sqrt{7}}{112}$  | 0                       | $-\frac{\sqrt{105}}{112}$ | 0                        | $\frac{\sqrt{5}}{16}$  |
|     |                               | 0                                | $\frac{\sqrt{21}}{42}$    | 0                          | $-\frac{\sqrt{42}}{280}$  | 0                         | $-\frac{\sqrt{105}}{140}$ | 0                       | 0                         | $\frac{\sqrt{210}}{112}$  | 0                        | $\frac{\sqrt{14}}{56}$  | 0                         | $-\frac{\sqrt{70}}{112}$ | 0                      |
|     |                               | 0                                | 0                         | $\frac{\sqrt{210}}{168}$   | 0                         | $\frac{\sqrt{105}}{140}$  | 0                         | 0                       | 0                         | 0                         | $\frac{\sqrt{70}}{112}$  | 0                       | $\frac{\sqrt{42}}{56}$    | 0                        | $\frac{\sqrt{2}}{16}$  |
| 695 | symmetry                      | $-\frac{z(3x^2+3y^2-2z^2)}{2}$   |                           |                            |                           |                           |                           |                         |                           |                           |                          |                         |                           |                          |                        |
|     | $\mathbb{T}_{3,2}^{(a)}(T_1)$ | 0                                | $-\frac{3\sqrt{21}i}{70}$ | 0                          | 0                         | 0                         | 0                         | 0                       | 0                         | $-\frac{\sqrt{210}i}{84}$ | 0                        | 0                       | 0                         | 0                        | 0                      |
|     |                               | 0                                | 0                         | $\frac{3\sqrt{14}i}{70}$   | 0                         | 0                         | 0                         | 0                       | 0                         | 0                         | $-\frac{\sqrt{42}i}{84}$ | 0                       | 0                         | 0                        | 0                      |
|     |                               | 0                                | 0                         | 0                          | $\frac{3\sqrt{14}i}{70}$  | 0                         | 0                         | 0                       | 0                         | 0                         | 0                        | $\frac{\sqrt{42}i}{84}$ | 0                         | 0                        | 0                      |
|     |                               | 0                                | 0                         | 0                          | 0                         | $-\frac{3\sqrt{21}i}{70}$ | 0                         | 0                       | 0                         | 0                         | 0                        | 0                       | $\frac{\sqrt{210}i}{84}$  | 0                        | 0                      |
|     |                               | $\frac{\sqrt{21}i}{42}$          | 0                         | 0                          | 0                         | 0                         | 0                         | 0                       | $-\frac{\sqrt{14}i}{14}$  | 0                         | 0                        | 0                       | 0                         | 0                        | 0                      |
|     |                               | 0                                | $-\frac{\sqrt{21}i}{30}$  | 0                          | 0                         | 0                         | 0                         | 0                       | 0                         | 0                         | 0                        | 0                       | 0                         | 0                        | 0                      |
|     |                               | 0                                | 0                         | $-\frac{2\sqrt{21}i}{105}$ | 0                         | 0                         | 0                         | 0                       | 0                         | 0                         | $\frac{\sqrt{7}i}{14}$   | 0                       | 0                         | 0                        | 0                      |
|     |                               | 0                                | 0                         | 0                          | $\frac{2\sqrt{21}i}{105}$ | 0                         | 0                         | 0                       | 0                         | 0                         | 0                        | $\frac{\sqrt{7}i}{14}$  | 0                         | 0                        | 0                      |
|     |                               | 0                                | 0                         | 0                          | 0                         | $\frac{\sqrt{21}i}{30}$   | 0                         | 0                       | 0                         | 0                         | 0                        | 0                       | 0                         | 0                        | 0                      |
|     |                               | 0                                | 0                         | 0                          | 0                         | 0                         | $-\frac{\sqrt{21}i}{42}$  | 0                       | 0                         | 0                         | 0                        | 0                       | 0                         | $-\frac{\sqrt{14}i}{14}$ | 0                      |
| 696 | symmetry                      | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ |                           |                            |                           |                           |                           |                         |                           |                           |                          |                         |                           |                          |                        |

continued ...

Table 9

| No. | multipole                     | matrix                            |                            |                           |                            |                           |                           |                          |                            |                            |                           |                            |                           |                            |                         |
|-----|-------------------------------|-----------------------------------|----------------------------|---------------------------|----------------------------|---------------------------|---------------------------|--------------------------|----------------------------|----------------------------|---------------------------|----------------------------|---------------------------|----------------------------|-------------------------|
|     | $\mathbb{T}_{3,0}^{(a)}(T_2)$ | $-\frac{3\sqrt{7}i}{112}$         | 0                          | $\frac{9\sqrt{70}i}{560}$ | 0                          | $\frac{9\sqrt{35}i}{560}$ | 0                         | 0                        | $-\frac{5\sqrt{42}i}{336}$ | 0                          | $\frac{\sqrt{210}i}{168}$ | 0                          | $\frac{\sqrt{14}i}{112}$  | 0                          | 0                       |
|     |                               | 0                                 | $\frac{\sqrt{105}i}{80}$   | 0                         | $-\frac{\sqrt{210}i}{560}$ | 0                         | $\frac{3\sqrt{21}i}{112}$ | $\frac{\sqrt{2}i}{16}$   | 0                          | 0                          | 0                         | $\frac{\sqrt{70}i}{112}$   | 0                         | $\frac{\sqrt{14}i}{56}$    | 0                       |
|     |                               | $-\frac{3\sqrt{21}i}{112}$        | 0                          | $\frac{\sqrt{210}i}{560}$ | 0                          | $-\frac{\sqrt{105}i}{80}$ | 0                         | 0                        | $\frac{\sqrt{14}i}{56}$    | 0                          | $\frac{\sqrt{70}i}{112}$  | 0                          | 0                         | 0                          | $\frac{\sqrt{2}i}{16}$  |
|     |                               | 0                                 | $-\frac{9\sqrt{35}i}{560}$ | 0                         | $-\frac{9\sqrt{70}i}{560}$ | 0                         | $\frac{3\sqrt{7}i}{112}$  | 0                        | 0                          | $\frac{\sqrt{14}i}{112}$   | 0                         | $\frac{\sqrt{210}i}{168}$  | 0                         | $-\frac{5\sqrt{42}i}{336}$ | 0                       |
|     |                               | 0                                 | $-\frac{\sqrt{7}i}{28}$    | 0                         | $-\frac{\sqrt{14}i}{56}$   | 0                         | 0                         | $-\frac{\sqrt{30}i}{48}$ | 0                          | $\frac{\sqrt{70}i}{56}$    | 0                         | $\frac{\sqrt{42}i}{112}$   | 0                         | 0                          | 0                       |
|     |                               | $-\frac{\sqrt{7}i}{28}$           | 0                          | $\frac{\sqrt{70}i}{280}$  | 0                          | $-\frac{\sqrt{35}i}{70}$  | 0                         | 0                        | $\frac{5\sqrt{42}i}{336}$  | 0                          | $\frac{\sqrt{210}i}{168}$ | 0                          | $\frac{3\sqrt{14}i}{112}$ | 0                          | 0                       |
|     |                               | 0                                 | $\frac{\sqrt{70}i}{280}$   | 0                         | $\frac{\sqrt{35}i}{70}$    | 0                         | $-\frac{\sqrt{14}i}{56}$  | $-\frac{\sqrt{3}i}{16}$  | 0                          | $\frac{5\sqrt{7}i}{112}$   | 0                         | $-\frac{\sqrt{105}i}{336}$ | 0                         | $\frac{3\sqrt{21}i}{112}$  | 0                       |
|     |                               | $-\frac{\sqrt{14}i}{56}$          | 0                          | $\frac{\sqrt{35}i}{70}$   | 0                          | $\frac{\sqrt{70}i}{280}$  | 0                         | 0                        | $-\frac{3\sqrt{21}i}{112}$ | 0                          | $\frac{\sqrt{105}i}{336}$ | 0                          | $-\frac{5\sqrt{7}i}{112}$ | 0                          | $\frac{\sqrt{3}i}{16}$  |
|     |                               | 0                                 | $-\frac{\sqrt{35}i}{70}$   | 0                         | $\frac{\sqrt{70}i}{280}$   | 0                         | $-\frac{\sqrt{7}i}{28}$   | 0                        | 0                          | $-\frac{3\sqrt{14}i}{112}$ | 0                         | $-\frac{\sqrt{210}i}{168}$ | 0                         | $-\frac{5\sqrt{42}i}{336}$ | 0                       |
|     |                               | 0                                 | 0                          | $-\frac{\sqrt{14}i}{56}$  | 0                          | $-\frac{\sqrt{7}i}{28}$   | 0                         | 0                        | 0                          | 0                          | $-\frac{\sqrt{42}i}{112}$ | 0                          | $-\frac{\sqrt{70}i}{56}$  | 0                          | $\frac{\sqrt{30}i}{48}$ |
| 697 | symmetry                      | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |                            |                           |                            |                           |                           |                          |                            |                            |                           |                            |                           |                            |                         |
|     | $\mathbb{T}_{3,1}^{(a)}(T_2)$ | $-\frac{3\sqrt{7}}{112}$          | 0                          | $-\frac{9\sqrt{70}}{560}$ | 0                          | $\frac{9\sqrt{35}}{560}$  | 0                         | 0                        | $-\frac{5\sqrt{42}}{336}$  | 0                          | $-\frac{\sqrt{210}}{168}$ | 0                          | $\frac{\sqrt{14}}{112}$   | 0                          | 0                       |
|     |                               | 0                                 | $\frac{\sqrt{105}}{80}$    | 0                         | $\frac{\sqrt{210}}{560}$   | 0                         | $\frac{3\sqrt{21}}{112}$  | $-\frac{\sqrt{2}}{16}$   | 0                          | 0                          | 0                         | $-\frac{\sqrt{70}}{112}$   | 0                         | $\frac{\sqrt{14}}{56}$     | 0                       |
|     |                               | $\frac{3\sqrt{21}}{112}$          | 0                          | $\frac{\sqrt{210}}{560}$  | 0                          | $\frac{\sqrt{105}}{80}$   | 0                         | 0                        | $-\frac{\sqrt{14}}{56}$    | 0                          | $\frac{\sqrt{70}}{112}$   | 0                          | 0                         | 0                          | $\frac{\sqrt{2}}{16}$   |
|     |                               | 0                                 | $\frac{9\sqrt{35}}{560}$   | 0                         | $-\frac{9\sqrt{70}}{560}$  | 0                         | $-\frac{3\sqrt{7}}{112}$  | 0                        | 0                          | $-\frac{\sqrt{14}}{112}$   | 0                         | $\frac{\sqrt{210}}{168}$   | 0                         | $\frac{5\sqrt{42}}{336}$   | 0                       |
|     |                               | 0                                 | $\frac{\sqrt{7}}{28}$      | 0                         | $-\frac{\sqrt{14}}{56}$    | 0                         | 0                         | $-\frac{\sqrt{30}}{48}$  | 0                          | $-\frac{\sqrt{70}}{56}$    | 0                         | $\frac{\sqrt{42}}{112}$    | 0                         | 0                          | 0                       |
|     |                               | $-\frac{\sqrt{7}}{28}$            | 0                          | $-\frac{\sqrt{70}}{280}$  | 0                          | $-\frac{\sqrt{35}}{70}$   | 0                         | 0                        | $\frac{5\sqrt{42}}{336}$   | 0                          | $-\frac{\sqrt{210}}{168}$ | 0                          | $\frac{3\sqrt{14}}{112}$  | 0                          | 0                       |
|     |                               | 0                                 | $\frac{\sqrt{70}}{280}$    | 0                         | $-\frac{\sqrt{35}}{70}$    | 0                         | $-\frac{\sqrt{14}}{56}$   | $\frac{\sqrt{3}}{16}$    | 0                          | $\frac{5\sqrt{7}}{112}$    | 0                         | $\frac{\sqrt{105}}{336}$   | 0                         | $\frac{3\sqrt{21}}{112}$   | 0                       |
|     |                               | $\frac{\sqrt{14}}{56}$            | 0                          | $\frac{\sqrt{35}}{70}$    | 0                          | $-\frac{\sqrt{70}}{280}$  | 0                         | 0                        | $\frac{3\sqrt{21}}{112}$   | 0                          | $\frac{\sqrt{105}}{336}$  | 0                          | $\frac{5\sqrt{7}}{112}$   | 0                          | $\frac{\sqrt{3}}{16}$   |
|     |                               | 0                                 | $\frac{\sqrt{35}}{70}$     | 0                         | $\frac{\sqrt{70}}{280}$    | 0                         | $\frac{\sqrt{7}}{28}$     | 0                        | 0                          | $\frac{3\sqrt{14}}{112}$   | 0                         | $-\frac{\sqrt{210}}{168}$  | 0                         | $\frac{5\sqrt{42}}{336}$   | 0                       |
|     |                               | 0                                 | 0                          | $\frac{\sqrt{14}}{56}$    | 0                          | $-\frac{\sqrt{7}}{28}$    | 0                         | 0                        | 0                          | 0                          | $\frac{\sqrt{42}}{112}$   | 0                          | $-\frac{\sqrt{70}}{56}$   | 0                          | $-\frac{\sqrt{30}}{48}$ |
| 698 | symmetry                      | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$  |                            |                           |                            |                           |                           |                          |                            |                            |                           |                            |                           |                            |                         |

continued ...

Table 9

| No. | multipole                     | matrix                                  |                            |                            |                            |                            |                          |                         |                         |                          |                           |                            |                          |                          |                        |
|-----|-------------------------------|---|----------------------------|----------------------------|----------------------------|----------------------------|--------------------------|-------------------------|-------------------------|--------------------------|---------------------------|----------------------------|--------------------------|--------------------------|------------------------|
|     | $\mathbb{T}_{3,2}^{(a)}(T_2)$ | 0                                       | 0                          | 0                          | $-\frac{3\sqrt{70}i}{140}$ | 0                          | 0                        | $-\frac{\sqrt{6}i}{24}$ | 0                       | 0                        | 0                         | $-\frac{\sqrt{210}i}{168}$ | 0                        | 0                        | 0                      |
|     |                               | $\frac{\sqrt{21}i}{28}$                 | 0                          | 0                          | 0                          | $-\frac{\sqrt{105}i}{140}$ | 0                        | 0                       | $\frac{\sqrt{14}i}{56}$ | 0                        | 0                         | 0                          | $-\frac{\sqrt{42}i}{56}$ | 0                        | 0                      |
|     |                               | 0                                       | $-\frac{\sqrt{105}i}{140}$ | 0                          | 0                          | 0                          | $\frac{\sqrt{21}i}{28}$  | 0                       | 0                       | $\frac{\sqrt{42}i}{56}$  | 0                         | 0                          | 0                        | $-\frac{\sqrt{14}i}{56}$ | 0                      |
|     |                               | 0                                       | 0                          | $-\frac{3\sqrt{70}i}{140}$ | 0                          | 0                          | 0                        | 0                       | 0                       | 0                        | $\frac{\sqrt{210}i}{168}$ | 0                          | 0                        | 0                        | $\frac{\sqrt{6}i}{24}$ |
|     |                               | 0                                       | 0                          | $\frac{\sqrt{14}i}{28}$    | 0                          | 0                          | 0                        | 0                       | 0                       | 0                        | $-\frac{\sqrt{42}i}{42}$  | 0                          | 0                        | 0                        | 0                      |
|     |                               | 0                                       | 0                          | 0                          | $\frac{\sqrt{70}i}{140}$   | 0                          | 0                        | $\frac{\sqrt{6}i}{12}$  | 0                       | 0                        | 0                         | $-\frac{\sqrt{210}i}{84}$  | 0                        | 0                        | 0                      |
|     |                               | $\frac{\sqrt{14}i}{28}$                 | 0                          | 0                          | 0                          | $-\frac{\sqrt{70}i}{140}$  | 0                        | 0                       | $\frac{\sqrt{21}i}{84}$ | 0                        | 0                         | 0                          | $-\frac{\sqrt{7}i}{28}$  | 0                        | 0                      |
|     |                               | 0                                       | $\frac{\sqrt{70}i}{140}$   | 0                          | 0                          | 0                          | $-\frac{\sqrt{14}i}{28}$ | 0                       | 0                       | $-\frac{\sqrt{7}i}{28}$  | 0                         | 0                          | 0                        | $\frac{\sqrt{21}i}{84}$  | 0                      |
|     |                               | 0                                       | 0                          | $-\frac{\sqrt{70}i}{140}$  | 0                          | 0                          | 0                        | 0                       | 0                       | 0                        | $-\frac{\sqrt{210}i}{84}$ | 0                          | 0                        | 0                        | $\frac{\sqrt{6}i}{12}$ |
|     |                               | 0                                       | 0                          | 0                          | $-\frac{\sqrt{14}i}{28}$   | 0                          | 0                        | 0                       | 0                       | 0                        | 0                         | $-\frac{\sqrt{42}i}{42}$   | 0                        | 0                        | 0                      |
| 699 | symmetry                      | $\frac{3\sqrt{35}xyz(x-y)(x+y)}{2}$     |                            |                            |                            |                            |                          |                         |                         |                          |                           |                            |                          |                          |                        |
|     | $\mathbb{T}_{5,0}^{(a)}(E)$   | 0                                       | 0                          | 0                          | 0                          | 0                          | 0                        | 0                       | 0                       | 0                        | 0                         | 0                          | $\frac{\sqrt{7}}{10}$    | 0                        |                        |
|     |                               | 0                                       | 0                          | 0                          | 0                          | 0                          | 0                        | 0                       | 0                       | 0                        | 0                         | 0                          | 0                        | $-\frac{\sqrt{3}}{10}$   |                        |
|     |                               | 0                                       | 0                          | 0                          | 0                          | 0                          | 0                        | $-\frac{\sqrt{3}}{10}$  | 0                       | 0                        | 0                         | 0                          | 0                        | 0                        |                        |
|     |                               | 0                                       | 0                          | 0                          | 0                          | 0                          | 0                        | 0                       | $\frac{\sqrt{7}}{10}$   | 0                        | 0                         | 0                          | 0                        | 0                        |                        |
|     |                               | 0                                       | 0                          | 0                          | 0                          | $-\frac{\sqrt{42}}{28}$    | 0                        | 0                       | 0                       | 0                        | 0                         | 0                          | $\frac{\sqrt{105}}{70}$  | 0                        |                        |
|     |                               | 0                                       | 0                          | 0                          | 0                          | 0                          | $\frac{\sqrt{42}}{28}$   | 0                       | 0                       | 0                        | 0                         | 0                          | 0                        | $\frac{\sqrt{7}}{70}$    |                        |
|     |                               | 0                                       | 0                          | 0                          | 0                          | 0                          | 0                        | 0                       | 0                       | 0                        | 0                         | 0                          | 0                        | $-\frac{\sqrt{2}}{10}$   |                        |
|     |                               | 0                                       | 0                          | 0                          | 0                          | 0                          | 0                        | $\frac{\sqrt{2}}{10}$   | 0                       | 0                        | 0                         | 0                          | 0                        | 0                        |                        |
|     |                               | $\frac{\sqrt{42}}{28}$                  | 0                          | 0                          | 0                          | 0                          | 0                        | 0                       | $-\frac{\sqrt{7}}{70}$  | 0                        | 0                         | 0                          | 0                        | 0                        |                        |
|     |                               | 0                                       | $-\frac{\sqrt{42}}{28}$    | 0                          | 0                          | 0                          | 0                        | 0                       | 0                       | $-\frac{\sqrt{105}}{70}$ | 0                         | 0                          | 0                        | 0                        |                        |
| 700 | symmetry                      | $\frac{\sqrt{105}xyz(x^2+y^2-2z^2)}{2}$ |                            |                            |                            |                            |                          |                         |                         |                          |                           |                            |                          |                          |                        |

continued ...

Table 9

| No. | multipole                        | matrix   |                           |                           |                           |                           |                           |                            |                            |                              |                          |                            |                             |                             |                           |  |
|-----|----------------------------------|--|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|----------------------------|----------------------------|------------------------------|--------------------------|----------------------------|-----------------------------|-----------------------------|---------------------------|--|
|     | $\mathbb{T}_{5,1}^{(a)}(E)$      | 0  | 0                         | 0                         | 0                         | 0                         | 0                         | $\frac{\sqrt{3}}{60}$      | 0                          | 0                            | 0                        | $-\frac{\sqrt{105}}{60}$   | 0                           | 0                           | 0                         |  |
|     |                                  | 0  | 0                         | 0                         | 0                         | 0                         | 0                         | $-\frac{\sqrt{7}}{20}$     | 0                          | 0                            | 0                        | 0                          | $\frac{\sqrt{21}}{20}$      | 0                           | 0                         |  |
|     |                                  | 0  | 0                         | 0                         | 0                         | 0                         | 0                         | 0                          | $\frac{\sqrt{21}}{20}$     | 0                            | 0                        | 0                          | 0                           | $-\frac{\sqrt{7}}{20}$      | 0                         |  |
|     |                                  | 0  | 0                         | 0                         | 0                         | 0                         | 0                         | 0                          | 0                          | $-\frac{\sqrt{105}}{60}$     | 0                        | 0                          | 0                           | 0                           | $\frac{\sqrt{3}}{60}$     |  |
|     |                                  | 0  | 0                         | $\frac{\sqrt{7}}{28}$     | 0                         | 0                         | 0                         | 0                          | 0                          | $-\frac{\sqrt{21}}{42}$      | 0                        | 0                          | 0                           | 0                           | 0                         |  |
|     |                                  | 0  | 0                         | 0                         | $-\frac{\sqrt{35}}{28}$   | 0                         | 0                         | $-\frac{\sqrt{3}}{30}$     | 0                          | 0                            | 0                        | $\frac{\sqrt{105}}{105}$   | 0                           | 0                           | 0                         |  |
|     |                                  | $-\frac{\sqrt{7}}{28}$                                     | 0                         | 0                         | 0                         | $\frac{\sqrt{35}}{28}$    | 0                         | 0                          | $\frac{2\sqrt{42}}{105}$   | 0                            | 0                        | 0                          | $\frac{\sqrt{14}}{70}$      | 0                           | 0                         |  |
|     |                                  | 0  | $\frac{\sqrt{35}}{28}$    | 0                         | 0                         | 0                         | $-\frac{\sqrt{7}}{28}$    | 0                          | 0                          | $-\frac{\sqrt{14}}{70}$      | 0                        | 0                          | 0                           | $-\frac{2\sqrt{42}}{105}$   | 0                         |  |
|     |                                  | 0  | 0                         | $-\frac{\sqrt{35}}{28}$   | 0                         | 0                         | 0                         | 0                          | 0                          | $-\frac{\sqrt{105}}{105}$    | 0                        | 0                          | 0                           | 0                           | $\frac{\sqrt{3}}{30}$     |  |
|     |                                  | 0  | 0                         | 0                         | $\frac{\sqrt{7}}{28}$     | 0                         | 0                         | 0                          | 0                          | 0                            | $\frac{\sqrt{21}}{42}$   | 0                          | 0                           | 0                           | 0                         |  |
| 701 | symmetry                         | $\frac{x(8x^4-40x^2y^2-40x^2z^2+15y^4+30y^2z^2+15z^4)}{8}$ |                           |                           |                           |                           |                           |                            |                            |                              |                          |                            |                             |                             |                           |  |
|     | $\mathbb{T}_{5,0}^{(a)}(T_1, 1)$ | 0  | 0                         | 0                         | 0                         | 0                         | 0                         | $-\frac{\sqrt{5}i}{80}$    | 0                          | $\frac{i}{16}$               | 0                        | $-\frac{7\sqrt{15}i}{240}$ | 0                           | $\frac{3\sqrt{35}i}{80}$    |                           |  |
|     |                                  | 0  | 0                         | 0                         | 0                         | 0                         | 0                         | $-\frac{\sqrt{105}i}{240}$ | 0                          | $\frac{3\sqrt{5}i}{80}$      | 0                        | $-\frac{\sqrt{3}i}{16}$    | 0                           | $\frac{7\sqrt{15}i}{240}$   | 0                         |  |
|     |                                  | 0  | 0                         | 0                         | 0                         | 0                         | 0                         | $\frac{7\sqrt{15}i}{240}$  | 0                          | $-\frac{\sqrt{3}i}{16}$      | 0                        | $\frac{3\sqrt{5}i}{80}$    | 0                           | $-\frac{\sqrt{105}i}{240}$  |                           |  |
|     |                                  | 0  | 0                         | 0                         | 0                         | 0                         | 0                         | $\frac{3\sqrt{35}i}{80}$   | 0                          | $-\frac{7\sqrt{15}i}{240}$   | 0                        | $\frac{i}{16}$             | 0                           | $-\frac{\sqrt{5}i}{80}$     | 0                         |  |
|     |                                  | 0  | $-\frac{\sqrt{30}i}{224}$ | 0                         | $\frac{\sqrt{15}i}{48}$   | 0                         | $-\frac{3\sqrt{6}i}{32}$  | $-\frac{\sqrt{7}i}{224}$   | 0                          | $\frac{5\sqrt{3}i}{224}$     | 0                        | $-\frac{\sqrt{5}i}{32}$    | 0                           | $\frac{3i}{32}$             | 0                         |  |
|     |                                  | $-\frac{\sqrt{30}i}{224}$                                  | 0                         | $\frac{5\sqrt{3}i}{112}$  | 0                         | $-\frac{5\sqrt{6}i}{96}$  | 0                         | 0                          | $\frac{23\sqrt{5}i}{1120}$ | 0                            | $-\frac{13i}{224}$       | 0                          | $\frac{\sqrt{15}i}{160}$    | 0                           | $\frac{3\sqrt{35}i}{160}$ |  |
|     |                                  | 0  | $\frac{5\sqrt{3}i}{112}$  | 0                         | $-\frac{5\sqrt{6}i}{112}$ | 0                         | $\frac{\sqrt{15}i}{48}$   | $\frac{\sqrt{70}i}{160}$   | 0                          | $-\frac{11\sqrt{30}i}{1120}$ | 0                        | $\frac{\sqrt{2}i}{224}$    | 0                           | $\frac{3\sqrt{10}i}{160}$   | 0                         |  |
|     |                                  | $\frac{\sqrt{15}i}{48}$                                    | 0                         | $-\frac{5\sqrt{6}i}{112}$ | 0                         | $\frac{5\sqrt{3}i}{112}$  | 0                         | 0                          | $-\frac{3\sqrt{10}i}{160}$ | 0                            | $-\frac{\sqrt{2}i}{224}$ | 0                          | $\frac{11\sqrt{30}i}{1120}$ | 0                           | $-\frac{\sqrt{70}i}{160}$ |  |
|     |                                  | 0  | $-\frac{5\sqrt{6}i}{96}$  | 0                         | $\frac{5\sqrt{3}i}{112}$  | 0                         | $-\frac{\sqrt{30}i}{224}$ | $-\frac{3\sqrt{35}i}{160}$ | 0                          | $-\frac{\sqrt{15}i}{160}$    | 0                        | $\frac{13i}{224}$          | 0                           | $-\frac{23\sqrt{5}i}{1120}$ | 0                         |  |
|     |                                  | $-\frac{3\sqrt{6}i}{32}$                                   | 0                         | $\frac{\sqrt{15}i}{48}$   | 0                         | $-\frac{\sqrt{30}i}{224}$ | 0                         | 0                          | $-\frac{3i}{32}$           | 0                            | $\frac{\sqrt{5}i}{32}$   | 0                          | $-\frac{5\sqrt{3}i}{224}$   | 0                           | $\frac{\sqrt{7}i}{224}$   |  |
| 702 | symmetry                         | $\frac{y(15x^4-40x^2y^2+30x^2z^2+8y^4-40y^2z^2+15z^4)}{8}$ |                           |                           |                           |                           |                           |                            |                            |                              |                          |                            |                             |                             |                           |  |

continued ...

Table 9

| No. | multipole                        | matrix   |                          |                          |                          |                          |                          |                           |                            |                            |                        |                        |                            |                            |                          |
|-----|----------------------------------|--|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------|----------------------------|----------------------------|------------------------|------------------------|----------------------------|----------------------------|--------------------------|
|     | $\mathbb{T}_{5,1}^{(a)}(T_1, 1)$ | 0  | 0                        | 0                        | 0                        | 0                        | 0                        | 0                         | $\frac{\sqrt{5}}{80}$      | 0                          | $\frac{1}{16}$         | 0                      | $\frac{7\sqrt{15}}{240}$   | 0                          | $\frac{3\sqrt{35}}{80}$  |
|     |                                  | 0  | 0                        | 0                        | 0                        | 0                        | 0                        | $-\frac{\sqrt{105}}{240}$ | 0                          | $-\frac{3\sqrt{5}}{80}$    | 0                      | $-\frac{\sqrt{3}}{16}$ | 0                          | $-\frac{7\sqrt{15}}{240}$  | 0                        |
|     |                                  | 0  | 0                        | 0                        | 0                        | 0                        | 0                        | 0                         | $\frac{7\sqrt{15}}{240}$   | 0                          | $\frac{\sqrt{3}}{16}$  | 0                      | $\frac{3\sqrt{5}}{80}$     | 0                          | $\frac{\sqrt{105}}{240}$ |
|     |                                  | 0  | 0                        | 0                        | 0                        | 0                        | 0                        | $-\frac{3\sqrt{35}}{80}$  | 0                          | $-\frac{7\sqrt{15}}{240}$  | 0                      | $-\frac{1}{16}$        | 0                          | $-\frac{\sqrt{5}}{80}$     | 0                        |
|     |                                  | 0  | $-\frac{\sqrt{30}}{224}$ | 0                        | $-\frac{\sqrt{15}}{48}$  | 0                        | $-\frac{3\sqrt{6}}{32}$  | $\frac{\sqrt{7}}{224}$    | 0                          | $\frac{5\sqrt{3}}{224}$    | 0                      | $\frac{\sqrt{5}}{32}$  | 0                          | $\frac{3}{32}$             | 0                        |
|     |                                  | $\frac{\sqrt{30}}{224}$                                    | 0                        | $\frac{5\sqrt{3}}{112}$  | 0                        | $\frac{5\sqrt{6}}{96}$   | 0                        | 0                         | $-\frac{23\sqrt{5}}{1120}$ | 0                          | $-\frac{13}{224}$      | 0                      | $-\frac{\sqrt{15}}{160}$   | 0                          | $\frac{3\sqrt{35}}{160}$ |
|     |                                  | 0  | $-\frac{5\sqrt{3}}{112}$ | 0                        | $-\frac{5\sqrt{6}}{112}$ | 0                        | $-\frac{\sqrt{15}}{48}$  | $\frac{\sqrt{70}}{160}$   | 0                          | $\frac{11\sqrt{30}}{1120}$ | 0                      | $\frac{\sqrt{2}}{224}$ | 0                          | $-\frac{3\sqrt{10}}{160}$  | 0                        |
|     |                                  | $\frac{\sqrt{15}}{48}$                                     | 0                        | $\frac{5\sqrt{6}}{112}$  | 0                        | $\frac{5\sqrt{3}}{112}$  | 0                        | 0                         | $-\frac{3\sqrt{10}}{160}$  | 0                          | $\frac{\sqrt{2}}{224}$ | 0                      | $\frac{11\sqrt{30}}{1120}$ | 0                          | $\frac{\sqrt{70}}{160}$  |
|     |                                  | 0  | $-\frac{5\sqrt{6}}{96}$  | 0                        | $-\frac{5\sqrt{3}}{112}$ | 0                        | $-\frac{\sqrt{30}}{224}$ | $\frac{3\sqrt{35}}{160}$  | 0                          | $-\frac{\sqrt{15}}{160}$   | 0                      | $-\frac{13}{224}$      | 0                          | $-\frac{23\sqrt{5}}{1120}$ | 0                        |
|     |                                  | $\frac{3\sqrt{6}}{32}$                                     | 0                        | $\frac{\sqrt{15}}{48}$   | 0                        | $\frac{\sqrt{30}}{224}$  | 0                        | 0                         | $\frac{3}{32}$             | 0                          | $\frac{\sqrt{5}}{32}$  | 0                      | $\frac{5\sqrt{3}}{224}$    | 0                          | $\frac{\sqrt{7}}{224}$   |
| 703 | symmetry                         | $\frac{z(15x^4+30x^2y^2-40x^2z^2+15y^4-40y^2z^2+8z^4)}{8}$ |                          |                          |                          |                          |                          |                           |                            |                            |                        |                        |                            |                            |                          |
|     | $\mathbb{T}_{5,2}^{(a)}(T_1, 1)$ | 0  | 0                        | 0                        | 0                        | 0                        | 0                        | 0                         | 0                          | $\frac{\sqrt{15}i}{30}$    | 0                      | 0                      | 0                          | 0                          | 0                        |
|     |                                  | 0  | 0                        | 0                        | 0                        | 0                        | 0                        | 0                         | 0                          | 0                          | $-\frac{\sqrt{3}i}{6}$ | 0                      | 0                          | 0                          | 0                        |
|     |                                  | 0  | 0                        | 0                        | 0                        | 0                        | 0                        | 0                         | 0                          | 0                          | 0                      | $\frac{\sqrt{3}i}{6}$  | 0                          | 0                          | 0                        |
|     |                                  | 0  | 0                        | 0                        | 0                        | 0                        | 0                        | 0                         | 0                          | 0                          | 0                      | 0                      | $-\frac{\sqrt{15}i}{30}$   | 0                          | 0                        |
|     |                                  | $-\frac{\sqrt{6}i}{84}$                                    | 0                        | 0                        | 0                        | 0                        | 0                        | 0                         | $\frac{i}{14}$             | 0                          | 0                      | 0                      | 0                          | 0                          | 0                        |
|     |                                  | 0  | $\frac{5\sqrt{6}i}{84}$  | 0                        | 0                        | 0                        | 0                        | 0                         | 0                          | $-\frac{3\sqrt{15}i}{70}$  | 0                      | 0                      | 0                          | 0                          | 0                        |
|     |                                  | 0  | 0                        | $-\frac{5\sqrt{6}i}{42}$ | 0                        | 0                        | 0                        | 0                         | 0                          | 0                          | $\frac{\sqrt{2}i}{14}$ | 0                      | 0                          | 0                          | 0                        |
|     |                                  | 0  | 0                        | 0                        | $\frac{5\sqrt{6}i}{42}$  | 0                        | 0                        | 0                         | 0                          | 0                          | 0                      | $\frac{\sqrt{2}i}{14}$ | 0                          | 0                          | 0                        |
|     |                                  | 0  | 0                        | 0                        | 0                        | $-\frac{5\sqrt{6}i}{84}$ | 0                        | 0                         | 0                          | 0                          | 0                      | 0                      | $-\frac{3\sqrt{15}i}{70}$  | 0                          | 0                        |
|     |                                  | 0  | 0                        | 0                        | 0                        | 0                        | $\frac{\sqrt{6}i}{84}$   | 0                         | 0                          | 0                          | 0                      | 0                      | 0                          | $\frac{i}{14}$             | 0                        |
| 704 | symmetry                         | $\frac{3\sqrt{35}x(y^2-2yz-z^2)(y^2+2yz-z^2)}{8}$          |                          |                          |                          |                          |                          |                           |                            |                            |                        |                        |                            |                            |                          |

*continued ...*



Table 9

| No. | multipole                        | matrix  |                            |                            |                            |                            |                            |                           |                             |                              |                              |                             |                             |                              |                          |
|-----|----------------------------------|---|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|-----------------------------|------------------------------|------------------------------|-----------------------------|-----------------------------|------------------------------|--------------------------|
|     | $\mathbb{T}_{5,0}^{(a)}(T_1, 2)$ | 0   | 0                          | 0                          | 0                          | 0                          | 0                          | 0                         | $-\frac{\sqrt{7}i}{80}$     | 0                            | $\frac{\sqrt{35}i}{80}$      | 0                           | $\frac{3\sqrt{21}i}{80}$    | 0                            | $\frac{i}{16}$           |
|     |                                  | 0   | 0                          | 0                          | 0                          | 0                          | 0                          | $\frac{3\sqrt{3}i}{80}$   | 0                           | $\frac{3\sqrt{7}i}{80}$      | 0                            | $-\frac{\sqrt{105}i}{80}$   | 0                           | $-\frac{3\sqrt{21}i}{80}$    | 0                        |
|     |                                  | 0   | 0                          | 0                          | 0                          | 0                          | 0                          | 0                         | $-\frac{3\sqrt{21}i}{80}$   | 0                            | $-\frac{\sqrt{105}i}{80}$    | 0                           | $\frac{3\sqrt{7}i}{80}$     | 0                            | $\frac{3\sqrt{3}i}{80}$  |
|     |                                  | 0   | 0                          | 0                          | 0                          | 0                          | 0                          | $\frac{i}{16}$            | 0                           | $\frac{3\sqrt{21}i}{80}$     | 0                            | $\frac{\sqrt{35}i}{80}$     | 0                           | $-\frac{\sqrt{7}i}{80}$      | 0                        |
|     |                                  | 0   | $-\frac{\sqrt{42}i}{224}$  | 0                          | $-\frac{3\sqrt{21}i}{112}$ | 0                          | $-\frac{\sqrt{210}i}{224}$ | $-\frac{\sqrt{5}i}{160}$  | 0                           | $\frac{\sqrt{105}i}{224}$    | 0                            | $\frac{9\sqrt{7}i}{224}$    | 0                           | $\frac{\sqrt{35}i}{224}$     | 0                        |
|     |                                  | $-\frac{\sqrt{42}i}{224}$                         | 0                          | $\frac{\sqrt{105}i}{112}$  | 0                          | $\frac{3\sqrt{210}i}{224}$ | 0                          | 0                         | $\frac{23\sqrt{7}i}{1120}$  | 0                            | $-\frac{13\sqrt{35}i}{1120}$ | 0                           | $-\frac{9\sqrt{21}i}{1120}$ | 0                            | $\frac{i}{32}$           |
|     |                                  | 0   | $\frac{\sqrt{105}i}{112}$  | 0                          | $-\frac{\sqrt{210}i}{112}$ | 0                          | $-\frac{3\sqrt{21}i}{112}$ | $-\frac{9\sqrt{2}i}{160}$ | 0                           | $-\frac{11\sqrt{42}i}{1120}$ | 0                            | $\frac{\sqrt{70}i}{1120}$   | 0                           | $-\frac{27\sqrt{14}i}{1120}$ | 0                        |
|     |                                  | $-\frac{3\sqrt{21}i}{112}$                        | 0                          | $-\frac{\sqrt{210}i}{112}$ | 0                          | $\frac{\sqrt{105}i}{112}$  | 0                          | 0                         | $\frac{27\sqrt{14}i}{1120}$ | 0                            | $-\frac{\sqrt{70}i}{1120}$   | 0                           | $\frac{11\sqrt{42}i}{1120}$ | 0                            | $\frac{9\sqrt{2}i}{160}$ |
|     |                                  | 0   | $\frac{3\sqrt{210}i}{224}$ | 0                          | $\frac{\sqrt{105}i}{112}$  | 0                          | $-\frac{\sqrt{42}i}{224}$  | $-\frac{i}{32}$           | 0                           | $\frac{9\sqrt{21}i}{1120}$   | 0                            | $\frac{13\sqrt{35}i}{1120}$ | 0                           | $-\frac{23\sqrt{7}i}{1120}$  | 0                        |
|     |                                  | $-\frac{\sqrt{210}i}{224}$                        | 0                          | $-\frac{3\sqrt{21}i}{112}$ | 0                          | $-\frac{\sqrt{42}i}{224}$  | 0                          | 0                         | $-\frac{\sqrt{35}i}{224}$   | 0                            | $-\frac{9\sqrt{7}i}{224}$    | 0                           | $-\frac{\sqrt{105}i}{224}$  | 0                            | $\frac{\sqrt{5}i}{160}$  |
| 705 | symmetry                         | $\frac{3\sqrt{35}y(x^2-2xz-z^2)(x^2+2xz-z^2)}{8}$ |                            |                            |                            |                            |                            |                           |                             |                              |                              |                             |                             |                              |                          |
|     | $\mathbb{T}_{5,1}^{(a)}(T_1, 2)$ | 0   | 0                          | 0                          | 0                          | 0                          | 0                          | 0                         | $\frac{\sqrt{7}}{80}$       | 0                            | $\frac{\sqrt{35}}{80}$       | 0                           | $-\frac{3\sqrt{21}}{80}$    | 0                            | $\frac{1}{16}$           |
|     |                                  | 0   | 0                          | 0                          | 0                          | 0                          | 0                          | $\frac{3\sqrt{3}}{80}$    | 0                           | $-\frac{3\sqrt{7}}{80}$      | 0                            | $-\frac{\sqrt{105}}{80}$    | 0                           | $\frac{3\sqrt{21}}{80}$      | 0                        |
|     |                                  | 0   | 0                          | 0                          | 0                          | 0                          | 0                          | 0                         | $-\frac{3\sqrt{21}}{80}$    | 0                            | $\frac{\sqrt{105}}{80}$      | 0                           | $\frac{3\sqrt{7}}{80}$      | 0                            | $-\frac{3\sqrt{3}}{80}$  |
|     |                                  | 0   | 0                          | 0                          | 0                          | 0                          | 0                          | $-\frac{1}{16}$           | 0                           | $\frac{3\sqrt{21}}{80}$      | 0                            | $-\frac{\sqrt{35}}{80}$     | 0                           | $-\frac{\sqrt{7}}{80}$       | 0                        |
|     |                                  | 0   | $-\frac{\sqrt{42}}{224}$   | 0                          | $\frac{3\sqrt{21}}{112}$   | 0                          | $-\frac{\sqrt{210}}{224}$  | $\frac{\sqrt{5}}{160}$    | 0                           | $\frac{\sqrt{105}}{224}$     | 0                            | $-\frac{9\sqrt{7}}{224}$    | 0                           | $\frac{\sqrt{35}}{224}$      | 0                        |
|     |                                  | $\frac{\sqrt{42}}{224}$                           | 0                          | $\frac{\sqrt{105}}{112}$   | 0                          | $-\frac{3\sqrt{210}}{224}$ | 0                          | 0                         | $-\frac{23\sqrt{7}}{1120}$  | 0                            | $-\frac{13\sqrt{35}}{1120}$  | 0                           | $\frac{9\sqrt{21}}{1120}$   | 0                            | $\frac{1}{32}$           |
|     |                                  | 0   | $-\frac{\sqrt{105}}{112}$  | 0                          | $-\frac{\sqrt{210}}{112}$  | 0                          | $\frac{3\sqrt{21}}{112}$   | $-\frac{9\sqrt{2}}{160}$  | 0                           | $\frac{11\sqrt{42}}{1120}$   | 0                            | $\frac{\sqrt{70}}{1120}$    | 0                           | $\frac{27\sqrt{14}}{1120}$   | 0                        |
|     |                                  | $-\frac{3\sqrt{21}}{112}$                         | 0                          | $\frac{\sqrt{210}}{112}$   | 0                          | $\frac{\sqrt{105}}{112}$   | 0                          | 0                         | $\frac{27\sqrt{14}}{1120}$  | 0                            | $\frac{\sqrt{70}}{1120}$     | 0                           | $\frac{11\sqrt{42}}{1120}$  | 0                            | $-\frac{9\sqrt{2}}{160}$ |
|     |                                  | 0   | $\frac{3\sqrt{210}}{224}$  | 0                          | $-\frac{\sqrt{105}}{112}$  | 0                          | $-\frac{\sqrt{42}}{224}$   | $\frac{1}{32}$            | 0                           | $\frac{9\sqrt{21}}{1120}$    | 0                            | $-\frac{13\sqrt{35}}{1120}$ | 0                           | $-\frac{23\sqrt{7}}{1120}$   | 0                        |
|     |                                  | $\frac{\sqrt{210}}{224}$                          | 0                          | $-\frac{3\sqrt{21}}{112}$  | 0                          | $\frac{\sqrt{42}}{224}$    | 0                          | 0                         | $\frac{\sqrt{35}}{224}$     | 0                            | $-\frac{9\sqrt{7}}{224}$     | 0                           | $\frac{\sqrt{105}}{224}$    | 0                            | $\frac{\sqrt{5}}{160}$   |
| 706 | symmetry                         | $\frac{3\sqrt{35}z(x^2-2xy-y^2)(x^2+2xy-y^2)}{8}$ |                            |                            |                            |                            |                            |                           |                             |                              |                              |                             |                             |                              |                          |

continued ...

Table 9

| No. | multipole                        | matrix |   |   |   |   |   |   |   |   |   |   |                        |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   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|-----|----------------------------------|--------|---|---|---|---|---|---|---|---|---|---|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|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|     | $\mathbb{T}_{5,2}^{(a)}(T_1, 2)$ | 0      | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{10}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0</ |

continued ...

Table 9

| No. | multipole                     | matrix   |                         |                          |                         |                          |                           |                          |                            |                            |                             |                             |                            |                            |                          |
|-----|-------------------------------|--|-------------------------|--------------------------|-------------------------|--------------------------|---------------------------|--------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|--------------------------|
|     | $\mathbb{T}_{5,1}^{(a)}(T_2)$ | 0  | 0                       | 0                        | 0                       | 0                        | 0                         | 0                        | $-\frac{\sqrt{21}}{120}$   | 0                          | $-\frac{\sqrt{105}}{120}$   | 0                           | $-\frac{\sqrt{7}}{40}$     | 0                          | $\frac{\sqrt{3}}{8}$     |
|     |                               | 0  | 0                       | 0                        | 0                       | 0                        | 0                         | $\frac{1}{40}$           | 0                          | $\frac{\sqrt{21}}{40}$     | 0                           | $\frac{\sqrt{35}}{40}$      | 0                          | $\frac{\sqrt{7}}{40}$      | 0                        |
|     |                               | 0  | 0                       | 0                        | 0                       | 0                        | 0                         | 0                        | $-\frac{\sqrt{7}}{40}$     | 0                          | $-\frac{\sqrt{35}}{40}$     | 0                           | $-\frac{\sqrt{21}}{40}$    | 0                          | $-\frac{1}{40}$          |
|     |                               | 0  | 0                       | 0                        | 0                       | 0                        | 0                         | $-\frac{\sqrt{3}}{8}$    | 0                          | $\frac{\sqrt{7}}{40}$      | 0                           | $\frac{\sqrt{105}}{120}$    | 0                          | $\frac{\sqrt{21}}{120}$    | 0                        |
|     |                               | 0  | $\frac{\sqrt{14}}{112}$ | 0                        | $\frac{\sqrt{7}}{56}$   | 0                        | $-\frac{3\sqrt{70}}{112}$ | $-\frac{\sqrt{15}}{240}$ | 0                          | $-\frac{\sqrt{35}}{112}$   | 0                           | $-\frac{\sqrt{21}}{112}$    | 0                          | $\frac{\sqrt{105}}{112}$   | 0                        |
|     |                               | $-\frac{\sqrt{14}}{112}$                         | 0                       | $-\frac{\sqrt{35}}{56}$  | 0                       | $-\frac{\sqrt{70}}{112}$ | 0                         | 0                        | $\frac{23\sqrt{21}}{1680}$ | 0                          | $\frac{13\sqrt{105}}{1680}$ | 0                           | $\frac{3\sqrt{7}}{560}$    | 0                          | $\frac{\sqrt{3}}{16}$    |
|     |                               | 0  | $\frac{\sqrt{35}}{56}$  | 0                        | $\frac{\sqrt{70}}{56}$  | 0                        | $\frac{\sqrt{7}}{56}$     | $-\frac{\sqrt{6}}{80}$   | 0                          | $-\frac{11\sqrt{14}}{560}$ | 0                           | $-\frac{\sqrt{210}}{1680}$  | 0                          | $\frac{3\sqrt{42}}{560}$   | 0                        |
|     |                               | $-\frac{\sqrt{7}}{56}$                           | 0                       | $-\frac{\sqrt{70}}{56}$  | 0                       | $-\frac{\sqrt{35}}{56}$  | 0                         | 0                        | $\frac{3\sqrt{42}}{560}$   | 0                          | $-\frac{\sqrt{210}}{1680}$  | 0                           | $-\frac{11\sqrt{14}}{560}$ | 0                          | $-\frac{\sqrt{6}}{80}$   |
|     |                               | 0  | $\frac{\sqrt{70}}{112}$ | 0                        | $\frac{\sqrt{35}}{56}$  | 0                        | $\frac{\sqrt{14}}{112}$   | $\frac{\sqrt{3}}{16}$    | 0                          | $\frac{3\sqrt{7}}{560}$    | 0                           | $\frac{13\sqrt{105}}{1680}$ | 0                          | $\frac{23\sqrt{21}}{1680}$ | 0                        |
|     |                               | $\frac{3\sqrt{70}}{112}$                         | 0                       | $-\frac{\sqrt{7}}{56}$   | 0                       | $-\frac{\sqrt{14}}{112}$ | 0                         | 0                        | $\frac{\sqrt{105}}{112}$   | 0                          | $-\frac{\sqrt{21}}{112}$    | 0                           | $-\frac{\sqrt{35}}{112}$   | 0                          | $-\frac{\sqrt{15}}{240}$ |
| 709 | symmetry                      | $-\frac{\sqrt{105}z(x-y)(x+y)(x^2+y^2-2z^2)}{4}$ |                         |                          |                         |                          |                           |                          |                            |                            |                             |                             |                            |                            |                          |
|     | $\mathbb{T}_{5,2}^{(a)}(T_2)$ | 0  | 0                       | 0                        | 0                       | 0                        | 0                         | $\frac{\sqrt{3}i}{60}$   | 0                          | 0                          | 0                           | $\frac{\sqrt{105}i}{60}$    | 0                          | 0                          | 0                        |
|     |                               | 0  | 0                       | 0                        | 0                       | 0                        | 0                         | 0                        | $-\frac{\sqrt{7}i}{20}$    | 0                          | 0                           | 0                           | $-\frac{\sqrt{21}i}{20}$   | 0                          | 0                        |
|     |                               | 0  | 0                       | 0                        | 0                       | 0                        | 0                         | 0                        | 0                          | $\frac{\sqrt{21}i}{20}$    | 0                           | 0                           | 0                          | $\frac{\sqrt{7}i}{20}$     | 0                        |
|     |                               | 0  | 0                       | 0                        | 0                       | 0                        | 0                         | 0                        | 0                          | 0                          | $-\frac{\sqrt{105}i}{60}$   | 0                           | 0                          | 0                          | $-\frac{\sqrt{3}i}{60}$  |
|     |                               | 0  | 0                       | $-\frac{\sqrt{7}i}{28}$  | 0                       | 0                        | 0                         | 0                        | 0                          | 0                          | $\frac{\sqrt{21}i}{42}$     | 0                           | 0                          | 0                          | 0                        |
|     |                               | 0  | 0                       | 0                        | $\frac{\sqrt{35}i}{28}$ | 0                        | 0                         | $-\frac{\sqrt{3}i}{30}$  | 0                          | 0                          | 0                           | $-\frac{\sqrt{105}i}{105}$  | 0                          | 0                          | 0                        |
|     |                               | $-\frac{\sqrt{7}i}{28}$                          | 0                       | 0                        | 0                       | $-\frac{\sqrt{35}i}{28}$ | 0                         | 0                        | $\frac{2\sqrt{42}i}{105}$  | 0                          | 0                           | 0                           | $-\frac{\sqrt{14}i}{70}$   | 0                          | 0                        |
|     |                               | 0  | $\frac{\sqrt{35}i}{28}$ | 0                        | 0                       | 0                        | $\frac{\sqrt{7}i}{28}$    | 0                        | 0                          | $-\frac{\sqrt{14}i}{70}$   | 0                           | 0                           | 0                          | $\frac{2\sqrt{42}i}{105}$  | 0                        |
|     |                               | 0  | 0                       | $-\frac{\sqrt{35}i}{28}$ | 0                       | 0                        | 0                         | 0                        | 0                          | 0                          | $-\frac{\sqrt{105}i}{105}$  | 0                           | 0                          | 0                          | $-\frac{\sqrt{3}i}{30}$  |
|     |                               | 0  | 0                       | 0                        | $\frac{\sqrt{7}i}{28}$  | 0                        | 0                         | 0                        | 0                          | 0                          | 0                           | $\frac{\sqrt{21}i}{42}$     | 0                          | 0                          | 0                        |
| 710 | symmetry                      | $\sqrt{15}xyz$                                   |                         |                          |                         |                          |                           |                          |                            |                            |                             |                             |                            |                            |                          |

continued ...

Table 9

| No. | multipole                          | matrix                         |                            |                          |                           |                            |                            |                           |                           |                          |                         |                         |                          |                          |                           |
|-----|------------------------------------|--------------------------------|----------------------------|--------------------------|---------------------------|----------------------------|----------------------------|---------------------------|---------------------------|--------------------------|-------------------------|-------------------------|--------------------------|--------------------------|---------------------------|
|     | $\mathbb{T}_3^{(1,-1;a)}(A_2)$     | 0                              | 0                          | 0                        | $-\frac{\sqrt{5}}{35}$    | 0                          | 0                          | $\frac{\sqrt{21}}{28}$    | 0                         | 0                        | 0                       | $-\frac{\sqrt{15}}{28}$ | 0                        | 0                        | 0                         |
|     |                                    | $-\frac{\sqrt{6}}{42}$         | 0                          | 0                        | 0                         | $-\frac{\sqrt{30}}{210}$   | 0                          | 0                         | $-\frac{3}{28}$           | 0                        | 0                       | 0                       | $-\frac{3\sqrt{3}}{28}$  | 0                        | 0                         |
|     |                                    | 0                              | $\frac{\sqrt{30}}{210}$    | 0                        | 0                         | 0                          | $\frac{\sqrt{6}}{42}$      | 0                         | 0                         | $-\frac{3\sqrt{3}}{28}$  | 0                       | 0                       | 0                        | $-\frac{3}{28}$          | 0                         |
|     |                                    | 0                              | 0                          | $\frac{\sqrt{5}}{35}$    | 0                         | 0                          | 0                          | 0                         | 0                         | 0                        | $-\frac{\sqrt{15}}{28}$ | 0                       | 0                        | 0                        | $\frac{\sqrt{21}}{28}$    |
|     |                                    | 0                              | 0                          | $\frac{3}{28}$           | 0                         | 0                          | 0                          | 0                         | 0                         | 0                        | $\frac{2\sqrt{3}}{21}$  | 0                       | 0                        | 0                        | 0                         |
|     |                                    | 0                              | 0                          | 0                        | $\frac{3\sqrt{5}}{140}$   | 0                          | 0                          | $\frac{\sqrt{21}}{21}$    | 0                         | 0                        | 0                       | $\frac{\sqrt{15}}{21}$  | 0                        | 0                        | 0                         |
|     |                                    | $-\frac{3}{28}$                | 0                          | 0                        | 0                         | $-\frac{3\sqrt{5}}{140}$   | 0                          | 0                         | $\frac{\sqrt{6}}{42}$     | 0                        | 0                       | 0                       | $\frac{\sqrt{2}}{14}$    | 0                        | 0                         |
|     |                                    | 0                              | $-\frac{3\sqrt{5}}{140}$   | 0                        | 0                         | 0                          | $-\frac{3}{28}$            | 0                         | 0                         | $-\frac{\sqrt{2}}{14}$   | 0                       | 0                       | 0                        | $-\frac{\sqrt{6}}{42}$   | 0                         |
|     |                                    | 0                              | 0                          | $\frac{3\sqrt{5}}{140}$  | 0                         | 0                          | 0                          | 0                         | 0                         | 0                        | $-\frac{\sqrt{15}}{21}$ | 0                       | 0                        | 0                        | $-\frac{\sqrt{21}}{21}$   |
|     |                                    | 0                              | 0                          | 0                        | $\frac{3}{28}$            | 0                          | 0                          | 0                         | 0                         | 0                        | 0                       | $-\frac{2\sqrt{3}}{21}$ | 0                        | 0                        | 0                         |
| 711 | symmetry                           | $\frac{x(2x^2-3y^2-3z^2)}{2}$  |                            |                          |                           |                            |                            |                           |                           |                          |                         |                         |                          |                          |                           |
|     | $\mathbb{T}_{3,0}^{(1,-1;a)}(T_1)$ | $-\frac{\sqrt{30}i}{280}$      | 0                          | $\frac{3\sqrt{3}i}{140}$ | 0                         | $-\frac{\sqrt{6}i}{56}$    | 0                          | 0                         | $-\frac{3\sqrt{5}i}{56}$  | 0                        | $\frac{3i}{28}$         | 0                       | $-\frac{\sqrt{15}i}{56}$ | 0                        | 0                         |
|     |                                    | 0                              | $\frac{\sqrt{2}i}{40}$     | 0                        | $-\frac{i}{140}$          | 0                          | $-\frac{\sqrt{10}i}{56}$   | $-\frac{\sqrt{105}i}{56}$ | 0                         | 0                        | 0                       | $\frac{3\sqrt{3}i}{56}$ | 0                        | $-\frac{\sqrt{15}i}{28}$ | 0                         |
|     |                                    | $\frac{\sqrt{10}i}{56}$        | 0                          | $\frac{i}{140}$          | 0                         | $-\frac{\sqrt{2}i}{40}$    | 0                          | 0                         | $-\frac{\sqrt{15}i}{28}$  | 0                        | $\frac{3\sqrt{3}i}{56}$ | 0                       | 0                        | 0                        | $-\frac{\sqrt{105}i}{56}$ |
|     |                                    | 0                              | $\frac{\sqrt{6}i}{56}$     | 0                        | $-\frac{3\sqrt{3}i}{140}$ | 0                          | $\frac{\sqrt{30}i}{280}$   | 0                         | 0                         | $-\frac{\sqrt{15}i}{56}$ | 0                       | $\frac{3i}{28}$         | 0                        | $-\frac{3\sqrt{5}i}{56}$ | 0                         |
|     |                                    | 0                              | $-\frac{3\sqrt{30}i}{280}$ | 0                        | $\frac{\sqrt{15}i}{56}$   | 0                          | 0                          | $\frac{\sqrt{7}i}{28}$    | 0                         | $-\frac{\sqrt{3}i}{14}$  | 0                       | $\frac{\sqrt{5}i}{28}$  | 0                        | 0                        | 0                         |
|     |                                    | $-\frac{3\sqrt{30}i}{280}$     | 0                          | $\frac{3\sqrt{3}i}{280}$ | 0                         | $\frac{\sqrt{6}i}{28}$     | 0                          | 0                         | $-\frac{\sqrt{5}i}{28}$   | 0                        | $-\frac{i}{14}$         | 0                       | $\frac{\sqrt{15}i}{28}$  | 0                        | 0                         |
|     |                                    | 0                              | $\frac{3\sqrt{3}i}{280}$   | 0                        | $\frac{3\sqrt{6}i}{140}$  | 0                          | $\frac{\sqrt{15}i}{56}$    | $-\frac{\sqrt{70}i}{56}$  | 0                         | $-\frac{\sqrt{30}i}{56}$ | 0                       | $\frac{\sqrt{2}i}{56}$  | 0                        | $\frac{3\sqrt{10}i}{56}$ | 0                         |
|     |                                    | $\frac{\sqrt{15}i}{56}$        | 0                          | $\frac{3\sqrt{6}i}{140}$ | 0                         | $\frac{3\sqrt{3}i}{280}$   | 0                          | 0                         | $-\frac{3\sqrt{10}i}{56}$ | 0                        | $-\frac{\sqrt{2}i}{56}$ | 0                       | $\frac{\sqrt{30}i}{56}$  | 0                        | $\frac{\sqrt{70}i}{56}$   |
|     |                                    | 0                              | $\frac{\sqrt{6}i}{28}$     | 0                        | $\frac{3\sqrt{3}i}{280}$  | 0                          | $-\frac{3\sqrt{30}i}{280}$ | 0                         | 0                         | $-\frac{\sqrt{15}i}{28}$ | 0                       | $\frac{i}{14}$          | 0                        | $\frac{\sqrt{5}i}{28}$   | 0                         |
|     |                                    | 0                              | 0                          | $\frac{\sqrt{15}i}{56}$  | 0                         | $-\frac{3\sqrt{30}i}{280}$ | 0                          | 0                         | 0                         | 0                        | $-\frac{\sqrt{5}i}{28}$ | 0                       | $\frac{\sqrt{3}i}{14}$   | 0                        | $-\frac{\sqrt{7}i}{28}$   |
| 712 | symmetry                           | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ |                            |                          |                           |                            |                            |                           |                           |                          |                         |                         |                          |                          |                           |

continued ...

Table 9

| No. | multipole                          | matrix  |                           |                          |                          |                          |                           |                          |                          |                         |                         |                        |                         |                          |                         |
|-----|------------------------------------|---|---------------------------|--------------------------|--------------------------|--------------------------|---------------------------|--------------------------|--------------------------|-------------------------|-------------------------|------------------------|-------------------------|--------------------------|-------------------------|
|     | $\mathbb{T}_{3,1}^{(1,-1;a)}(T_1)$ | $\frac{\sqrt{30}}{280}$   | 0                         | $\frac{3\sqrt{3}}{140}$  | 0                        | $\frac{\sqrt{6}}{56}$    | 0                         | 0                        | $\frac{3\sqrt{5}}{56}$   | 0                       | $\frac{3}{28}$          | 0                      | $\frac{\sqrt{15}}{56}$  | 0                        | 0                       |
|     |                                    | 0   | $-\frac{\sqrt{2}}{40}$    | 0                        | $-\frac{1}{140}$         | 0                        | $\frac{\sqrt{10}}{56}$    | $-\frac{\sqrt{105}}{56}$ | 0                        | 0                       | 0                       | $\frac{3\sqrt{3}}{56}$ | 0                       | $\frac{\sqrt{15}}{28}$   | 0                       |
|     |                                    | $\frac{\sqrt{10}}{56}$  | 0                         | $-\frac{1}{140}$         | 0                        | $-\frac{\sqrt{2}}{40}$   | 0                         | 0                        | $-\frac{\sqrt{15}}{28}$  | 0                       | $-\frac{3\sqrt{3}}{56}$ | 0                      | 0                       | 0                        | $\frac{\sqrt{105}}{56}$ |
|     |                                    | 0   | $\frac{\sqrt{6}}{56}$     | 0                        | $\frac{3\sqrt{3}}{140}$  | 0                        | $\frac{\sqrt{30}}{280}$   | 0                        | 0                        | $-\frac{\sqrt{15}}{56}$ | 0                       | $-\frac{3}{28}$        | 0                       | $-\frac{3\sqrt{5}}{56}$  | 0                       |
|     |                                    | 0   | $-\frac{3\sqrt{30}}{280}$ | 0                        | $-\frac{\sqrt{15}}{56}$  | 0                        | 0                         | $-\frac{\sqrt{7}}{28}$   | 0                        | $-\frac{\sqrt{3}}{14}$  | 0                       | $-\frac{\sqrt{5}}{28}$ | 0                       | 0                        | 0                       |
|     |                                    | $\frac{3\sqrt{30}}{280}$  | 0                         | $\frac{3\sqrt{3}}{280}$  | 0                        | $-\frac{\sqrt{6}}{28}$   | 0                         | 0                        | $\frac{\sqrt{5}}{28}$    | 0                       | $-\frac{1}{14}$         | 0                      | $-\frac{\sqrt{15}}{28}$ | 0                        | 0                       |
|     |                                    | 0   | $-\frac{3\sqrt{3}}{280}$  | 0                        | $\frac{3\sqrt{6}}{140}$  | 0                        | $-\frac{\sqrt{15}}{56}$   | $-\frac{\sqrt{70}}{56}$  | 0                        | $\frac{\sqrt{30}}{56}$  | 0                       | $\frac{\sqrt{2}}{56}$  | 0                       | $-\frac{3\sqrt{10}}{56}$ | 0                       |
|     |                                    | $\frac{\sqrt{15}}{56}$  | 0                         | $-\frac{3\sqrt{6}}{140}$ | 0                        | $\frac{3\sqrt{3}}{280}$  | 0                         | 0                        | $-\frac{3\sqrt{10}}{56}$ | 0                       | $\frac{\sqrt{2}}{56}$   | 0                      | $\frac{\sqrt{30}}{56}$  | 0                        | $-\frac{\sqrt{70}}{56}$ |
|     |                                    | 0   | $\frac{\sqrt{6}}{28}$     | 0                        | $-\frac{3\sqrt{3}}{280}$ | 0                        | $-\frac{3\sqrt{30}}{280}$ | 0                        | 0                        | $-\frac{\sqrt{15}}{28}$ | 0                       | $-\frac{1}{14}$        | 0                       | $\frac{\sqrt{5}}{28}$    | 0                       |
|     |                                    | 0   | 0                         | $\frac{\sqrt{15}}{56}$   | 0                        | $\frac{3\sqrt{30}}{280}$ | 0                         | 0                        | 0                        | 0                       | $-\frac{\sqrt{5}}{28}$  | 0                      | $-\frac{\sqrt{3}}{14}$  | 0                        | $-\frac{\sqrt{7}}{28}$  |
| 713 | symmetry                           | $-\frac{z(3x^2+3y^2-2z^2)}{2}$  |                           |                          |                          |                          |                           |                          |                          |                         |                         |                        |                         |                          |                         |
|     | $\mathbb{T}_{3,2}^{(1,-1;a)}(T_1)$ | $\begin{bmatrix} 0 & -\frac{\sqrt{6}i}{35} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{15}i}{14} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{2i}{35} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{14} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{2i}{35} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{14} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{35} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{15}i}{14} & 0 & 0 & 0 \\ \frac{\sqrt{6}i}{28} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{2i}{7} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{6}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{6}i}{35} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{7} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{6}i}{35} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{7} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{2i}{7} & 0 \end{bmatrix}$ |                           |                          |                          |                          |                           |                          |                          |                         |                         |                        |                         |                          |                         |
| 714 | symmetry                           | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$  |                           |                          |                          |                          |                           |                          |                          |                         |                         |                        |                         |                          |                         |

continued ...

Table 9

| No. | multipole                          | matrix                            |                            |                           |                           |                            |                          |                          |                          |                          |                           |                          |                         |                          |                           |
|-----|------------------------------------|-----------------------------------|----------------------------|---------------------------|---------------------------|----------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------|--------------------------|-------------------------|--------------------------|---------------------------|
|     | $\mathbb{T}_{3,0}^{(1,-1;a)}(T_2)$ | $-\frac{\sqrt{2}i}{56}$           | 0                          | $\frac{3\sqrt{5}i}{140}$  | 0                         | $\frac{3\sqrt{10}i}{280}$  | 0                        | 0                        | $-\frac{5\sqrt{3}i}{56}$ | 0                        | $\frac{\sqrt{15}i}{28}$   | 0                        | $\frac{3i}{56}$         | 0                        | 0                         |
|     |                                    | 0                                 | $\frac{\sqrt{30}i}{120}$   | 0                         | $-\frac{\sqrt{15}i}{420}$ | 0                          | $\frac{\sqrt{6}i}{56}$   | $\frac{3\sqrt{7}i}{56}$  | 0                        | 0                        | 0                         | $\frac{3\sqrt{5}i}{56}$  | 0                       | $\frac{3i}{28}$          | 0                         |
|     |                                    | $-\frac{\sqrt{6}i}{56}$           | 0                          | $\frac{\sqrt{15}i}{420}$  | 0                         | $-\frac{\sqrt{30}i}{120}$  | 0                        | 0                        | $\frac{3i}{28}$          | 0                        | $\frac{3\sqrt{5}i}{56}$   | 0                        | 0                       | 0                        | $\frac{3\sqrt{7}i}{56}$   |
|     |                                    | 0                                 | $-\frac{3\sqrt{10}i}{280}$ | 0                         | $-\frac{3\sqrt{5}i}{140}$ | 0                          | $\frac{\sqrt{2}i}{56}$   | 0                        | 0                        | $\frac{3i}{56}$          | 0                         | $\frac{\sqrt{15}i}{28}$  | 0                       | $-\frac{5\sqrt{3}i}{56}$ | 0                         |
|     |                                    | 0                                 | $-\frac{3\sqrt{2}i}{56}$   | 0                         | $-\frac{3i}{56}$          | 0                          | 0                        | $\frac{\sqrt{105}i}{84}$ | 0                        | $-\frac{\sqrt{5}i}{14}$  | 0                         | $-\frac{\sqrt{3}i}{28}$  | 0                       | 0                        | 0                         |
|     |                                    | $-\frac{3\sqrt{2}i}{56}$          | 0                          | $\frac{3\sqrt{5}i}{280}$  | 0                         | $-\frac{3\sqrt{10}i}{140}$ | 0                        | 0                        | $-\frac{5\sqrt{3}i}{84}$ | 0                        | $-\frac{\sqrt{15}i}{42}$  | 0                        | $-\frac{3i}{28}$        | 0                        | 0                         |
|     |                                    | 0                                 | $\frac{3\sqrt{5}i}{280}$   | 0                         | $\frac{3\sqrt{10}i}{140}$ | 0                          | $-\frac{3i}{56}$         | $\frac{\sqrt{42}i}{56}$  | 0                        | $-\frac{5\sqrt{2}i}{56}$ | 0                         | $\frac{\sqrt{30}i}{168}$ | 0                       | $-\frac{3\sqrt{6}i}{56}$ | 0                         |
|     |                                    | $-\frac{3i}{56}$                  | 0                          | $\frac{3\sqrt{10}i}{140}$ | 0                         | $\frac{3\sqrt{5}i}{280}$   | 0                        | 0                        | $\frac{3\sqrt{6}i}{56}$  | 0                        | $-\frac{\sqrt{30}i}{168}$ | 0                        | $\frac{5\sqrt{2}i}{56}$ | 0                        | $-\frac{\sqrt{42}i}{56}$  |
|     |                                    | 0                                 | $-\frac{3\sqrt{10}i}{140}$ | 0                         | $\frac{3\sqrt{5}i}{280}$  | 0                          | $-\frac{3\sqrt{2}i}{56}$ | 0                        | 0                        | $\frac{3i}{28}$          | 0                         | $\frac{\sqrt{15}i}{42}$  | 0                       | $\frac{5\sqrt{3}i}{84}$  | 0                         |
|     |                                    | 0                                 | 0                          | $-\frac{3i}{56}$          | 0                         | $-\frac{3\sqrt{2}i}{56}$   | 0                        | 0                        | 0                        | 0                        | $\frac{\sqrt{3}i}{28}$    | 0                        | $\frac{\sqrt{5}i}{14}$  | 0                        | $-\frac{\sqrt{105}i}{84}$ |
| 715 | symmetry                           | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |                            |                           |                           |                            |                          |                          |                          |                          |                           |                          |                         |                          |                           |
|     | $\mathbb{T}_{3,1}^{(1,-1;a)}(T_2)$ | $-\frac{\sqrt{2}}{56}$            | 0                          | $-\frac{3\sqrt{5}}{140}$  | 0                         | $\frac{3\sqrt{10}}{280}$   | 0                        | 0                        | $-\frac{5\sqrt{3}}{56}$  | 0                        | $-\frac{\sqrt{15}}{28}$   | 0                        | $\frac{3}{56}$          | 0                        | 0                         |
|     |                                    | 0                                 | $\frac{\sqrt{30}}{120}$    | 0                         | $\frac{\sqrt{15}}{420}$   | 0                          | $\frac{\sqrt{6}}{56}$    | $-\frac{3\sqrt{7}}{56}$  | 0                        | 0                        | 0                         | $-\frac{3\sqrt{5}}{56}$  | 0                       | $\frac{3}{28}$           | 0                         |
|     |                                    | $\frac{\sqrt{6}}{56}$             | 0                          | $\frac{\sqrt{15}}{420}$   | 0                         | $\frac{\sqrt{30}}{120}$    | 0                        | 0                        | $-\frac{3}{28}$          | 0                        | $\frac{3\sqrt{5}}{56}$    | 0                        | 0                       | 0                        | $\frac{3\sqrt{7}}{56}$    |
|     |                                    | 0                                 | $\frac{3\sqrt{10}}{280}$   | 0                         | $-\frac{3\sqrt{5}}{140}$  | 0                          | $-\frac{\sqrt{2}}{56}$   | 0                        | 0                        | $-\frac{3}{56}$          | 0                         | $\frac{\sqrt{15}}{28}$   | 0                       | $\frac{5\sqrt{3}}{56}$   | 0                         |
|     |                                    | 0                                 | $\frac{3\sqrt{2}}{56}$     | 0                         | $-\frac{3}{56}$           | 0                          | 0                        | $\frac{\sqrt{105}}{84}$  | 0                        | $\frac{\sqrt{5}}{14}$    | 0                         | $-\frac{\sqrt{3}}{28}$   | 0                       | 0                        | 0                         |
|     |                                    | $-\frac{3\sqrt{2}}{56}$           | 0                          | $-\frac{3\sqrt{5}}{280}$  | 0                         | $-\frac{3\sqrt{10}}{140}$  | 0                        | 0                        | $-\frac{5\sqrt{3}}{84}$  | 0                        | $\frac{\sqrt{15}}{42}$    | 0                        | $-\frac{3}{28}$         | 0                        | 0                         |
|     |                                    | 0                                 | $\frac{3\sqrt{5}}{280}$    | 0                         | $-\frac{3\sqrt{10}}{140}$ | 0                          | $-\frac{3}{56}$          | $-\frac{\sqrt{42}}{56}$  | 0                        | $-\frac{5\sqrt{2}}{56}$  | 0                         | $-\frac{\sqrt{30}}{168}$ | 0                       | $-\frac{3\sqrt{6}}{56}$  | 0                         |
|     |                                    | $\frac{3}{56}$                    | 0                          | $\frac{3\sqrt{10}}{140}$  | 0                         | $-\frac{3\sqrt{5}}{280}$   | 0                        | 0                        | $-\frac{3\sqrt{6}}{56}$  | 0                        | $-\frac{\sqrt{30}}{168}$  | 0                        | $-\frac{5\sqrt{2}}{56}$ | 0                        | $-\frac{\sqrt{42}}{56}$   |
|     |                                    | 0                                 | $\frac{3\sqrt{10}}{140}$   | 0                         | $\frac{3\sqrt{5}}{280}$   | 0                          | $\frac{3\sqrt{2}}{56}$   | 0                        | 0                        | $-\frac{3}{28}$          | 0                         | $\frac{\sqrt{15}}{42}$   | 0                       | $-\frac{5\sqrt{3}}{84}$  | 0                         |
|     |                                    | 0                                 | 0                          | $\frac{3}{56}$            | 0                         | $-\frac{3\sqrt{2}}{56}$    | 0                        | 0                        | 0                        | 0                        | $-\frac{\sqrt{3}}{28}$    | 0                        | $\frac{\sqrt{5}}{14}$   | 0                        | $\frac{\sqrt{105}}{84}$   |
| 716 | symmetry                           | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$  |                            |                           |                           |                            |                          |                          |                          |                          |                           |                          |                         |                          |                           |

continued ...

Table 9

| No. | multipole                          | matrix                                  |                           |                           |                          |                           |                           |                          |                         |                         |                         |                          |                           |                         |                          |
|-----|------------------------------------|---|---------------------------|---------------------------|--------------------------|---------------------------|---------------------------|--------------------------|-------------------------|-------------------------|-------------------------|--------------------------|---------------------------|-------------------------|--------------------------|
|     | $\mathbb{T}_{3,2}^{(1,-1;a)}(T_2)$ | 0                                       | 0                         | 0                         | $-\frac{\sqrt{5}i}{35}$  | 0                         | 0                         | $-\frac{\sqrt{21}i}{28}$ | 0                       | 0                       | 0                       | $-\frac{\sqrt{15}i}{28}$ | 0                         | 0                       | 0                        |
|     |                                    | $\frac{\sqrt{6}i}{42}$                  | 0                         | 0                         | 0                        | $-\frac{\sqrt{30}i}{210}$ | 0                         | 0                        | $\frac{3i}{28}$         | 0                       | 0                       | 0                        | $-\frac{3\sqrt{3}i}{28}$  | 0                       | 0                        |
|     |                                    | 0                                       | $-\frac{\sqrt{30}i}{210}$ | 0                         | 0                        | 0                         | $\frac{\sqrt{6}i}{42}$    | 0                        | 0                       | $\frac{3\sqrt{3}i}{28}$ | 0                       | 0                        | 0                         | $-\frac{3i}{28}$        | 0                        |
|     |                                    | 0                                       | 0                         | $-\frac{\sqrt{5}i}{35}$   | 0                        | 0                         | 0                         | 0                        | 0                       | $\frac{\sqrt{15}i}{28}$ | 0                       | 0                        | 0                         | 0                       | $\frac{\sqrt{21}i}{28}$  |
|     |                                    | 0                                       | 0                         | $\frac{3i}{28}$           | 0                        | 0                         | 0                         | 0                        | 0                       | $\frac{2\sqrt{3}i}{21}$ | 0                       | 0                        | 0                         | 0                       | 0                        |
|     |                                    | 0                                       | 0                         | 0                         | $\frac{3\sqrt{5}i}{140}$ | 0                         | 0                         | $-\frac{\sqrt{21}i}{21}$ | 0                       | 0                       | 0                       | $\frac{\sqrt{15}i}{21}$  | 0                         | 0                       | 0                        |
|     |                                    | $\frac{3i}{28}$                         | 0                         | 0                         | 0                        | $-\frac{3\sqrt{5}i}{140}$ | 0                         | 0                        | $-\frac{\sqrt{6}i}{42}$ | 0                       | 0                       | 0                        | $\frac{\sqrt{2}i}{14}$    | 0                       | 0                        |
|     |                                    | 0                                       | $\frac{3\sqrt{5}i}{140}$  | 0                         | 0                        | 0                         | $-\frac{3i}{28}$          | 0                        | 0                       | $\frac{\sqrt{2}i}{14}$  | 0                       | 0                        | 0                         | $-\frac{\sqrt{6}i}{42}$ | 0                        |
|     |                                    | 0                                       | 0                         | $-\frac{3\sqrt{5}i}{140}$ | 0                        | 0                         | 0                         | 0                        | 0                       | $\frac{\sqrt{15}i}{21}$ | 0                       | 0                        | 0                         | 0                       | $-\frac{\sqrt{21}i}{21}$ |
|     |                                    | 0                                       | 0                         | 0                         | $-\frac{3i}{28}$         | 0                         | 0                         | 0                        | 0                       | 0                       | $\frac{2\sqrt{3}i}{21}$ | 0                        | 0                         | 0                       | 0                        |
| 717 | symmetry                           | $\frac{3\sqrt{35}xyz(x-y)(x+y)}{2}$     |                           |                           |                          |                           |                           |                          |                         |                         |                         |                          |                           |                         |                          |
|     | $\mathbb{T}_{5,0}^{(1,-1;a)}(E)$   | 0                                       | 0                         | 0                         | 0                        | 0                         | 0                         | 0                        | 0                       | 0                       | 0                       | $\frac{\sqrt{210}}{100}$ | 0                         |                         |                          |
|     |                                    | 0                                       | 0                         | 0                         | 0                        | 0                         | 0                         | 0                        | 0                       | 0                       | 0                       | 0                        | $-\frac{3\sqrt{10}}{100}$ |                         |                          |
|     |                                    | 0                                       | 0                         | 0                         | 0                        | 0                         | $-\frac{3\sqrt{10}}{100}$ | 0                        | 0                       | 0                       | 0                       | 0                        | 0                         |                         |                          |
|     |                                    | 0                                       | 0                         | 0                         | 0                        | 0                         | 0                         | $\frac{\sqrt{210}}{100}$ | 0                       | 0                       | 0                       | 0                        | 0                         |                         |                          |
|     |                                    | 0                                       | 0                         | 0                         | $-\frac{\sqrt{35}}{70}$  | 0                         | 0                         | 0                        | 0                       | 0                       | 0                       | $-\frac{3\sqrt{14}}{35}$ | 0                         |                         |                          |
|     |                                    | 0                                       | 0                         | 0                         | 0                        | $\frac{\sqrt{35}}{70}$    | 0                         | 0                        | 0                       | 0                       | 0                       | 0                        | $-\frac{\sqrt{210}}{175}$ |                         |                          |
|     |                                    | 0                                       | 0                         | 0                         | 0                        | 0                         | 0                         | 0                        | 0                       | 0                       | 0                       | 0                        | 0                         | $\frac{2\sqrt{15}}{25}$ |                          |
|     |                                    | 0                                       | 0                         | 0                         | 0                        | 0                         | $-\frac{2\sqrt{15}}{25}$  | 0                        | 0                       | 0                       | 0                       | 0                        | 0                         | 0                       |                          |
|     |                                    | $\frac{\sqrt{35}}{70}$                  | 0                         | 0                         | 0                        | 0                         | 0                         | $\frac{\sqrt{210}}{175}$ | 0                       | 0                       | 0                       | 0                        | 0                         | 0                       |                          |
|     |                                    | 0                                       | $-\frac{\sqrt{35}}{70}$   | 0                         | 0                        | 0                         | 0                         | 0                        | $\frac{3\sqrt{14}}{35}$ | 0                       | 0                       | 0                        | 0                         | 0                       |                          |
| 718 | symmetry                           | $\frac{\sqrt{105}xyz(x^2+y^2-2z^2)}{2}$ |                           |                           |                          |                           |                           |                          |                         |                         |                         |                          |                           |                         |                          |

continued ...

Table 9

| No. | multipole                             | matrix   |                          |                          |                          |                          |                           |                           |                            |                            |                            |                             |                            |                           |                            |  |
|-----|---------------------------------------|--|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------|---------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|----------------------------|---------------------------|----------------------------|--|
|     | $\mathbb{T}_{5,1}^{(1,-1;a)}(E)$      | 0  | 0                        | 0                        | 0                        | 0                        | 0                         | $\frac{\sqrt{10}}{200}$   | 0                          | 0                          | 0                          | $-\frac{\sqrt{14}}{40}$     | 0                          | 0                         | 0                          |  |
|     |                                       | 0  | 0                        | 0                        | 0                        | 0                        | 0                         | $-\frac{\sqrt{210}}{200}$ | 0                          | 0                          | 0                          | $\frac{3\sqrt{70}}{200}$    | 0                          | 0                         | 0                          |  |
|     |                                       | 0  | 0                        | 0                        | 0                        | 0                        | 0                         | 0                         | $\frac{3\sqrt{70}}{200}$   | 0                          | 0                          | 0                           | $-\frac{\sqrt{210}}{200}$  | 0                         | 0                          |  |
|     |                                       | 0  | 0                        | 0                        | 0                        | 0                        | 0                         | 0                         | 0                          | $-\frac{\sqrt{14}}{40}$    | 0                          | 0                           | 0                          | 0                         | $\frac{\sqrt{10}}{200}$    |  |
|     |                                       | 0  | 0                        | $\frac{\sqrt{210}}{420}$ | 0                        | 0                        | 0                         | 0                         | 0                          | $\frac{\sqrt{70}}{35}$     | 0                          | 0                           | 0                          | 0                         | 0                          |  |
|     |                                       | 0  | 0                        | 0                        | $-\frac{\sqrt{42}}{84}$  | 0                        | 0                         | $\frac{\sqrt{10}}{25}$    | 0                          | 0                          | 0                          | $-\frac{2\sqrt{14}}{35}$    | 0                          | 0                         | 0                          |  |
|     |                                       | $-\frac{\sqrt{210}}{420}$                                  | 0                        | 0                        | 0                        | $\frac{\sqrt{42}}{84}$   | 0                         | 0                         | $-\frac{8\sqrt{35}}{175}$  | 0                          | 0                          | 0                           | $-\frac{2\sqrt{105}}{175}$ | 0                         | 0                          |  |
|     |                                       | 0  | $\frac{\sqrt{42}}{84}$   | 0                        | 0                        | 0                        | $-\frac{\sqrt{210}}{420}$ | 0                         | 0                          | $\frac{2\sqrt{105}}{175}$  | 0                          | 0                           | 0                          | $\frac{8\sqrt{35}}{175}$  | 0                          |  |
|     |                                       | 0  | 0                        | $-\frac{\sqrt{42}}{84}$  | 0                        | 0                        | 0                         | 0                         | 0                          | $\frac{2\sqrt{14}}{35}$    | 0                          | 0                           | 0                          | 0                         | $-\frac{\sqrt{10}}{25}$    |  |
|     |                                       | 0  | 0                        | 0                        | $\frac{\sqrt{210}}{420}$ | 0                        | 0                         | 0                         | 0                          | 0                          | $-\frac{\sqrt{70}}{35}$    | 0                           | 0                          | 0                         | 0                          |  |
| 719 | symmetry                              | $\frac{x(8x^4-40x^2y^2-40x^2z^2+15y^4+30y^2z^2+15z^4)}{8}$ |                          |                          |                          |                          |                           |                           |                            |                            |                            |                             |                            |                           |                            |  |
|     | $\mathbb{T}_{5,0}^{(1,-1;a)}(T_1, 1)$ | 0  | 0                        | 0                        | 0                        | 0                        | 0                         | $-\frac{\sqrt{6}i}{160}$  | 0                          | $\frac{\sqrt{30}i}{160}$   | 0                          | $-\frac{7\sqrt{2}i}{160}$   | 0                          | $\frac{3\sqrt{42}i}{160}$ | 0                          |  |
|     |                                       | 0  | 0                        | 0                        | 0                        | 0                        | 0                         | $-\frac{\sqrt{14}i}{160}$ | 0                          | $\frac{3\sqrt{6}i}{160}$   | 0                          | $-\frac{3\sqrt{10}i}{160}$  | 0                          | $\frac{7\sqrt{2}i}{160}$  | 0                          |  |
|     |                                       | 0  | 0                        | 0                        | 0                        | 0                        | 0                         | $\frac{7\sqrt{2}i}{160}$  | 0                          | $-\frac{3\sqrt{10}i}{160}$ | 0                          | $\frac{3\sqrt{6}i}{160}$    | 0                          | $-\frac{\sqrt{14}i}{160}$ | 0                          |  |
|     |                                       | 0  | 0                        | 0                        | 0                        | 0                        | 0                         | $\frac{3\sqrt{42}i}{160}$ | 0                          | $-\frac{7\sqrt{2}i}{160}$  | 0                          | $\frac{\sqrt{30}i}{160}$    | 0                          | $-\frac{\sqrt{6}i}{160}$  | 0                          |  |
|     |                                       | 0  | $-\frac{i}{112}$         | 0                        | $\frac{\sqrt{2}i}{48}$   | 0                        | $-\frac{3\sqrt{5}i}{80}$  | $\frac{\sqrt{210}i}{560}$ | 0                          | $-\frac{3\sqrt{10}i}{112}$ | 0                          | $\frac{\sqrt{6}i}{16}$      | 0                          | $-\frac{3\sqrt{30}i}{80}$ | 0                          |  |
|     |                                       | $-\frac{i}{112}$   | 0                        | $\frac{\sqrt{10}i}{112}$ | 0                        | $-\frac{\sqrt{5}i}{48}$  | 0                         | 0                         | $-\frac{23\sqrt{6}i}{560}$ | 0                          | $\frac{13\sqrt{30}i}{560}$ | 0                           | $-\frac{3\sqrt{2}i}{80}$   | 0                         | $-\frac{3\sqrt{42}i}{80}$  |  |
|     |                                       | 0  | $\frac{\sqrt{10}i}{112}$ | 0                        | $-\frac{\sqrt{5}i}{56}$  | 0                        | $\frac{\sqrt{2}i}{48}$    | $-\frac{\sqrt{21}i}{40}$  | 0                          | $\frac{33i}{280}$          | 0                          | $-\frac{\sqrt{15}i}{280}$   | 0                          | $-\frac{3\sqrt{3}i}{40}$  | 0                          |  |
|     |                                       | $\frac{\sqrt{2}i}{48}$                                     | 0                        | $-\frac{\sqrt{5}i}{56}$  | 0                        | $\frac{\sqrt{10}i}{112}$ | 0                         | 0                         | $\frac{3\sqrt{3}i}{40}$    | 0                          | $\frac{\sqrt{15}i}{280}$   | 0                           | $-\frac{33i}{280}$         | 0                         | $\frac{\sqrt{21}i}{40}$    |  |
|     |                                       | 0  | $-\frac{\sqrt{5}i}{48}$  | 0                        | $\frac{\sqrt{10}i}{112}$ | 0                        | $-\frac{i}{112}$          | $\frac{3\sqrt{42}i}{80}$  | 0                          | $\frac{3\sqrt{2}i}{80}$    | 0                          | $-\frac{13\sqrt{30}i}{560}$ | 0                          | $\frac{23\sqrt{6}i}{560}$ | 0                          |  |
|     |                                       | $-\frac{3\sqrt{5}i}{80}$                                   | 0                        | $\frac{\sqrt{2}i}{48}$   | 0                        | $-\frac{i}{112}$         | 0                         | 0                         | $\frac{3\sqrt{30}i}{80}$   | 0                          | $-\frac{\sqrt{6}i}{16}$    | 0                           | $\frac{3\sqrt{10}i}{112}$  | 0                         | $-\frac{\sqrt{210}i}{560}$ |  |
| 720 | symmetry                              | $\frac{y(15x^4-40x^2y^2+30x^2z^2+8y^4-40y^2z^2+15z^4)}{8}$ |                          |                          |                          |                          |                           |                           |                            |                            |                            |                             |                            |                           |                            |  |

continued ...



Table 9

| No. | multipole                             | matrix   |                          |                         |                          |                         |                         |                           |                          |                           |                           |                           |                           |                          |                           |
|-----|---------------------------------------|--|--------------------------|-------------------------|--------------------------|-------------------------|-------------------------|---------------------------|--------------------------|---------------------------|---------------------------|---------------------------|---------------------------|--------------------------|---------------------------|
|     | $\mathbb{T}_{5,1}^{(1,-1;a)}(T_1, 1)$ | 0  | 0                        | 0                       | 0                        | 0                       | 0                       | 0                         | $\frac{\sqrt{6}}{160}$   | 0                         | $\frac{\sqrt{30}}{160}$   | 0                         | $\frac{7\sqrt{2}}{160}$   | 0                        | $\frac{3\sqrt{42}}{160}$  |
|     |                                       | 0  | 0                        | 0                       | 0                        | 0                       | 0                       | $-\frac{\sqrt{14}}{160}$  | 0                        | $-\frac{3\sqrt{6}}{160}$  | 0                         | $-\frac{3\sqrt{10}}{160}$ | 0                         | $-\frac{7\sqrt{2}}{160}$ | 0                         |
|     |                                       | 0  | 0                        | 0                       | 0                        | 0                       | 0                       | 0                         | $\frac{7\sqrt{2}}{160}$  | 0                         | $\frac{3\sqrt{10}}{160}$  | 0                         | $\frac{3\sqrt{6}}{160}$   | 0                        | $\frac{\sqrt{14}}{160}$   |
|     |                                       | 0  | 0                        | 0                       | 0                        | 0                       | 0                       | $-\frac{3\sqrt{42}}{160}$ | 0                        | $-\frac{7\sqrt{2}}{160}$  | 0                         | $-\frac{\sqrt{30}}{160}$  | 0                         | $-\frac{\sqrt{6}}{160}$  | 0                         |
|     |                                       | 0  | $-\frac{1}{112}$         | 0                       | $-\frac{\sqrt{2}}{48}$   | 0                       | $-\frac{3\sqrt{5}}{80}$ | $-\frac{\sqrt{210}}{560}$ | 0                        | $-\frac{3\sqrt{10}}{112}$ | 0                         | $-\frac{\sqrt{6}}{16}$    | 0                         | $-\frac{3\sqrt{30}}{80}$ | 0                         |
|     |                                       | $\frac{1}{112}$  | 0                        | $\frac{\sqrt{10}}{112}$ | 0                        | $\frac{\sqrt{5}}{48}$   | 0                       | 0                         | $\frac{23\sqrt{6}}{560}$ | 0                         | $\frac{13\sqrt{30}}{560}$ | 0                         | $\frac{3\sqrt{2}}{80}$    | 0                        | $-\frac{3\sqrt{42}}{80}$  |
|     |                                       | 0  | $-\frac{\sqrt{10}}{112}$ | 0                       | $-\frac{\sqrt{5}}{56}$   | 0                       | $-\frac{\sqrt{2}}{48}$  | $-\frac{\sqrt{21}}{40}$   | 0                        | $-\frac{33}{280}$         | 0                         | $-\frac{\sqrt{15}}{280}$  | 0                         | $\frac{3\sqrt{3}}{40}$   | 0                         |
|     |                                       | $\frac{\sqrt{2}}{48}$                                      | 0                        | $\frac{\sqrt{5}}{56}$   | 0                        | $\frac{\sqrt{10}}{112}$ | 0                       | 0                         | $\frac{3\sqrt{3}}{40}$   | 0                         | $-\frac{\sqrt{15}}{280}$  | 0                         | $-\frac{33}{280}$         | 0                        | $-\frac{\sqrt{21}}{40}$   |
|     |                                       | 0  | $-\frac{\sqrt{5}}{48}$   | 0                       | $-\frac{\sqrt{10}}{112}$ | 0                       | $-\frac{1}{112}$        | $-\frac{3\sqrt{42}}{80}$  | 0                        | $\frac{3\sqrt{2}}{80}$    | 0                         | $\frac{13\sqrt{30}}{560}$ | 0                         | $\frac{23\sqrt{6}}{560}$ | 0                         |
|     |                                       | $\frac{3\sqrt{5}}{80}$                                     | 0                        | $\frac{\sqrt{2}}{48}$   | 0                        | $\frac{1}{112}$         | 0                       | 0                         | $-\frac{3\sqrt{30}}{80}$ | 0                         | $-\frac{\sqrt{6}}{16}$    | 0                         | $-\frac{3\sqrt{10}}{112}$ | 0                        | $-\frac{\sqrt{210}}{560}$ |
| 721 | symmetry                              | $\frac{z(15x^4+30x^2y^2-40x^2z^2+15y^4-40y^2z^2+8z^4)}{8}$ |                          |                         |                          |                         |                         |                           |                          |                           |                           |                           |                           |                          |                           |
|     | $\mathbb{T}_{5,2}^{(1,-1;a)}(T_1, 1)$ | 0  | 0                        | 0                       | 0                        | 0                       | 0                       | 0                         | $\frac{\sqrt{2}i}{20}$   | 0                         | 0                         | 0                         | 0                         | 0                        | 0                         |
|     |                                       | 0  | 0                        | 0                       | 0                        | 0                       | 0                       | 0                         | 0                        | $-\frac{\sqrt{10}i}{20}$  | 0                         | 0                         | 0                         | 0                        | 0                         |
|     |                                       | 0  | 0                        | 0                       | 0                        | 0                       | 0                       | 0                         | 0                        | 0                         | $\frac{\sqrt{10}i}{20}$   | 0                         | 0                         | 0                        | 0                         |
|     |                                       | 0  | 0                        | 0                       | 0                        | 0                       | 0                       | 0                         | 0                        | 0                         | 0                         | $-\frac{\sqrt{2}i}{20}$   | 0                         | 0                        | 0                         |
|     |                                       | $-\frac{\sqrt{5}i}{210}$                                   | 0                        | 0                       | 0                        | 0                       | 0                       | 0                         | $-\frac{\sqrt{30}i}{35}$ | 0                         | 0                         | 0                         | 0                         | 0                        | 0                         |
|     |                                       | 0  | $\frac{\sqrt{5}i}{42}$   | 0                       | 0                        | 0                       | 0                       | 0                         | $\frac{9\sqrt{2}i}{35}$  | 0                         | 0                         | 0                         | 0                         | 0                        | 0                         |
|     |                                       | 0  | 0                        | $-\frac{\sqrt{5}i}{21}$ | 0                        | 0                       | 0                       | 0                         | 0                        | $-\frac{2\sqrt{15}i}{35}$ | 0                         | 0                         | 0                         | 0                        | 0                         |
|     |                                       | 0  | 0                        | 0                       | $\frac{\sqrt{5}i}{21}$   | 0                       | 0                       | 0                         | 0                        | 0                         | $-\frac{2\sqrt{15}i}{35}$ | 0                         | 0                         | 0                        | 0                         |
|     |                                       | 0  | 0                        | 0                       | 0                        | $-\frac{\sqrt{5}i}{42}$ | 0                       | 0                         | 0                        | 0                         | 0                         | $\frac{9\sqrt{2}i}{35}$   | 0                         | 0                        | 0                         |
|     |                                       | 0  | 0                        | 0                       | 0                        | 0                       | $\frac{\sqrt{5}i}{210}$ | 0                         | 0                        | 0                         | 0                         | 0                         | 0                         | $-\frac{\sqrt{30}i}{35}$ | 0                         |
| 722 | symmetry                              | $\frac{3\sqrt{35}x(y^2-2yz-z^2)(y^2+2yz-z^2)}{8}$          |                          |                         |                          |                         |                         |                           |                          |                           |                           |                           |                           |                          |                           |

continued ...

Table 9

| No. | multipole                             | matrix  |                           |                            |                            |                           |                            |                           |                               |                              |                            |                             |                              |                              |                            |
|-----|---------------------------------------|---|---------------------------|----------------------------|----------------------------|---------------------------|----------------------------|---------------------------|-------------------------------|------------------------------|----------------------------|-----------------------------|------------------------------|------------------------------|----------------------------|
|     | $\mathbb{T}_{5,0}^{(1,-1;a)}(T_1, 2)$ | 0   | 0                         | 0                          | 0                          | 0                         | 0                          | 0                         | $-\frac{\sqrt{210}i}{800}$    | 0                            | $\frac{\sqrt{42}i}{160}$   | 0                           | $\frac{9\sqrt{70}i}{800}$    | 0                            | $\frac{\sqrt{30}i}{160}$   |
|     |                                       | 0   | 0                         | 0                          | 0                          | 0                         | 0                          | $\frac{9\sqrt{10}i}{800}$ | 0                             | $\frac{3\sqrt{210}i}{800}$   | 0                          | $-\frac{3\sqrt{14}i}{160}$  | 0                            | $-\frac{9\sqrt{70}i}{800}$   | 0                          |
|     |                                       | 0   | 0                         | 0                          | 0                          | 0                         | 0                          | 0                         | $-\frac{9\sqrt{70}i}{800}$    | 0                            | $-\frac{3\sqrt{14}i}{160}$ | 0                           | $\frac{3\sqrt{210}i}{800}$   | 0                            | $\frac{9\sqrt{10}i}{800}$  |
|     |                                       | 0   | 0                         | 0                          | 0                          | 0                         | 0                          | $\frac{\sqrt{30}i}{160}$  | 0                             | $\frac{9\sqrt{70}i}{800}$    | 0                          | $\frac{\sqrt{42}i}{160}$    | 0                            | $-\frac{\sqrt{210}i}{800}$   | 0                          |
|     |                                       | 0   | $-\frac{\sqrt{35}i}{560}$ | 0                          | $-\frac{3\sqrt{70}i}{560}$ | 0                         | $-\frac{\sqrt{7}i}{112}$   | $\frac{\sqrt{6}i}{80}$    | 0                             | $-\frac{3\sqrt{14}i}{112}$   | 0                          | $-\frac{9\sqrt{210}i}{560}$ | 0                            | $-\frac{\sqrt{42}i}{112}$    | 0                          |
|     |                                       | $-\frac{\sqrt{35}i}{560}$                         | 0                         | $\frac{\sqrt{14}i}{112}$   | 0                          | $\frac{3\sqrt{7}i}{112}$  | 0                          | 0                         | $-\frac{23\sqrt{210}i}{2800}$ | 0                            | $\frac{13\sqrt{42}i}{560}$ | 0                           | $\frac{27\sqrt{70}i}{2800}$  | 0                            | $-\frac{\sqrt{30}i}{80}$   |
|     |                                       | 0   | $\frac{\sqrt{14}i}{112}$  | 0                          | $-\frac{\sqrt{7}i}{56}$    | 0                         | $-\frac{3\sqrt{70}i}{560}$ | $\frac{9\sqrt{15}i}{200}$ | 0                             | $\frac{33\sqrt{35}i}{1400}$  | 0                          | $-\frac{\sqrt{21}i}{280}$   | 0                            | $\frac{27\sqrt{105}i}{1400}$ | 0                          |
|     |                                       | $-\frac{3\sqrt{70}i}{560}$                        | 0                         | $-\frac{\sqrt{7}i}{56}$    | 0                          | $\frac{\sqrt{14}i}{112}$  | 0                          | 0                         | $-\frac{27\sqrt{105}i}{1400}$ | 0                            | $\frac{\sqrt{21}i}{280}$   | 0                           | $-\frac{33\sqrt{35}i}{1400}$ | 0                            | $-\frac{9\sqrt{15}i}{200}$ |
|     |                                       | 0   | $\frac{3\sqrt{7}i}{112}$  | 0                          | $\frac{\sqrt{14}i}{112}$   | 0                         | $-\frac{\sqrt{35}i}{560}$  | $\frac{\sqrt{30}i}{80}$   | 0                             | $-\frac{27\sqrt{70}i}{2800}$ | 0                          | $-\frac{13\sqrt{42}i}{560}$ | 0                            | $\frac{23\sqrt{210}i}{2800}$ | 0                          |
|     |                                       | $-\frac{\sqrt{7}i}{112}$                          | 0                         | $-\frac{3\sqrt{70}i}{560}$ | 0                          | $-\frac{\sqrt{35}i}{560}$ | 0                          | 0                         | $\frac{\sqrt{42}i}{112}$      | 0                            | $\frac{9\sqrt{210}i}{560}$ | 0                           | $\frac{3\sqrt{14}i}{112}$    | 0                            | $-\frac{\sqrt{6}i}{80}$    |
| 723 | symmetry                              | $\frac{3\sqrt{35}y(x^2-2xz-z^2)(x^2+2xz-z^2)}{8}$ |                           |                            |                            |                           |                            |                           |                               |                              |                            |                             |                              |                              |                            |
|     | $\mathbb{T}_{5,1}^{(1,-1;a)}(T_1, 2)$ | 0   | 0                         | 0                          | 0                          | 0                         | 0                          | 0                         | $\frac{\sqrt{210}}{800}$      | 0                            | $\frac{\sqrt{42}}{160}$    | 0                           | $-\frac{9\sqrt{70}}{800}$    | 0                            | $\frac{\sqrt{30}}{160}$    |
|     |                                       | 0   | 0                         | 0                          | 0                          | 0                         | 0                          | $\frac{9\sqrt{10}}{800}$  | 0                             | $-\frac{3\sqrt{210}}{800}$   | 0                          | $-\frac{3\sqrt{14}}{160}$   | 0                            | $\frac{9\sqrt{70}}{800}$     | 0                          |
|     |                                       | 0   | 0                         | 0                          | 0                          | 0                         | 0                          | 0                         | $-\frac{9\sqrt{70}}{800}$     | 0                            | $\frac{3\sqrt{14}}{160}$   | 0                           | $\frac{3\sqrt{210}}{800}$    | 0                            | $-\frac{9\sqrt{10}}{800}$  |
|     |                                       | 0   | 0                         | 0                          | 0                          | 0                         | 0                          | $-\frac{\sqrt{30}}{160}$  | 0                             | $\frac{9\sqrt{70}}{800}$     | 0                          | $-\frac{\sqrt{42}}{160}$    | 0                            | $-\frac{\sqrt{210}}{800}$    | 0                          |
|     |                                       | 0   | $-\frac{\sqrt{35}}{560}$  | 0                          | $\frac{3\sqrt{70}}{560}$   | 0                         | $-\frac{\sqrt{7}}{112}$    | $-\frac{\sqrt{6}}{80}$    | 0                             | $-\frac{3\sqrt{14}}{112}$    | 0                          | $\frac{9\sqrt{210}}{560}$   | 0                            | $-\frac{\sqrt{42}}{112}$     | 0                          |
|     |                                       | $\frac{\sqrt{35}}{560}$                           | 0                         | $\frac{\sqrt{14}}{112}$    | 0                          | $-\frac{3\sqrt{7}}{112}$  | 0                          | 0                         | $\frac{23\sqrt{210}}{2800}$   | 0                            | $\frac{13\sqrt{42}}{560}$  | 0                           | $-\frac{27\sqrt{70}}{2800}$  | 0                            | $-\frac{\sqrt{30}}{80}$    |
|     |                                       | 0   | $-\frac{\sqrt{14}}{112}$  | 0                          | $-\frac{\sqrt{7}}{56}$     | 0                         | $\frac{3\sqrt{70}}{560}$   | $\frac{9\sqrt{15}}{200}$  | 0                             | $-\frac{33\sqrt{35}}{1400}$  | 0                          | $-\frac{\sqrt{21}}{280}$    | 0                            | $-\frac{27\sqrt{105}}{1400}$ | 0                          |
|     |                                       | $-\frac{3\sqrt{70}}{560}$                         | 0                         | $\frac{\sqrt{7}}{56}$      | 0                          | $\frac{\sqrt{14}}{112}$   | 0                          | 0                         | $-\frac{27\sqrt{105}}{1400}$  | 0                            | $-\frac{\sqrt{21}}{280}$   | 0                           | $-\frac{33\sqrt{35}}{1400}$  | 0                            | $\frac{9\sqrt{15}}{200}$   |
|     |                                       | 0   | $\frac{3\sqrt{7}}{112}$   | 0                          | $-\frac{\sqrt{14}}{112}$   | 0                         | $-\frac{\sqrt{35}}{560}$   | $-\frac{\sqrt{30}}{80}$   | 0                             | $-\frac{27\sqrt{70}}{2800}$  | 0                          | $\frac{13\sqrt{42}}{560}$   | 0                            | $\frac{23\sqrt{210}}{2800}$  | 0                          |
|     |                                       | $\frac{\sqrt{7}}{112}$                            | 0                         | $-\frac{3\sqrt{70}}{560}$  | 0                          | $\frac{\sqrt{35}}{560}$   | 0                          | 0                         | $-\frac{\sqrt{42}}{112}$      | 0                            | $\frac{9\sqrt{210}}{560}$  | 0                           | $-\frac{3\sqrt{14}}{112}$    | 0                            | $-\frac{\sqrt{6}}{80}$     |
| 724 | symmetry                              | $\frac{3\sqrt{35}z(x^2-2xy-y^2)(x^2+2xy-y^2)}{8}$ |                           |                            |                            |                           |                            |                           |                               |                              |                            |                             |                              |                              |                            |

continued ...

Table 9

| No. | multipole                             | matrix  |                            |                           |                           |                            |                            |                           |                              |                             |                            |                             |                              |                             |  |
|-----|---------------------------------------|---|----------------------------|---------------------------|---------------------------|----------------------------|----------------------------|---------------------------|------------------------------|-----------------------------|----------------------------|-----------------------------|------------------------------|-----------------------------|--|
|     | $\mathbb{T}_{5,2}^{(1,-1;a)}(T_1, 2)$ | 0   | 0                          | 0                         | 0                         | 0                          | 0                          | 0                         | 0                            | 0                           | 0                          | 0                           | $\frac{\sqrt{210i}}{100}$    | 0                           |  |
|     |                                       | 0   | 0                          | 0                         | 0                         | 0                          | 0                          | 0                         | 0                            | 0                           | 0                          | 0                           | 0                            | $-\frac{3\sqrt{10i}}{100}$  |  |
|     |                                       | 0   | 0                          | 0                         | 0                         | 0                          | 0                          | $\frac{3\sqrt{10i}}{100}$ | 0                            | 0                           | 0                          | 0                           | 0                            | 0                           |  |
|     |                                       | 0   | 0                          | 0                         | 0                         | 0                          | 0                          | 0                         | $-\frac{\sqrt{210i}}{100}$   | 0                           | 0                          | 0                           | 0                            | 0                           |  |
|     |                                       | 0   | 0                          | 0                         | 0                         | $-\frac{\sqrt{35i}}{70}$   | 0                          | 0                         | 0                            | 0                           | 0                          | 0                           | $-\frac{3\sqrt{14i}}{35}$    | 0                           |  |
|     |                                       | 0   | 0                          | 0                         | 0                         | 0                          | $\frac{\sqrt{35i}}{70}$    | 0                         | 0                            | 0                           | 0                          | 0                           | 0                            | $-\frac{\sqrt{210i}}{175}$  |  |
|     |                                       | 0   | 0                          | 0                         | 0                         | 0                          | 0                          | 0                         | 0                            | 0                           | 0                          | 0                           | 0                            | $\frac{2\sqrt{15i}}{25}$    |  |
|     |                                       | 0   | 0                          | 0                         | 0                         | 0                          | 0                          | $\frac{2\sqrt{15i}}{25}$  | 0                            | 0                           | 0                          | 0                           | 0                            | 0                           |  |
|     |                                       | $-\frac{\sqrt{35i}}{70}$                        | 0                          | 0                         | 0                         | 0                          | 0                          | 0                         | $-\frac{\sqrt{210i}}{175}$   | 0                           | 0                          | 0                           | 0                            | 0                           |  |
|     |                                       | 0   | $\frac{\sqrt{35i}}{70}$    | 0                         | 0                         | 0                          | 0                          | 0                         | 0                            | $-\frac{3\sqrt{14i}}{35}$   | 0                          | 0                           | 0                            | 0                           |  |
| 725 | symmetry                              | $\frac{\sqrt{105}x(y-z)(y+z)(2x^2-y^2-z^2)}{4}$ |                            |                           |                           |                            |                            |                           |                              |                             |                            |                             |                              |                             |  |
|     | $\mathbb{T}_{5,0}^{(1,-1;a)}(T_2)$    | 0   | 0                          | 0                         | 0                         | 0                          | 0                          | $-\frac{\sqrt{70i}}{400}$ | 0                            | $\frac{\sqrt{14i}}{80}$     | 0                          | $-\frac{\sqrt{210i}}{400}$  | 0                            | $-\frac{3\sqrt{10i}}{80}$   |  |
|     |                                       | 0   | 0                          | 0                         | 0                         | 0                          | 0                          | $-\frac{\sqrt{30i}}{400}$ | 0                            | $\frac{3\sqrt{70i}}{400}$   | 0                          | $-\frac{\sqrt{42i}}{80}$    | 0                            | $\frac{\sqrt{210i}}{400}$   |  |
|     |                                       | 0   | 0                          | 0                         | 0                         | 0                          | 0                          | 0                         | $\frac{\sqrt{210i}}{400}$    | 0                           | $-\frac{\sqrt{42i}}{80}$   | 0                           | $\frac{3\sqrt{70i}}{400}$    | $-\frac{\sqrt{30i}}{400}$   |  |
|     |                                       | 0   | 0                          | 0                         | 0                         | 0                          | 0                          | $-\frac{3\sqrt{10i}}{80}$ | 0                            | $-\frac{\sqrt{210i}}{400}$  | 0                          | $\frac{\sqrt{14i}}{80}$     | 0                            | $-\frac{\sqrt{70i}}{400}$   |  |
|     |                                       | 0   | $-\frac{\sqrt{105i}}{840}$ | 0                         | $\frac{\sqrt{210i}}{840}$ | 0                          | $\frac{\sqrt{21i}}{56}$    | $\frac{\sqrt{2i}}{40}$    | 0                            | $-\frac{\sqrt{42i}}{56}$    | 0                          | $\frac{3\sqrt{70i}}{280}$   | 0                            | $\frac{3\sqrt{14i}}{56}$    |  |
|     |                                       | $-\frac{\sqrt{105i}}{840}$                      | 0                          | $\frac{\sqrt{42i}}{168}$  | 0                         | $-\frac{\sqrt{21i}}{168}$  | 0                          | 0                         | $-\frac{23\sqrt{70i}}{1400}$ | 0                           | $\frac{13\sqrt{14i}}{280}$ | 0                           | $-\frac{3\sqrt{210i}}{1400}$ | $\frac{3\sqrt{10i}}{40}$    |  |
|     |                                       | 0   | $\frac{\sqrt{42i}}{168}$   | 0                         | $-\frac{\sqrt{21i}}{84}$  | 0                          | $\frac{\sqrt{210i}}{840}$  | $-\frac{3\sqrt{5i}}{100}$ | 0                            | $\frac{11\sqrt{105i}}{700}$ | 0                          | $-\frac{\sqrt{7i}}{140}$    | 0                            | $-\frac{9\sqrt{35i}}{700}$  |  |
|     |                                       | $\frac{\sqrt{210i}}{840}$                       | 0                          | $-\frac{\sqrt{21i}}{84}$  | 0                         | $\frac{\sqrt{42i}}{168}$   | 0                          | 0                         | $\frac{9\sqrt{35i}}{700}$    | 0                           | $\frac{\sqrt{7i}}{140}$    | 0                           | $-\frac{11\sqrt{105i}}{700}$ | $\frac{3\sqrt{5i}}{100}$    |  |
|     |                                       | 0   | $-\frac{\sqrt{21i}}{168}$  | 0                         | $\frac{\sqrt{42i}}{168}$  | 0                          | $-\frac{\sqrt{105i}}{840}$ | $-\frac{3\sqrt{10i}}{40}$ | 0                            | $\frac{3\sqrt{210i}}{1400}$ | 0                          | $-\frac{13\sqrt{14i}}{280}$ | 0                            | $\frac{23\sqrt{70i}}{1400}$ |  |
|     |                                       | $\frac{\sqrt{21i}}{56}$                         | 0                          | $\frac{\sqrt{210i}}{840}$ | 0                         | $-\frac{\sqrt{105i}}{840}$ | 0                          | 0                         | $-\frac{3\sqrt{14i}}{56}$    | 0                           | $-\frac{3\sqrt{70i}}{280}$ | 0                           | $\frac{\sqrt{42i}}{56}$      | $-\frac{\sqrt{2i}}{40}$     |  |
| 726 | symmetry                              | $\frac{\sqrt{105}y(x-z)(x+z)(x^2-2y^2+z^2)}{4}$ |                            |                           |                           |                            |                            |                           |                              |                             |                            |                             |                              |                             |  |

continued ...

Table 9

| No. | multipole                          | matrix   |                          |                            |                           |                           |                           |                          |                             |                             |                            |                            |                             |                             |                           |
|-----|------------------------------------|--|--------------------------|----------------------------|---------------------------|---------------------------|---------------------------|--------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|---------------------------|
|     | $\mathbb{T}_{5,1}^{(1,-1;a)}(T_2)$ | 0  | 0                        | 0                          | 0                         | 0                         | 0                         | 0                        | $-\frac{\sqrt{70}}{400}$    | 0                           | $-\frac{\sqrt{14}}{80}$    | 0                          | $-\frac{\sqrt{210}}{400}$   | 0                           | $\frac{3\sqrt{10}}{80}$   |
|     |                                    | 0  | 0                        | 0                          | 0                         | 0                         | 0                         | $\frac{\sqrt{30}}{400}$  | 0                           | $\frac{3\sqrt{70}}{400}$    | 0                          | $\frac{\sqrt{42}}{80}$     | 0                           | $\frac{\sqrt{210}}{400}$    | 0                         |
|     |                                    | 0  | 0                        | 0                          | 0                         | 0                         | 0                         | 0                        | $-\frac{\sqrt{210}}{400}$   | 0                           | $-\frac{\sqrt{42}}{80}$    | 0                          | $-\frac{3\sqrt{70}}{400}$   | 0                           | $-\frac{\sqrt{30}}{400}$  |
|     |                                    | 0  | 0                        | 0                          | 0                         | 0                         | 0                         | $-\frac{3\sqrt{10}}{80}$ | 0                           | $\frac{\sqrt{210}}{400}$    | 0                          | $\frac{\sqrt{14}}{80}$     | 0                           | $\frac{\sqrt{70}}{400}$     | 0                         |
|     |                                    | 0  | $\frac{\sqrt{105}}{840}$ | 0                          | $\frac{\sqrt{210}}{840}$  | 0                         | $-\frac{\sqrt{21}}{56}$   | $\frac{\sqrt{2}}{40}$    | 0                           | $\frac{\sqrt{42}}{56}$      | 0                          | $\frac{3\sqrt{70}}{280}$   | 0                           | $-\frac{3\sqrt{14}}{56}$    | 0                         |
|     |                                    | $-\frac{\sqrt{105}}{840}$                        | 0                        | $-\frac{\sqrt{42}}{168}$   | 0                         | $-\frac{\sqrt{21}}{168}$  | 0                         | 0                        | $-\frac{23\sqrt{70}}{1400}$ | 0                           | $-\frac{13\sqrt{14}}{280}$ | 0                          | $-\frac{3\sqrt{210}}{1400}$ | 0                           | $-\frac{3\sqrt{10}}{40}$  |
|     |                                    | 0  | $\frac{\sqrt{42}}{168}$  | 0                          | $\frac{\sqrt{21}}{84}$    | 0                         | $\frac{\sqrt{210}}{840}$  | $\frac{3\sqrt{5}}{100}$  | 0                           | $\frac{11\sqrt{105}}{700}$  | 0                          | $\frac{\sqrt{7}}{140}$     | 0                           | $-\frac{9\sqrt{35}}{700}$   | 0                         |
|     |                                    | $-\frac{\sqrt{210}}{840}$                        | 0                        | $-\frac{\sqrt{21}}{84}$    | 0                         | $-\frac{\sqrt{42}}{168}$  | 0                         | 0                        | $-\frac{9\sqrt{35}}{700}$   | 0                           | $\frac{\sqrt{7}}{140}$     | 0                          | $\frac{11\sqrt{105}}{700}$  | 0                           | $\frac{3\sqrt{5}}{100}$   |
|     |                                    | 0  | $\frac{\sqrt{21}}{168}$  | 0                          | $\frac{\sqrt{42}}{168}$   | 0                         | $\frac{\sqrt{105}}{840}$  | $-\frac{3\sqrt{10}}{40}$ | 0                           | $-\frac{3\sqrt{210}}{1400}$ | 0                          | $-\frac{13\sqrt{14}}{280}$ | 0                           | $-\frac{23\sqrt{70}}{1400}$ | 0                         |
|     |                                    | $\frac{\sqrt{21}}{56}$                           | 0                        | $-\frac{\sqrt{210}}{840}$  | 0                         | $-\frac{\sqrt{105}}{840}$ | 0                         | 0                        | $-\frac{3\sqrt{14}}{56}$    | 0                           | $\frac{3\sqrt{70}}{280}$   | 0                          | $\frac{\sqrt{42}}{56}$      | 0                           | $\frac{\sqrt{2}}{40}$     |
| 727 | symmetry                           | $-\frac{\sqrt{105}z(x-y)(x+y)(x^2+y^2-2z^2)}{4}$ |                          |                            |                           |                           |                           |                          |                             |                             |                            |                            |                             |                             |                           |
|     | $\mathbb{T}_{5,2}^{(1,-1;a)}(T_2)$ | 0  | 0                        | 0                          | 0                         | 0                         | 0                         | $\frac{\sqrt{10}i}{200}$ | 0                           | 0                           | 0                          | $\frac{\sqrt{14}i}{40}$    | 0                           | 0                           | 0                         |
|     |                                    | 0  | 0                        | 0                          | 0                         | 0                         | 0                         | 0                        | $-\frac{\sqrt{210}i}{200}$  | 0                           | 0                          | 0                          | $-\frac{3\sqrt{70}i}{200}$  | 0                           | 0                         |
|     |                                    | 0  | 0                        | 0                          | 0                         | 0                         | 0                         | 0                        | 0                           | $\frac{3\sqrt{70}i}{200}$   | 0                          | 0                          | 0                           | $\frac{\sqrt{210}i}{200}$   | 0                         |
|     |                                    | 0  | 0                        | 0                          | 0                         | 0                         | 0                         | 0                        | 0                           | 0                           | $-\frac{\sqrt{14}i}{40}$   | 0                          | 0                           | 0                           | $-\frac{\sqrt{10}i}{200}$ |
|     |                                    | 0  | 0                        | $-\frac{\sqrt{210}i}{420}$ | 0                         | 0                         | 0                         | 0                        | 0                           | 0                           | $-\frac{\sqrt{70}i}{35}$   | 0                          | 0                           | 0                           | 0                         |
|     |                                    | 0  | 0                        | 0                          | $\frac{\sqrt{42}i}{84}$   | 0                         | 0                         | $\frac{\sqrt{10}i}{25}$  | 0                           | 0                           | 0                          | $\frac{2\sqrt{14}i}{35}$   | 0                           | 0                           | 0                         |
|     |                                    | $-\frac{\sqrt{210}i}{420}$                       | 0                        | 0                          | 0                         | $-\frac{\sqrt{42}i}{84}$  | 0                         | 0                        | $-\frac{8\sqrt{35}i}{175}$  | 0                           | 0                          | 0                          | $\frac{2\sqrt{105}i}{175}$  | 0                           | 0                         |
|     |                                    | 0  | $\frac{\sqrt{42}i}{84}$  | 0                          | 0                         | 0                         | $\frac{\sqrt{210}i}{420}$ | 0                        | 0                           | $\frac{2\sqrt{105}i}{175}$  | 0                          | 0                          | 0                           | $-\frac{8\sqrt{35}i}{175}$  | 0                         |
|     |                                    | 0  | 0                        | $-\frac{\sqrt{42}i}{84}$   | 0                         | 0                         | 0                         | 0                        | 0                           | 0                           | $\frac{2\sqrt{14}i}{35}$   | 0                          | 0                           | 0                           | $\frac{\sqrt{10}i}{25}$   |
|     |                                    | 0  | 0                        | 0                          | $\frac{\sqrt{210}i}{420}$ | 0                         | 0                         | 0                        | 0                           | 0                           | 0                          | $-\frac{\sqrt{70}i}{35}$   | 0                           | 0                           | 0                         |
| 728 | symmetry                           | $x$  |                          |                            |                           |                           |                           |                          |                             |                             |                            |                            |                             |                             |                           |

continued ...

Table 9

| No. | multipole                         | matrix                    |                           |                          |                          |                           |                           |                         |                         |                         |                         |                         |                          |                          |                          |
|-----|-----------------------------------|---------------------------|---------------------------|--------------------------|--------------------------|---------------------------|---------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|--------------------------|--------------------------|--------------------------|
|     | $\mathbb{T}_{1,0}^{(1,0;a)}(T_1)$ | $-\frac{\sqrt{10}i}{20}$  | 0                         | $\frac{i}{20}$           | 0                        | 0                         | 0                         | 0                       | 0                       | 0                       | 0                       | 0                       | 0                        | 0                        | 0                        |
|     |                                   | 0                         | $-\frac{\sqrt{6}i}{20}$   | 0                        | $\frac{\sqrt{3}i}{20}$   | 0                         | 0                         | 0                       | 0                       | 0                       | 0                       | 0                       | 0                        | 0                        | 0                        |
|     |                                   | 0                         | 0                         | $-\frac{\sqrt{3}i}{20}$  | 0                        | $\frac{\sqrt{6}i}{20}$    | 0                         | 0                       | 0                       | 0                       | 0                       | 0                       | 0                        | 0                        | 0                        |
|     |                                   | 0                         | 0                         | 0                        | $-\frac{i}{20}$          | 0                         | $\frac{\sqrt{10}i}{20}$   | 0                       | 0                       | 0                       | 0                       | 0                       | 0                        | 0                        | 0                        |
|     |                                   | 0                         | $-\frac{3\sqrt{10}i}{70}$ | 0                        | 0                        | 0                         | 0                         | $\frac{\sqrt{21}i}{28}$ | 0                       | $-\frac{i}{28}$         | 0                       | 0                       | 0                        | 0                        | 0                        |
|     |                                   | $-\frac{3\sqrt{10}i}{70}$ | 0                         | $-\frac{6i}{35}$         | 0                        | 0                         | 0                         | 0                       | $\frac{\sqrt{15}i}{28}$ | 0                       | $-\frac{\sqrt{3}i}{28}$ | 0                       | 0                        | 0                        | 0                        |
|     |                                   | 0                         | $-\frac{6i}{35}$          | 0                        | $-\frac{9\sqrt{2}i}{70}$ | 0                         | 0                         | 0                       | 0                       | $\frac{\sqrt{10}i}{28}$ | 0                       | $-\frac{\sqrt{6}i}{28}$ | 0                        | 0                        | 0                        |
|     |                                   | 0                         | 0                         | $-\frac{9\sqrt{2}i}{70}$ | 0                        | $-\frac{6i}{35}$          | 0                         | 0                       | 0                       | 0                       | $\frac{\sqrt{6}i}{28}$  | 0                       | $-\frac{\sqrt{10}i}{28}$ | 0                        | 0                        |
|     |                                   | 0                         | 0                         | 0                        | $-\frac{6i}{35}$         | 0                         | $-\frac{3\sqrt{10}i}{70}$ | 0                       | 0                       | 0                       | 0                       | $\frac{\sqrt{3}i}{28}$  | 0                        | $-\frac{\sqrt{15}i}{28}$ | 0                        |
|     |                                   | 0                         | 0                         | 0                        | 0                        | $-\frac{3\sqrt{10}i}{70}$ | 0                         | 0                       | 0                       | 0                       | 0                       | 0                       | $\frac{i}{28}$           | 0                        | $-\frac{\sqrt{21}i}{28}$ |
| 729 | symmetry                          | $y$                       |                           |                          |                          |                           |                           |                         |                         |                         |                         |                         |                          |                          |                          |
|     | $\mathbb{T}_{1,1}^{(1,0;a)}(T_1)$ | $\frac{\sqrt{10}}{20}$    | 0                         | $\frac{1}{20}$           | 0                        | 0                         | 0                         | 0                       | 0                       | 0                       | 0                       | 0                       | 0                        | 0                        | 0                        |
|     |                                   | 0                         | $\frac{\sqrt{6}}{20}$     | 0                        | $\frac{\sqrt{3}}{20}$    | 0                         | 0                         | 0                       | 0                       | 0                       | 0                       | 0                       | 0                        | 0                        | 0                        |
|     |                                   | 0                         | 0                         | $\frac{\sqrt{3}}{20}$    | 0                        | $\frac{\sqrt{6}}{20}$     | 0                         | 0                       | 0                       | 0                       | 0                       | 0                       | 0                        | 0                        | 0                        |
|     |                                   | 0                         | 0                         | 0                        | $\frac{1}{20}$           | 0                         | $\frac{\sqrt{10}}{20}$    | 0                       | 0                       | 0                       | 0                       | 0                       | 0                        | 0                        | 0                        |
|     |                                   | 0                         | $-\frac{3\sqrt{10}}{70}$  | 0                        | 0                        | 0                         | 0                         | $-\frac{\sqrt{21}}{28}$ | 0                       | $-\frac{1}{28}$         | 0                       | 0                       | 0                        | 0                        | 0                        |
|     |                                   | $\frac{3\sqrt{10}}{70}$   | 0                         | $-\frac{6}{35}$          | 0                        | 0                         | 0                         | 0                       | $-\frac{\sqrt{15}}{28}$ | 0                       | $-\frac{\sqrt{3}}{28}$  | 0                       | 0                        | 0                        | 0                        |
|     |                                   | 0                         | $\frac{6}{35}$            | 0                        | $-\frac{9\sqrt{2}}{70}$  | 0                         | 0                         | 0                       | 0                       | $-\frac{\sqrt{10}}{28}$ | 0                       | $-\frac{\sqrt{6}}{28}$  | 0                        | 0                        | 0                        |
|     |                                   | 0                         | 0                         | $\frac{9\sqrt{2}}{70}$   | 0                        | $-\frac{6}{35}$           | 0                         | 0                       | 0                       | 0                       | $-\frac{\sqrt{6}}{28}$  | 0                       | $-\frac{\sqrt{10}}{28}$  | 0                        | 0                        |
|     |                                   | 0                         | 0                         | 0                        | $\frac{6}{35}$           | 0                         | $-\frac{3\sqrt{10}}{70}$  | 0                       | 0                       | 0                       | 0                       | $-\frac{\sqrt{3}}{28}$  | 0                        | $-\frac{\sqrt{15}}{28}$  | 0                        |
|     |                                   | 0                         | 0                         | 0                        | 0                        | $\frac{3\sqrt{10}}{70}$   | 0                         | 0                       | 0                       | 0                       | 0                       | 0                       | $-\frac{1}{28}$          | 0                        | $-\frac{\sqrt{21}}{28}$  |
| 730 | symmetry                          | $z$                       |                           |                          |                          |                           |                           |                         |                         |                         |                         |                         |                          |                          |                          |

*continued ...*

Table 9

| No. | multipole                         | matrix                        |                           |                          |                           |                           |                         |                         |                         |                          |                          |                         |                         |                         |                        |
|-----|-----------------------------------|-------------------------------|---------------------------|--------------------------|---------------------------|---------------------------|-------------------------|-------------------------|-------------------------|--------------------------|--------------------------|-------------------------|-------------------------|-------------------------|------------------------|
|     | $\mathbb{T}_{1,2}^{(1,0;a)}(T_1)$ | 0                             | $\frac{\sqrt{2}i}{10}$    | 0                        | 0                         | 0                         | 0                       | 0                       | 0                       | 0                        | 0                        | 0                       | 0                       | 0                       | 0                      |
|     |                                   | 0                             | 0                         | $\frac{\sqrt{3}i}{10}$   | 0                         | 0                         | 0                       | 0                       | 0                       | 0                        | 0                        | 0                       | 0                       | 0                       | 0                      |
|     |                                   | 0                             | 0                         | 0                        | $\frac{\sqrt{3}i}{10}$    | 0                         | 0                       | 0                       | 0                       | 0                        | 0                        | 0                       | 0                       | 0                       | 0                      |
|     |                                   | 0                             | 0                         | 0                        | 0                         | $\frac{\sqrt{2}i}{10}$    | 0                       | 0                       | 0                       | 0                        | 0                        | 0                       | 0                       | 0                       | 0                      |
|     |                                   | $-\frac{3\sqrt{2}i}{14}$      | 0                         | 0                        | 0                         | 0                         | 0                       | $-\frac{\sqrt{3}i}{14}$ | 0                       | 0                        | 0                        | 0                       | 0                       | 0                       | 0                      |
|     |                                   | 0                             | $-\frac{9\sqrt{2}i}{70}$  | 0                        | 0                         | 0                         | 0                       | 0                       | $-\frac{\sqrt{5}i}{14}$ | 0                        | 0                        | 0                       | 0                       | 0                       | 0                      |
|     |                                   | 0                             | 0                         | $-\frac{3\sqrt{2}i}{70}$ | 0                         | 0                         | 0                       | 0                       | 0                       | $-\frac{\sqrt{6}i}{14}$  | 0                        | 0                       | 0                       | 0                       | 0                      |
|     |                                   | 0                             | 0                         | 0                        | $\frac{3\sqrt{2}i}{70}$   | 0                         | 0                       | 0                       | 0                       | 0                        | $-\frac{\sqrt{6}i}{14}$  | 0                       | 0                       | 0                       | 0                      |
|     |                                   | 0                             | 0                         | 0                        | 0                         | $\frac{9\sqrt{2}i}{70}$   | 0                       | 0                       | 0                       | 0                        | 0                        | $-\frac{\sqrt{5}i}{14}$ | 0                       | 0                       | 0                      |
|     |                                   | 0                             | 0                         | 0                        | 0                         | 0                         | $\frac{3\sqrt{2}i}{14}$ | 0                       | 0                       | 0                        | 0                        | 0                       | $-\frac{\sqrt{3}i}{14}$ | 0                       | 0                      |
| 731 | symmetry                          | $\sqrt{15}xyz$                |                           |                          |                           |                           |                         |                         |                         |                          |                          |                         |                         |                         |                        |
|     | $\mathbb{T}_3^{(1,0;a)}(A_2)$     | 0                             | 0                         | 0                        | $-\frac{\sqrt{210}}{280}$ | 0                         | 0                       | $-\frac{\sqrt{2}}{8}$   | 0                       | 0                        | 0                        | $\frac{\sqrt{70}}{56}$  | 0                       | 0                       | 0                      |
|     |                                   | $-\frac{\sqrt{7}}{56}$        | 0                         | 0                        | 0                         | $-\frac{\sqrt{35}}{280}$  | 0                       | 0                       | $\frac{\sqrt{42}}{56}$  | 0                        | 0                        | 0                       | $\frac{3\sqrt{14}}{56}$ | 0                       | 0                      |
|     |                                   | 0                             | $\frac{\sqrt{35}}{280}$   | 0                        | 0                         | 0                         | $\frac{\sqrt{7}}{56}$   | 0                       | 0                       | $\frac{3\sqrt{14}}{56}$  | 0                        | 0                       | 0                       | $\frac{\sqrt{42}}{56}$  | 0                      |
|     |                                   | 0                             | 0                         | $\frac{\sqrt{210}}{280}$ | 0                         | 0                         | 0                       | 0                       | 0                       | 0                        | $\frac{\sqrt{70}}{56}$   | 0                       | 0                       | 0                       | $-\frac{\sqrt{2}}{8}$  |
|     |                                   | 0                             | 0                         | $\frac{\sqrt{42}}{28}$   | 0                         | 0                         | 0                       | 0                       | 0                       | 0                        | $\frac{\sqrt{14}}{84}$   | 0                       | 0                       | 0                       | 0                      |
|     |                                   | 0                             | 0                         | 0                        | $\frac{\sqrt{210}}{140}$  | 0                         | 0                       | $\frac{\sqrt{2}}{24}$   | 0                       | 0                        | 0                        | $\frac{\sqrt{70}}{168}$ | 0                       | 0                       | 0                      |
|     |                                   | $-\frac{\sqrt{42}}{28}$       | 0                         | 0                        | 0                         | $-\frac{\sqrt{210}}{140}$ | 0                       | 0                       | $\frac{\sqrt{7}}{168}$  | 0                        | 0                        | 0                       | $\frac{\sqrt{21}}{168}$ | 0                       | 0                      |
|     |                                   | 0                             | $-\frac{\sqrt{210}}{140}$ | 0                        | 0                         | 0                         | $-\frac{\sqrt{42}}{28}$ | 0                       | 0                       | $-\frac{\sqrt{21}}{168}$ | 0                        | 0                       | 0                       | $-\frac{\sqrt{7}}{168}$ | 0                      |
|     |                                   | 0                             | 0                         | $\frac{\sqrt{210}}{140}$ | 0                         | 0                         | 0                       | 0                       | 0                       | 0                        | $-\frac{\sqrt{70}}{168}$ | 0                       | 0                       | 0                       | $-\frac{\sqrt{2}}{24}$ |
|     |                                   | 0                             | 0                         | 0                        | $\frac{\sqrt{42}}{28}$    | 0                         | 0                       | 0                       | 0                       | 0                        | 0                        | $-\frac{\sqrt{14}}{84}$ | 0                       | 0                       | 0                      |
| 732 | symmetry                          | $\frac{x(2x^2-3y^2-3z^2)}{2}$ |                           |                          |                           |                           |                         |                         |                         |                          |                          |                         |                         |                         |                        |

continued ...

Table 9

| No.                               | multipole | matrix                         |                            |                            |                             |                            |                            |                          |                            |                            |                            |                            |                          |                           |                         |
|-----------------------------------|-----------|--------------------------------|----------------------------|----------------------------|-----------------------------|----------------------------|----------------------------|--------------------------|----------------------------|----------------------------|----------------------------|----------------------------|--------------------------|---------------------------|-------------------------|
| $\mathbb{T}_{3,0}^{(1,0;a)}(T_1)$ |           | $-\frac{3\sqrt{35}i}{1120}$    | 0                          | $\frac{9\sqrt{14}i}{1120}$ | 0                           | $-\frac{3\sqrt{7}i}{224}$  | 0                          | 0                        | $\frac{\sqrt{210}i}{112}$  | 0                          | $-\frac{\sqrt{42}i}{56}$   | 0                          | $\frac{\sqrt{70}i}{112}$ | 0                         | 0                       |
|                                   |           | 0                              | $\frac{\sqrt{21}i}{160}$   | 0                          | $-\frac{\sqrt{42}i}{1120}$  | 0                          | $-\frac{\sqrt{105}i}{224}$ | $\frac{\sqrt{10}i}{16}$  | 0                          | 0                          | 0                          | $-\frac{3\sqrt{14}i}{112}$ | 0                        | $\frac{\sqrt{70}i}{56}$   | 0                       |
|                                   |           | $\frac{\sqrt{105}i}{224}$      | 0                          | $\frac{\sqrt{42}i}{1120}$  | 0                           | $-\frac{\sqrt{21}i}{160}$  | 0                          | 0                        | $\frac{\sqrt{70}i}{56}$    | 0                          | $-\frac{3\sqrt{14}i}{112}$ | 0                          | 0                        | 0                         | $\frac{\sqrt{10}i}{16}$ |
|                                   |           | 0                              | $\frac{3\sqrt{7}i}{224}$   | 0                          | $-\frac{9\sqrt{14}i}{1120}$ | 0                          | $\frac{3\sqrt{35}i}{1120}$ | 0                        | 0                          | $\frac{\sqrt{70}i}{112}$   | 0                          | $-\frac{\sqrt{42}i}{56}$   | 0                        | $\frac{\sqrt{210}i}{112}$ | 0                       |
|                                   |           | 0                              | $-\frac{3\sqrt{35}i}{140}$ | 0                          | $\frac{\sqrt{70}i}{56}$     | 0                          | 0                          | $\frac{\sqrt{6}i}{96}$   | 0                          | $-\frac{\sqrt{14}i}{112}$  | 0                          | $\frac{\sqrt{210}i}{672}$  | 0                        | 0                         | 0                       |
|                                   |           | $-\frac{3\sqrt{35}i}{140}$     | 0                          | $\frac{3\sqrt{14}i}{280}$  | 0                           | $\frac{\sqrt{7}i}{14}$     | 0                          | 0                        | $-\frac{\sqrt{210}i}{672}$ | 0                          | $-\frac{\sqrt{42}i}{336}$  | 0                          | $\frac{\sqrt{70}i}{224}$ | 0                         | 0                       |
|                                   |           | 0                              | $\frac{3\sqrt{14}i}{280}$  | 0                          | $\frac{3\sqrt{7}i}{70}$     | 0                          | $\frac{\sqrt{70}i}{56}$    | $-\frac{\sqrt{15}i}{96}$ | 0                          | $-\frac{\sqrt{35}i}{224}$  | 0                          | $\frac{\sqrt{21}i}{672}$   | 0                        | $\frac{\sqrt{105}i}{224}$ | 0                       |
|                                   |           | $\frac{\sqrt{70}i}{56}$        | 0                          | $\frac{3\sqrt{7}i}{70}$    | 0                           | $\frac{3\sqrt{14}i}{280}$  | 0                          | 0                        | $-\frac{\sqrt{105}i}{224}$ | 0                          | $-\frac{\sqrt{21}i}{672}$  | 0                          | $\frac{\sqrt{35}i}{224}$ | 0                         | $\frac{\sqrt{15}i}{96}$ |
|                                   |           | 0                              | $\frac{\sqrt{7}i}{14}$     | 0                          | $\frac{3\sqrt{14}i}{280}$   | 0                          | $-\frac{3\sqrt{35}i}{140}$ | 0                        | 0                          | $-\frac{\sqrt{70}i}{224}$  | 0                          | $\frac{\sqrt{42}i}{336}$   | 0                        | $\frac{\sqrt{210}i}{672}$ | 0                       |
|                                   |           | 0                              | 0                          | $\frac{\sqrt{70}i}{56}$    | 0                           | $-\frac{3\sqrt{35}i}{140}$ | 0                          | 0                        | 0                          | $-\frac{\sqrt{210}i}{672}$ | 0                          | $\frac{\sqrt{14}i}{112}$   | 0                        | $-\frac{\sqrt{6}i}{96}$   |                         |
| 733                               | symmetry  | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ |                            |                            |                             |                            |                            |                          |                            |                            |                            |                            |                          |                           |                         |
| $\mathbb{T}_{3,1}^{(1,0;a)}(T_1)$ |           | $\frac{3\sqrt{35}}{1120}$      | 0                          | $\frac{9\sqrt{14}}{1120}$  | 0                           | $\frac{3\sqrt{7}}{224}$    | 0                          | 0                        | $-\frac{\sqrt{210}}{112}$  | 0                          | $-\frac{\sqrt{42}}{56}$    | 0                          | $-\frac{\sqrt{70}}{112}$ | 0                         | 0                       |
|                                   |           | 0                              | $-\frac{\sqrt{21}}{160}$   | 0                          | $-\frac{\sqrt{42}}{1120}$   | 0                          | $\frac{\sqrt{105}}{224}$   | $\frac{\sqrt{10}}{16}$   | 0                          | 0                          | 0                          | $-\frac{3\sqrt{14}}{112}$  | 0                        | $-\frac{\sqrt{70}}{56}$   | 0                       |
|                                   |           | $\frac{\sqrt{105}}{224}$       | 0                          | $-\frac{\sqrt{42}}{1120}$  | 0                           | $-\frac{\sqrt{21}}{160}$   | 0                          | 0                        | $\frac{\sqrt{70}}{56}$     | 0                          | $\frac{3\sqrt{14}}{112}$   | 0                          | 0                        | 0                         | $-\frac{\sqrt{10}}{16}$ |
|                                   |           | 0                              | $\frac{3\sqrt{7}}{224}$    | 0                          | $\frac{9\sqrt{14}}{1120}$   | 0                          | $\frac{3\sqrt{35}}{1120}$  | 0                        | 0                          | $\frac{\sqrt{70}}{112}$    | 0                          | $\frac{\sqrt{42}}{56}$     | 0                        | $\frac{\sqrt{210}}{112}$  | 0                       |
|                                   |           | 0                              | $-\frac{3\sqrt{35}}{140}$  | 0                          | $-\frac{\sqrt{70}}{56}$     | 0                          | 0                          | $-\frac{\sqrt{6}}{96}$   | 0                          | $-\frac{\sqrt{14}}{112}$   | 0                          | $-\frac{\sqrt{210}}{672}$  | 0                        | 0                         | 0                       |
|                                   |           | $\frac{3\sqrt{35}}{140}$       | 0                          | $\frac{3\sqrt{14}}{280}$   | 0                           | $-\frac{\sqrt{7}}{14}$     | 0                          | 0                        | $\frac{\sqrt{210}}{672}$   | 0                          | $-\frac{\sqrt{42}}{336}$   | 0                          | $-\frac{\sqrt{70}}{224}$ | 0                         | 0                       |
|                                   |           | 0                              | $-\frac{3\sqrt{14}}{280}$  | 0                          | $\frac{3\sqrt{7}}{70}$      | 0                          | $-\frac{\sqrt{70}}{56}$    | $-\frac{\sqrt{15}}{96}$  | 0                          | $\frac{\sqrt{35}}{224}$    | 0                          | $\frac{\sqrt{21}}{672}$    | 0                        | $-\frac{\sqrt{105}}{224}$ | 0                       |
|                                   |           | $\frac{\sqrt{70}}{56}$         | 0                          | $-\frac{3\sqrt{7}}{70}$    | 0                           | $\frac{3\sqrt{14}}{280}$   | 0                          | 0                        | $-\frac{\sqrt{105}}{224}$  | 0                          | $\frac{\sqrt{21}}{672}$    | 0                          | $\frac{\sqrt{35}}{224}$  | 0                         | $-\frac{\sqrt{15}}{96}$ |
|                                   |           | 0                              | $\frac{\sqrt{7}}{14}$      | 0                          | $-\frac{3\sqrt{14}}{280}$   | 0                          | $-\frac{3\sqrt{35}}{140}$  | 0                        | 0                          | $-\frac{\sqrt{70}}{224}$   | 0                          | $-\frac{\sqrt{42}}{336}$   | 0                        | $\frac{\sqrt{210}}{672}$  | 0                       |
|                                   |           | 0                              | 0                          | $\frac{\sqrt{70}}{56}$     | 0                           | $\frac{3\sqrt{35}}{140}$   | 0                          | 0                        | 0                          | $-\frac{\sqrt{210}}{672}$  | 0                          | $-\frac{\sqrt{14}}{112}$   | 0                        | $-\frac{\sqrt{6}}{96}$    |                         |
| 734                               | symmetry  | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ |                            |                            |                             |                            |                            |                          |                            |                            |                            |                            |                          |                           |                         |

continued ...

Table 9

| No. | multipole                         | matrix                            |                              |                             |                              |                             |                          |                         |                            |                            |                            |                            |                           |                           |                          |
|-----|-----------------------------------|-----------------------------------|------------------------------|-----------------------------|------------------------------|-----------------------------|--------------------------|-------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|---------------------------|--------------------------|
|     | $\mathbb{T}_{3,2}^{(1,0;a)}(T_1)$ | 0                                 | $-\frac{3\sqrt{7}i}{140}$    | 0                           | 0                            | 0                           | 0                        | 0                       | 0                          | $\frac{\sqrt{70}i}{28}$    | 0                          | 0                          | 0                         | 0                         | 0                        |
|     |                                   | 0                                 | 0                            | $\frac{\sqrt{42}i}{140}$    | 0                            | 0                           | 0                        | 0                       | 0                          | 0                          | $\frac{\sqrt{14}i}{28}$    | 0                          | 0                         | 0                         | 0                        |
|     |                                   | 0                                 | 0                            | 0                           | $\frac{\sqrt{42}i}{140}$     | 0                           | 0                        | 0                       | 0                          | 0                          | 0                          | $-\frac{\sqrt{14}i}{28}$   | 0                         | 0                         | 0                        |
|     |                                   | 0                                 | 0                            | 0                           | 0                            | $-\frac{3\sqrt{7}i}{140}$   | 0                        | 0                       | 0                          | 0                          | 0                          | 0                          | $-\frac{\sqrt{70}i}{28}$  | 0                         | 0                        |
|     |                                   | $\frac{\sqrt{7}i}{14}$            | 0                            | 0                           | 0                            | 0                           | 0                        | 0                       | $\frac{\sqrt{42}i}{84}$    | 0                          | 0                          | 0                          | 0                         | 0                         | 0                        |
|     |                                   | 0                                 | $-\frac{\sqrt{7}i}{10}$      | 0                           | 0                            | 0                           | 0                        | 0                       | 0                          | 0                          | 0                          | 0                          | 0                         | 0                         | 0                        |
|     |                                   | 0                                 | 0                            | $-\frac{2\sqrt{7}i}{35}$    | 0                            | 0                           | 0                        | 0                       | 0                          | 0                          | $-\frac{\sqrt{21}i}{84}$   | 0                          | 0                         | 0                         | 0                        |
|     |                                   | 0                                 | 0                            | 0                           | $\frac{2\sqrt{7}i}{35}$      | 0                           | 0                        | 0                       | 0                          | 0                          | 0                          | $-\frac{\sqrt{21}i}{84}$   | 0                         | 0                         | 0                        |
|     |                                   | 0                                 | 0                            | 0                           | 0                            | $\frac{\sqrt{7}i}{10}$      | 0                        | 0                       | 0                          | 0                          | 0                          | 0                          | 0                         | 0                         | 0                        |
|     |                                   | 0                                 | 0                            | 0                           | 0                            | 0                           | $-\frac{\sqrt{7}i}{14}$  | 0                       | 0                          | 0                          | 0                          | 0                          | 0                         | $\frac{\sqrt{42}i}{84}$   | 0                        |
| 735 | symmetry                          | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$  |                              |                             |                              |                             |                          |                         |                            |                            |                            |                            |                           |                           |                          |
|     | $\mathbb{T}_{3,0}^{(1,0;a)}(T_2)$ | $-\frac{\sqrt{21}i}{224}$         | 0                            | $\frac{3\sqrt{210}i}{1120}$ | 0                            | $\frac{3\sqrt{105}i}{1120}$ | 0                        | 0                       | $\frac{5\sqrt{14}i}{112}$  | 0                          | $-\frac{\sqrt{70}i}{56}$   | 0                          | $-\frac{\sqrt{42}i}{112}$ | 0                         | 0                        |
|     |                                   | 0                                 | $\frac{\sqrt{35}i}{160}$     | 0                           | $-\frac{\sqrt{70}i}{1120}$   | 0                           | $\frac{3\sqrt{7}i}{224}$ | $-\frac{\sqrt{6}i}{16}$ | 0                          | 0                          | 0                          | $-\frac{\sqrt{210}i}{112}$ | 0                         | $-\frac{\sqrt{42}i}{56}$  | 0                        |
|     |                                   | $-\frac{3\sqrt{7}i}{224}$         | 0                            | $\frac{\sqrt{70}i}{1120}$   | 0                            | $-\frac{\sqrt{35}i}{160}$   | 0                        | 0                       | $-\frac{\sqrt{42}i}{56}$   | 0                          | $-\frac{\sqrt{210}i}{112}$ | 0                          | 0                         | 0                         | $-\frac{\sqrt{6}i}{16}$  |
|     |                                   | 0                                 | $-\frac{3\sqrt{105}i}{1120}$ | 0                           | $-\frac{3\sqrt{210}i}{1120}$ | 0                           | $\frac{\sqrt{21}i}{224}$ | 0                       | 0                          | $-\frac{\sqrt{42}i}{112}$  | 0                          | $-\frac{\sqrt{70}i}{56}$   | 0                         | $\frac{5\sqrt{14}i}{112}$ | 0                        |
|     |                                   | 0                                 | $-\frac{\sqrt{21}i}{28}$     | 0                           | $-\frac{\sqrt{42}i}{56}$     | 0                           | 0                        | $\frac{\sqrt{10}i}{96}$ | 0                          | $-\frac{\sqrt{210}i}{336}$ | 0                          | $-\frac{\sqrt{14}i}{224}$  | 0                         | 0                         | 0                        |
|     |                                   | $-\frac{\sqrt{21}i}{28}$          | 0                            | $\frac{\sqrt{210}i}{280}$   | 0                            | $-\frac{\sqrt{105}i}{70}$   | 0                        | 0                       | $-\frac{5\sqrt{14}i}{672}$ | 0                          | $-\frac{\sqrt{70}i}{336}$  | 0                          | $-\frac{\sqrt{42}i}{224}$ | 0                         | 0                        |
|     |                                   | 0                                 | $\frac{\sqrt{210}i}{280}$    | 0                           | $\frac{\sqrt{105}i}{70}$     | 0                           | $-\frac{\sqrt{42}i}{56}$ | $\frac{i}{32}$          | 0                          | $-\frac{5\sqrt{21}i}{672}$ | 0                          | $\frac{\sqrt{35}i}{672}$   | 0                         | $-\frac{3\sqrt{7}i}{224}$ | 0                        |
|     |                                   | $-\frac{\sqrt{42}i}{56}$          | 0                            | $\frac{\sqrt{105}i}{70}$    | 0                            | $\frac{\sqrt{210}i}{280}$   | 0                        | 0                       | $\frac{3\sqrt{7}i}{224}$   | 0                          | $-\frac{\sqrt{35}i}{672}$  | 0                          | $\frac{5\sqrt{21}i}{672}$ | 0                         | $-\frac{i}{32}$          |
|     |                                   | 0                                 | $-\frac{\sqrt{105}i}{70}$    | 0                           | $\frac{\sqrt{210}i}{280}$    | 0                           | $-\frac{\sqrt{21}i}{28}$ | 0                       | 0                          | $\frac{\sqrt{42}i}{224}$   | 0                          | $\frac{\sqrt{70}i}{336}$   | 0                         | $\frac{5\sqrt{14}i}{672}$ | 0                        |
|     |                                   | 0                                 | 0                            | $-\frac{\sqrt{42}i}{56}$    | 0                            | $-\frac{\sqrt{21}i}{28}$    | 0                        | 0                       | 0                          | 0                          | $\frac{\sqrt{14}i}{224}$   | 0                          | $\frac{\sqrt{210}i}{336}$ | 0                         | $-\frac{\sqrt{10}i}{96}$ |
| 736 | symmetry                          | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |                              |                             |                              |                             |                          |                         |                            |                            |                            |                            |                           |                           |                          |

continued ...



Table 9

| No. | multipole                         | matrix                              |                            |                             |                             |                            |                          |                         |                           |                           |                           |                          |                           |                           |                         |
|-----|-----------------------------------|-------------------------------------|----------------------------|-----------------------------|-----------------------------|----------------------------|--------------------------|-------------------------|---------------------------|---------------------------|---------------------------|--------------------------|---------------------------|---------------------------|-------------------------|
|     | $\mathbb{T}_{3,1}^{(1,0;a)}(T_2)$ | $-\frac{\sqrt{21}}{224}$            | 0                          | $-\frac{3\sqrt{210}}{1120}$ | 0                           | $\frac{3\sqrt{105}}{1120}$ | 0                        | 0                       | $\frac{5\sqrt{14}}{112}$  | 0                         | $\frac{\sqrt{70}}{56}$    | 0                        | $-\frac{\sqrt{42}}{112}$  | 0                         | 0                       |
|     |                                   | 0                                   | $\frac{\sqrt{35}}{160}$    | 0                           | $\frac{\sqrt{70}}{1120}$    | 0                          | $\frac{3\sqrt{7}}{224}$  | $\frac{\sqrt{6}}{16}$   | 0                         | 0                         | 0                         | $\frac{\sqrt{210}}{112}$ | 0                         | $-\frac{\sqrt{42}}{56}$   | 0                       |
|     |                                   | $\frac{3\sqrt{7}}{224}$             | 0                          | $\frac{\sqrt{70}}{1120}$    | 0                           | $\frac{\sqrt{35}}{160}$    | 0                        | 0                       | $\frac{\sqrt{42}}{56}$    | 0                         | $-\frac{\sqrt{210}}{112}$ | 0                        | 0                         | 0                         | $-\frac{\sqrt{6}}{16}$  |
|     |                                   | 0                                   | $\frac{3\sqrt{105}}{1120}$ | 0                           | $-\frac{3\sqrt{210}}{1120}$ | 0                          | $-\frac{\sqrt{21}}{224}$ | 0                       | 0                         | $\frac{\sqrt{42}}{112}$   | 0                         | $-\frac{\sqrt{70}}{56}$  | 0                         | $-\frac{5\sqrt{14}}{112}$ | 0                       |
|     |                                   | 0                                   | $\frac{\sqrt{21}}{28}$     | 0                           | $-\frac{\sqrt{42}}{56}$     | 0                          | 0                        | $\frac{\sqrt{10}}{96}$  | 0                         | $\frac{\sqrt{210}}{336}$  | 0                         | $-\frac{\sqrt{14}}{224}$ | 0                         | 0                         | 0                       |
|     |                                   | $-\frac{\sqrt{21}}{28}$             | 0                          | $-\frac{\sqrt{210}}{280}$   | 0                           | $-\frac{\sqrt{105}}{70}$   | 0                        | 0                       | $-\frac{5\sqrt{14}}{672}$ | 0                         | $\frac{\sqrt{70}}{336}$   | 0                        | $-\frac{\sqrt{42}}{224}$  | 0                         | 0                       |
|     |                                   | 0                                   | $\frac{\sqrt{210}}{280}$   | 0                           | $-\frac{\sqrt{105}}{70}$    | 0                          | $-\frac{\sqrt{42}}{56}$  | $-\frac{1}{32}$         | 0                         | $-\frac{5\sqrt{21}}{672}$ | 0                         | $-\frac{\sqrt{35}}{672}$ | 0                         | $-\frac{3\sqrt{7}}{224}$  | 0                       |
|     |                                   | $\frac{\sqrt{42}}{56}$              | 0                          | $\frac{\sqrt{105}}{70}$     | 0                           | $-\frac{\sqrt{210}}{280}$  | 0                        | 0                       | $-\frac{3\sqrt{7}}{224}$  | 0                         | $-\frac{\sqrt{35}}{672}$  | 0                        | $-\frac{5\sqrt{21}}{672}$ | 0                         | $-\frac{1}{32}$         |
|     |                                   | 0                                   | $\frac{\sqrt{105}}{70}$    | 0                           | $\frac{\sqrt{210}}{280}$    | 0                          | $\frac{\sqrt{21}}{28}$   | 0                       | 0                         | $-\frac{\sqrt{42}}{224}$  | 0                         | $\frac{\sqrt{70}}{336}$  | 0                         | $-\frac{5\sqrt{14}}{672}$ | 0                       |
|     |                                   | 0                                   | 0                          | $\frac{\sqrt{42}}{56}$      | 0                           | $-\frac{\sqrt{21}}{28}$    | 0                        | 0                       | 0                         | 0                         | $-\frac{\sqrt{14}}{224}$  | 0                        | $\frac{\sqrt{210}}{336}$  | 0                         | $\frac{\sqrt{10}}{96}$  |
| 737 | symmetry                          | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$    |                            |                             |                             |                            |                          |                         |                           |                           |                           |                          |                           |                           |                         |
|     | $\mathbb{T}_{3,2}^{(1,0;a)}(T_2)$ | 0                                   | 0                          | 0                           | $-\frac{\sqrt{210}i}{280}$  | 0                          | 0                        | $\frac{\sqrt{2}i}{8}$   | 0                         | 0                         | 0                         | $\frac{\sqrt{70}i}{56}$  | 0                         | 0                         | 0                       |
|     |                                   | $\frac{\sqrt{7}i}{56}$              | 0                          | 0                           | 0                           | $-\frac{\sqrt{35}i}{280}$  | 0                        | 0                       | $-\frac{\sqrt{42}i}{56}$  | 0                         | 0                         | 0                        | $\frac{3\sqrt{14}i}{56}$  | 0                         | 0                       |
|     |                                   | 0                                   | $-\frac{\sqrt{35}i}{280}$  | 0                           | 0                           | 0                          | $\frac{\sqrt{7}i}{56}$   | 0                       | 0                         | $-\frac{3\sqrt{14}i}{56}$ | 0                         | 0                        | 0                         | $\frac{\sqrt{42}i}{56}$   | 0                       |
|     |                                   | 0                                   | 0                          | $-\frac{\sqrt{210}i}{280}$  | 0                           | 0                          | 0                        | 0                       | 0                         | 0                         | $-\frac{\sqrt{70}i}{56}$  | 0                        | 0                         | 0                         | $-\frac{\sqrt{2}i}{8}$  |
|     |                                   | 0                                   | 0                          | $\frac{\sqrt{42}i}{28}$     | 0                           | 0                          | 0                        | 0                       | 0                         | 0                         | $\frac{\sqrt{14}i}{84}$   | 0                        | 0                         | 0                         | 0                       |
|     |                                   | 0                                   | 0                          | 0                           | $\frac{\sqrt{210}i}{140}$   | 0                          | 0                        | $-\frac{\sqrt{2}i}{24}$ | 0                         | 0                         | 0                         | $\frac{\sqrt{70}i}{168}$ | 0                         | 0                         | 0                       |
|     |                                   | $\frac{\sqrt{42}i}{28}$             | 0                          | 0                           | 0                           | $-\frac{\sqrt{210}i}{140}$ | 0                        | 0                       | $-\frac{\sqrt{7}i}{168}$  | 0                         | 0                         | 0                        | $\frac{\sqrt{21}i}{168}$  | 0                         | 0                       |
|     |                                   | 0                                   | $\frac{\sqrt{210}i}{140}$  | 0                           | 0                           | 0                          | $-\frac{\sqrt{42}i}{28}$ | 0                       | 0                         | $\frac{\sqrt{21}i}{168}$  | 0                         | 0                        | 0                         | $-\frac{\sqrt{7}i}{168}$  | 0                       |
|     |                                   | 0                                   | 0                          | $-\frac{\sqrt{210}i}{140}$  | 0                           | 0                          | 0                        | 0                       | 0                         | 0                         | $\frac{\sqrt{70}i}{168}$  | 0                        | 0                         | 0                         | $-\frac{\sqrt{2}i}{24}$ |
|     |                                   | 0                                   | 0                          | 0                           | $-\frac{\sqrt{42}i}{28}$    | 0                          | 0                        | 0                       | 0                         | 0                         | 0                         | $\frac{\sqrt{14}i}{84}$  | 0                         | 0                         | 0                       |
| 738 | symmetry                          | $\frac{3\sqrt{35}xyz(x-y)(x+y)}{2}$ |                            |                             |                             |                            |                          |                         |                           |                           |                           |                          |                           |                           |                         |

continued ...

Table 9

| No. | multipole                       | matrix   |                          |                          |                          |                          |                           |                          |                           |                           |                         |                          |                            |                          |  |
|-----|---------------------------------|--|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------|--------------------------|---------------------------|---------------------------|-------------------------|--------------------------|----------------------------|--------------------------|--|
|     | $\mathbb{T}_{5,0}^{(1,0;a)}(E)$ | 0  | 0                        | 0                        | 0                        | 0                        | 0                         | 0                        | 0                         | 0                         | 0                       | 0                        | $-\frac{\sqrt{210}}{50}$   | 0                        |  |
|     |                                 | 0  | 0                        | 0                        | 0                        | 0                        | 0                         | 0                        | 0                         | 0                         | 0                       | 0                        | 0                          | $\frac{3\sqrt{10}}{50}$  |  |
|     |                                 | 0  | 0                        | 0                        | 0                        | 0                        | $\frac{3\sqrt{10}}{50}$   | 0                        | 0                         | 0                         | 0                       | 0                        | 0                          | 0                        |  |
|     |                                 | 0  | 0                        | 0                        | 0                        | 0                        | 0                         | $-\frac{\sqrt{210}}{50}$ | 0                         | 0                         | 0                       | 0                        | 0                          | 0                        |  |
|     |                                 | 0  | 0                        | 0                        | 0                        | $-\frac{3\sqrt{35}}{70}$ | 0                         | 0                        | 0                         | 0                         | 0                       | $-\frac{\sqrt{14}}{140}$ | 0                          | 0                        |  |
|     |                                 | 0  | 0                        | 0                        | 0                        | 0                        | $\frac{3\sqrt{35}}{70}$   | 0                        | 0                         | 0                         | 0                       | 0                        | $-\frac{\sqrt{210}}{2100}$ | 0                        |  |
|     |                                 | 0  | 0                        | 0                        | 0                        | 0                        | 0                         | 0                        | 0                         | 0                         | 0                       | 0                        | 0                          | $\frac{\sqrt{15}}{150}$  |  |
|     |                                 | 0  | 0                        | 0                        | 0                        | 0                        | 0                         | $-\frac{\sqrt{15}}{150}$ | 0                         | 0                         | 0                       | 0                        | 0                          | 0                        |  |
|     |                                 | $\frac{3\sqrt{35}}{70}$                                    | 0                        | 0                        | 0                        | 0                        | 0                         | 0                        | $\frac{\sqrt{210}}{2100}$ | 0                         | 0                       | 0                        | 0                          | 0                        |  |
|     |                                 | 0  | $-\frac{3\sqrt{35}}{70}$ | 0                        | 0                        | 0                        | 0                         | 0                        | 0                         | $\frac{\sqrt{14}}{140}$   | 0                       | 0                        | 0                          | 0                        |  |
| 739 | symmetry                        | $\frac{\sqrt{105}xyz(x^2+y^2-2z^2)}{2}$                    |                          |                          |                          |                          |                           |                          |                           |                           |                         |                          |                            |                          |  |
|     | $\mathbb{T}_{5,1}^{(1,0;a)}(E)$ | 0  | 0                        | 0                        | 0                        | 0                        | 0                         | $-\frac{\sqrt{10}}{100}$ | 0                         | 0                         | 0                       | $\frac{\sqrt{14}}{20}$   | 0                          | 0                        |  |
|     |                                 | 0  | 0                        | 0                        | 0                        | 0                        | 0                         | 0                        | $\frac{\sqrt{210}}{100}$  | 0                         | 0                       | 0                        | $-\frac{3\sqrt{70}}{100}$  | 0                        |  |
|     |                                 | 0  | 0                        | 0                        | 0                        | 0                        | 0                         | 0                        | 0                         | $-\frac{3\sqrt{70}}{100}$ | 0                       | 0                        | 0                          | $\frac{\sqrt{210}}{100}$ |  |
|     |                                 | 0  | 0                        | 0                        | 0                        | 0                        | 0                         | 0                        | 0                         | 0                         | $\frac{\sqrt{14}}{20}$  | 0                        | 0                          | $-\frac{\sqrt{10}}{100}$ |  |
|     |                                 | 0  | 0                        | $\frac{\sqrt{210}}{140}$ | 0                        | 0                        | 0                         | 0                        | 0                         | 0                         | $\frac{\sqrt{70}}{420}$ | 0                        | 0                          | 0                        |  |
|     |                                 | 0  | 0                        | 0                        | $-\frac{\sqrt{42}}{28}$  | 0                        | 0                         | $\frac{\sqrt{10}}{300}$  | 0                         | 0                         | 0                       | $-\frac{\sqrt{14}}{210}$ | 0                          | 0                        |  |
|     |                                 | $-\frac{\sqrt{210}}{140}$                                  | 0                        | 0                        | 0                        | $\frac{\sqrt{42}}{28}$   | 0                         | 0                        | $-\frac{2\sqrt{35}}{525}$ | 0                         | 0                       | 0                        | $-\frac{\sqrt{105}}{1050}$ | 0                        |  |
|     |                                 | 0  | $\frac{\sqrt{42}}{28}$   | 0                        | 0                        | 0                        | $-\frac{\sqrt{210}}{140}$ | 0                        | 0                         | $\frac{\sqrt{105}}{1050}$ | 0                       | 0                        | 0                          | $\frac{2\sqrt{35}}{525}$ |  |
|     |                                 | 0  | 0                        | $-\frac{\sqrt{42}}{28}$  | 0                        | 0                        | 0                         | 0                        | 0                         | 0                         | $\frac{\sqrt{14}}{210}$ | 0                        | 0                          | $-\frac{\sqrt{10}}{300}$ |  |
|     |                                 | 0  | 0                        | 0                        | $\frac{\sqrt{210}}{140}$ | 0                        | 0                         | 0                        | 0                         | 0                         | 0                       | $-\frac{\sqrt{70}}{420}$ | 0                          | 0                        |  |
| 740 | symmetry                        | $\frac{x(8x^4-40x^2y^2-40x^2z^2+15y^4+30y^2z^2+15z^4)}{8}$ |                          |                          |                          |                          |                           |                          |                           |                           |                         |                          |                            |                          |  |

continued ...

Table 9

| No. | multipole                            | matrix   |                           |                           |                           |                           |                          |                            |                             |                           |                             |                              |                          |                            |                             |
|-----|--------------------------------------|--|---------------------------|---------------------------|---------------------------|---------------------------|--------------------------|----------------------------|-----------------------------|---------------------------|-----------------------------|------------------------------|--------------------------|----------------------------|-----------------------------|
|     | $\mathbb{T}_{5,0}^{(1,0;a)}(T_1, 1)$ | 0  | 0                         | 0                         | 0                         | 0                         | 0                        | 0                          | $\frac{\sqrt{6}i}{80}$      | 0                         | $-\frac{\sqrt{30}i}{80}$    | 0                            | $\frac{7\sqrt{2}i}{80}$  | 0                          | $-\frac{3\sqrt{42}i}{80}$   |
|     |                                      | 0  | 0                         | 0                         | 0                         | 0                         | 0                        | $\frac{\sqrt{14}i}{80}$    | 0                           | $-\frac{3\sqrt{6}i}{80}$  | 0                           | $\frac{3\sqrt{10}i}{80}$     | 0                        | $-\frac{7\sqrt{2}i}{80}$   | 0                           |
|     |                                      | 0  | 0                         | 0                         | 0                         | 0                         | 0                        | $-\frac{7\sqrt{2}i}{80}$   | 0                           | $\frac{3\sqrt{10}i}{80}$  | 0                           | $-\frac{3\sqrt{6}i}{80}$     | 0                        | $\frac{\sqrt{14}i}{80}$    | 0                           |
|     |                                      | 0  | 0                         | 0                         | 0                         | 0                         | 0                        | $-\frac{3\sqrt{42}i}{80}$  | 0                           | $\frac{7\sqrt{2}i}{80}$   | 0                           | $-\frac{\sqrt{30}i}{80}$     | 0                        | $\frac{\sqrt{6}i}{80}$     | 0                           |
|     |                                      | 0  | $-\frac{3i}{112}$         | 0                         | $\frac{\sqrt{2}i}{16}$    | 0                         | $-\frac{9\sqrt{5}i}{80}$ | $\frac{\sqrt{210}i}{6720}$ | 0                           | $-\frac{\sqrt{10}i}{448}$ | 0                           | $\frac{\sqrt{6}i}{192}$      | 0                        | $-\frac{\sqrt{30}i}{320}$  | 0                           |
|     |                                      | $-\frac{3i}{112}$  | 0                         | $\frac{3\sqrt{10}i}{112}$ | 0                         | $-\frac{\sqrt{5}i}{16}$   | 0                        | 0                          | $-\frac{23\sqrt{6}i}{6720}$ | 0                         | $\frac{13\sqrt{30}i}{6720}$ | 0                            | $-\frac{\sqrt{2}i}{320}$ | 0                          | $-\frac{\sqrt{42}i}{320}$   |
|     |                                      | 0  | $\frac{3\sqrt{10}i}{112}$ | 0                         | $-\frac{3\sqrt{5}i}{56}$  | 0                         | $\frac{\sqrt{2}i}{16}$   | $-\frac{\sqrt{21}i}{480}$  | 0                           | $\frac{11i}{1120}$        | 0                           | $-\frac{\sqrt{15}i}{3360}$   | 0                        | $-\frac{\sqrt{3}i}{160}$   | 0                           |
|     |                                      | $\frac{\sqrt{2}i}{16}$                                     | 0                         | $-\frac{3\sqrt{5}i}{56}$  | 0                         | $\frac{3\sqrt{10}i}{112}$ | 0                        | 0                          | $\frac{\sqrt{3}i}{160}$     | 0                         | $\frac{\sqrt{15}i}{3360}$   | 0                            | $-\frac{11i}{1120}$      | 0                          | $\frac{\sqrt{21}i}{480}$    |
|     |                                      | 0  | $-\frac{\sqrt{5}i}{16}$   | 0                         | $\frac{3\sqrt{10}i}{112}$ | 0                         | $-\frac{3i}{112}$        | $\frac{\sqrt{42}i}{320}$   | 0                           | $\frac{\sqrt{2}i}{320}$   | 0                           | $-\frac{13\sqrt{30}i}{6720}$ | 0                        | $\frac{23\sqrt{6}i}{6720}$ | 0                           |
|     |                                      | $-\frac{9\sqrt{5}i}{80}$                                   | 0                         | $\frac{\sqrt{2}i}{16}$    | 0                         | $-\frac{3i}{112}$         | 0                        | 0                          | $\frac{\sqrt{30}i}{320}$    | 0                         | $-\frac{\sqrt{6}i}{192}$    | 0                            | $\frac{\sqrt{10}i}{448}$ | 0                          | $-\frac{\sqrt{210}i}{6720}$ |
| 741 | symmetry                             | $\frac{y(15x^4-40x^2y^2+30x^2z^2+8y^4-40y^2z^2+15z^4)}{8}$ |                           |                           |                           |                           |                          |                            |                             |                           |                             |                              |                          |                            |                             |
|     | $\mathbb{T}_{5,1}^{(1,0;a)}(T_1, 1)$ | 0  | 0                         | 0                         | 0                         | 0                         | 0                        | 0                          | $-\frac{\sqrt{6}}{80}$      | 0                         | $-\frac{\sqrt{30}}{80}$     | 0                            | $-\frac{7\sqrt{2}}{80}$  | 0                          | $-\frac{3\sqrt{42}}{80}$    |
|     |                                      | 0  | 0                         | 0                         | 0                         | 0                         | 0                        | $\frac{\sqrt{14}}{80}$     | 0                           | $\frac{3\sqrt{6}}{80}$    | 0                           | $\frac{3\sqrt{10}}{80}$      | 0                        | $\frac{7\sqrt{2}}{80}$     | 0                           |
|     |                                      | 0  | 0                         | 0                         | 0                         | 0                         | 0                        | 0                          | $-\frac{7\sqrt{2}}{80}$     | 0                         | $-\frac{3\sqrt{10}}{80}$    | 0                            | $-\frac{3\sqrt{6}}{80}$  | 0                          | $-\frac{\sqrt{14}}{80}$     |
|     |                                      | 0  | 0                         | 0                         | 0                         | 0                         | 0                        | $\frac{3\sqrt{42}}{80}$    | 0                           | $\frac{7\sqrt{2}}{80}$    | 0                           | $\frac{\sqrt{30}}{80}$       | 0                        | $\frac{\sqrt{6}}{80}$      | 0                           |
|     |                                      | 0  | $-\frac{3}{112}$          | 0                         | $-\frac{\sqrt{2}}{16}$    | 0                         | $-\frac{9\sqrt{5}}{80}$  | $-\frac{\sqrt{210}}{6720}$ | 0                           | $-\frac{\sqrt{10}}{448}$  | 0                           | $-\frac{\sqrt{6}}{192}$      | 0                        | $-\frac{\sqrt{30}}{320}$   | 0                           |
|     |                                      | $\frac{3}{112}$  | 0                         | $\frac{3\sqrt{10}}{112}$  | 0                         | $\frac{\sqrt{5}}{16}$     | 0                        | 0                          | $\frac{23\sqrt{6}}{6720}$   | 0                         | $\frac{13\sqrt{30}}{6720}$  | 0                            | $\frac{\sqrt{2}}{320}$   | 0                          | $-\frac{\sqrt{42}}{320}$    |
|     |                                      | 0  | $-\frac{3\sqrt{10}}{112}$ | 0                         | $-\frac{3\sqrt{5}}{56}$   | 0                         | $-\frac{\sqrt{2}}{16}$   | $-\frac{\sqrt{21}}{480}$   | 0                           | $-\frac{11}{1120}$        | 0                           | $-\frac{\sqrt{15}}{3360}$    | 0                        | $\frac{\sqrt{3}}{160}$     | 0                           |
|     |                                      | $\frac{\sqrt{2}}{16}$                                      | 0                         | $\frac{3\sqrt{5}}{56}$    | 0                         | $\frac{3\sqrt{10}}{112}$  | 0                        | 0                          | $\frac{\sqrt{3}}{160}$      | 0                         | $-\frac{\sqrt{15}}{3360}$   | 0                            | $-\frac{11}{1120}$       | 0                          | $-\frac{\sqrt{21}}{480}$    |
|     |                                      | 0  | $-\frac{\sqrt{5}}{16}$    | 0                         | $-\frac{3\sqrt{10}}{112}$ | 0                         | $-\frac{3}{112}$         | $-\frac{\sqrt{42}}{320}$   | 0                           | $\frac{\sqrt{2}}{320}$    | 0                           | $\frac{13\sqrt{30}}{6720}$   | 0                        | $\frac{23\sqrt{6}}{6720}$  | 0                           |
|     |                                      | $\frac{9\sqrt{5}}{80}$                                     | 0                         | $\frac{\sqrt{2}}{16}$     | 0                         | $\frac{3}{112}$           | 0                        | 0                          | $-\frac{\sqrt{30}}{320}$    | 0                         | $-\frac{\sqrt{6}}{192}$     | 0                            | $-\frac{\sqrt{10}}{448}$ | 0                          | $-\frac{\sqrt{210}}{6720}$  |
| 742 | symmetry                             | $\frac{z(15x^4+30x^2y^2-40x^2z^2+15y^4-40y^2z^2+8z^4)}{8}$ |                           |                           |                           |                           |                          |                            |                             |                           |                             |                              |                          |                            |                             |

continued ...

Table 9

| No. | multipole                            | matrix  |                            |                            |                            |                            |                            |                            |                                |                              |                             |                              |                              |                               |                            |   |
|-----|--------------------------------------|---|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|--------------------------------|------------------------------|-----------------------------|------------------------------|------------------------------|-------------------------------|----------------------------|---|
|     | $\mathbb{T}_{5,2}^{(1,0;a)}(T_1, 1)$ | 0   | 0                          | 0                          | 0                          | 0                          | 0                          | 0                          | 0                              | $-\frac{\sqrt{2}i}{10}$      | 0                           | 0                            | 0                            | 0                             | 0                          | 0 |
|     |                                      | 0   | 0                          | 0                          | 0                          | 0                          | 0                          | 0                          | 0                              | 0                            | $\frac{\sqrt{10}i}{10}$     | 0                            | 0                            | 0                             | 0                          | 0 |
|     |                                      | 0   | 0                          | 0                          | 0                          | 0                          | 0                          | 0                          | 0                              | 0                            | 0                           | $-\frac{\sqrt{10}i}{10}$     | 0                            | 0                             | 0                          | 0 |
|     |                                      | 0   | 0                          | 0                          | 0                          | 0                          | 0                          | 0                          | 0                              | 0                            | 0                           | 0                            | $\frac{\sqrt{2}i}{10}$       | 0                             | 0                          | 0 |
|     |                                      | $-\frac{\sqrt{5}i}{70}$                           | 0                          | 0                          | 0                          | 0                          | 0                          | 0                          | $-\frac{\sqrt{30}i}{420}$      | 0                            | 0                           | 0                            | 0                            | 0                             | 0                          | 0 |
|     |                                      | 0   | $\frac{\sqrt{5}i}{14}$     | 0                          | 0                          | 0                          | 0                          | 0                          | 0                              | $\frac{3\sqrt{2}i}{140}$     | 0                           | 0                            | 0                            | 0                             | 0                          | 0 |
|     |                                      | 0   | 0                          | $-\frac{\sqrt{5}i}{7}$     | 0                          | 0                          | 0                          | 0                          | 0                              | $-\frac{\sqrt{15}i}{210}$    | 0                           | 0                            | 0                            | 0                             | 0                          | 0 |
|     |                                      | 0   | 0                          | 0                          | $\frac{\sqrt{5}i}{7}$      | 0                          | 0                          | 0                          | 0                              | 0                            | 0                           | $-\frac{\sqrt{15}i}{210}$    | 0                            | 0                             | 0                          | 0 |
|     |                                      | 0   | 0                          | 0                          | 0                          | $-\frac{\sqrt{5}i}{14}$    | 0                          | 0                          | 0                              | 0                            | 0                           | 0                            | $\frac{3\sqrt{2}i}{140}$     | 0                             | 0                          | 0 |
|     |                                      | 0   | 0                          | 0                          | 0                          | 0                          | $\frac{\sqrt{5}i}{70}$     | 0                          | 0                              | 0                            | 0                           | 0                            | 0                            | $-\frac{\sqrt{30}i}{420}$     | 0                          | 0 |
| 743 | symmetry                             | $\frac{3\sqrt{35}x(y^2-2yz-z^2)(y^2+2yz-z^2)}{8}$ |                            |                            |                            |                            |                            |                            |                                |                              |                             |                              |                              |                               |                            |   |
|     | $\mathbb{T}_{5,0}^{(1,0;a)}(T_1, 2)$ | 0   | 0                          | 0                          | 0                          | 0                          | 0                          | 0                          | $\frac{\sqrt{210}i}{400}$      | 0                            | $-\frac{\sqrt{42}i}{80}$    | 0                            | $-\frac{9\sqrt{70}i}{400}$   | 0                             | $-\frac{\sqrt{30}i}{80}$   | 0 |
|     |                                      | 0   | 0                          | 0                          | 0                          | 0                          | 0                          | $-\frac{9\sqrt{10}i}{400}$ | 0                              | $-\frac{3\sqrt{210}i}{400}$  | 0                           | $\frac{3\sqrt{14}i}{80}$     | 0                            | $\frac{9\sqrt{70}i}{400}$     | 0                          | 0 |
|     |                                      | 0   | 0                          | 0                          | 0                          | 0                          | 0                          | 0                          | $\frac{9\sqrt{70}i}{400}$      | 0                            | $\frac{3\sqrt{14}i}{80}$    | 0                            | $-\frac{3\sqrt{210}i}{400}$  | 0                             | $-\frac{9\sqrt{10}i}{400}$ | 0 |
|     |                                      | 0   | 0                          | 0                          | 0                          | 0                          | 0                          | $-\frac{\sqrt{30}i}{80}$   | 0                              | $-\frac{9\sqrt{70}i}{400}$   | 0                           | $-\frac{\sqrt{42}i}{80}$     | 0                            | $\frac{\sqrt{210}i}{400}$     | 0                          | 0 |
|     |                                      | 0   | $-\frac{3\sqrt{35}i}{560}$ | 0                          | $-\frac{9\sqrt{70}i}{560}$ | 0                          | $-\frac{3\sqrt{7}i}{112}$  | $\frac{\sqrt{6}i}{960}$    | 0                              | $-\frac{\sqrt{14}i}{448}$    | 0                           | $-\frac{3\sqrt{210}i}{2240}$ | 0                            | $-\frac{\sqrt{42}i}{1344}$    | 0                          | 0 |
|     |                                      | $-\frac{3\sqrt{35}i}{560}$                        | 0                          | $\frac{3\sqrt{14}i}{112}$  | 0                          | $\frac{9\sqrt{7}i}{112}$   | 0                          | 0                          | $-\frac{23\sqrt{210}i}{33600}$ | 0                            | $\frac{13\sqrt{42}i}{6720}$ | 0                            | $\frac{9\sqrt{70}i}{11200}$  | 0                             | $-\frac{\sqrt{30}i}{960}$  | 0 |
|     |                                      | 0   | $\frac{3\sqrt{14}i}{112}$  | 0                          | $-\frac{3\sqrt{7}i}{56}$   | 0                          | $-\frac{9\sqrt{70}i}{560}$ | $\frac{3\sqrt{15}i}{800}$  | 0                              | $\frac{11\sqrt{35}i}{5600}$  | 0                           | $-\frac{\sqrt{21}i}{3360}$   | 0                            | $\frac{9\sqrt{105}i}{5600}$   | 0                          | 0 |
|     |                                      | $-\frac{9\sqrt{70}i}{560}$                        | 0                          | $-\frac{3\sqrt{7}i}{56}$   | 0                          | $\frac{3\sqrt{14}i}{112}$  | 0                          | 0                          | $-\frac{9\sqrt{105}i}{5600}$   | 0                            | $\frac{\sqrt{21}i}{3360}$   | 0                            | $-\frac{11\sqrt{35}i}{5600}$ | 0                             | $-\frac{3\sqrt{15}i}{800}$ | 0 |
|     |                                      | 0   | $\frac{9\sqrt{7}i}{112}$   | 0                          | $\frac{3\sqrt{14}i}{112}$  | 0                          | $-\frac{3\sqrt{35}i}{560}$ | $\frac{\sqrt{30}i}{960}$   | 0                              | $-\frac{9\sqrt{70}i}{11200}$ | 0                           | $-\frac{13\sqrt{42}i}{6720}$ | 0                            | $\frac{23\sqrt{210}i}{33600}$ | 0                          | 0 |
|     |                                      | $-\frac{3\sqrt{7}i}{112}$                         | 0                          | $-\frac{9\sqrt{70}i}{560}$ | 0                          | $-\frac{3\sqrt{35}i}{560}$ | 0                          | 0                          | $\frac{\sqrt{42}i}{1344}$      | 0                            | $\frac{3\sqrt{210}i}{2240}$ | 0                            | $\frac{\sqrt{14}i}{448}$     | 0                             | $-\frac{\sqrt{6}i}{960}$   | 0 |
| 744 | symmetry                             | $\frac{3\sqrt{35}y(x^2-2xz-z^2)(x^2+2xz-z^2)}{8}$ |                            |                            |                            |                            |                            |                            |                                |                              |                             |                              |                              |                               |                            |   |

continued ...

Table 9

| No. | multipole                            | matrix  |                           |                           |                           |                           |                           |                           |                              |                             |                            |                            |                             |                              |                          |
|-----|--------------------------------------|---|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|------------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------|------------------------------|--------------------------|
|     | $\mathbb{T}_{5,1}^{(1,0;a)}(T_1, 2)$ | 0   | 0                         | 0                         | 0                         | 0                         | 0                         | 0                         | $-\frac{\sqrt{210}}{400}$    | 0                           | $-\frac{\sqrt{42}}{80}$    | 0                          | $\frac{9\sqrt{70}}{400}$    | 0                            | $-\frac{\sqrt{30}}{80}$  |
|     |                                      | 0   | 0                         | 0                         | 0                         | 0                         | 0                         | $-\frac{9\sqrt{10}}{400}$ | 0                            | $\frac{3\sqrt{210}}{400}$   | 0                          | $\frac{3\sqrt{14}}{80}$    | 0                           | $-\frac{9\sqrt{70}}{400}$    | 0                        |
|     |                                      | 0   | 0                         | 0                         | 0                         | 0                         | 0                         | 0                         | $\frac{9\sqrt{70}}{400}$     | 0                           | $-\frac{3\sqrt{14}}{80}$   | 0                          | $-\frac{3\sqrt{210}}{400}$  | 0                            | $\frac{9\sqrt{10}}{400}$ |
|     |                                      | 0   | 0                         | 0                         | 0                         | 0                         | 0                         | $\frac{\sqrt{30}}{80}$    | 0                            | $-\frac{9\sqrt{70}}{400}$   | 0                          | $\frac{\sqrt{42}}{80}$     | 0                           | $\frac{\sqrt{210}}{400}$     | 0                        |
|     |                                      | 0   | $-\frac{3\sqrt{35}}{560}$ | 0                         | $\frac{9\sqrt{70}}{560}$  | 0                         | $-\frac{3\sqrt{7}}{112}$  | $-\frac{\sqrt{6}}{960}$   | 0                            | $-\frac{\sqrt{14}}{448}$    | 0                          | $\frac{3\sqrt{210}}{2240}$ | 0                           | $-\frac{\sqrt{42}}{1344}$    | 0                        |
|     |                                      | $\frac{3\sqrt{35}}{560}$                          | 0                         | $\frac{3\sqrt{14}}{112}$  | 0                         | $-\frac{9\sqrt{7}}{112}$  | 0                         | 0                         | $\frac{23\sqrt{210}}{33600}$ | 0                           | $\frac{13\sqrt{42}}{6720}$ | 0                          | $-\frac{9\sqrt{70}}{11200}$ | 0                            | $-\frac{\sqrt{30}}{960}$ |
|     |                                      | 0   | $-\frac{3\sqrt{14}}{112}$ | 0                         | $-\frac{3\sqrt{7}}{56}$   | 0                         | $\frac{9\sqrt{70}}{560}$  | $\frac{3\sqrt{15}}{800}$  | 0                            | $-\frac{11\sqrt{35}}{5600}$ | 0                          | $-\frac{\sqrt{21}}{3360}$  | 0                           | $-\frac{9\sqrt{105}}{5600}$  | 0                        |
|     |                                      | $-\frac{9\sqrt{70}}{560}$                         | 0                         | $\frac{3\sqrt{7}}{56}$    | 0                         | $\frac{3\sqrt{14}}{112}$  | 0                         | 0                         | $-\frac{9\sqrt{105}}{5600}$  | 0                           | $-\frac{\sqrt{21}}{3360}$  | 0                          | $-\frac{11\sqrt{35}}{5600}$ | 0                            | $\frac{3\sqrt{15}}{800}$ |
|     |                                      | 0   | $\frac{9\sqrt{7}}{112}$   | 0                         | $-\frac{3\sqrt{14}}{112}$ | 0                         | $-\frac{3\sqrt{35}}{560}$ | $-\frac{\sqrt{30}}{960}$  | 0                            | $-\frac{9\sqrt{70}}{11200}$ | 0                          | $\frac{13\sqrt{42}}{6720}$ | 0                           | $\frac{23\sqrt{210}}{33600}$ | 0                        |
|     |                                      | $\frac{3\sqrt{7}}{112}$                           | 0                         | $-\frac{9\sqrt{70}}{560}$ | 0                         | $\frac{3\sqrt{35}}{560}$  | 0                         | 0                         | $-\frac{\sqrt{42}}{1344}$    | 0                           | $\frac{3\sqrt{210}}{2240}$ | 0                          | $-\frac{\sqrt{14}}{448}$    | 0                            | $-\frac{\sqrt{6}}{960}$  |
| 745 | symmetry                             | $\frac{3\sqrt{35}z(x^2-2xy-y^2)(x^2+2xy-y^2)}{8}$ |                           |                           |                           |                           |                           |                           |                              |                             |                            |                            |                             |                              |                          |
|     | $\mathbb{T}_{5,2}^{(1,0;a)}(T_1, 2)$ | 0   | 0                         | 0                         | 0                         | 0                         | 0                         | 0                         | 0                            | 0                           | 0                          | 0                          | $-\frac{\sqrt{210}i}{50}$   | 0                            |                          |
|     |                                      | 0   | 0                         | 0                         | 0                         | 0                         | 0                         | 0                         | 0                            | 0                           | 0                          | 0                          | 0                           | $\frac{3\sqrt{10}i}{50}$     |                          |
|     |                                      | 0   | 0                         | 0                         | 0                         | 0                         | 0                         | $-\frac{3\sqrt{10}i}{50}$ | 0                            | 0                           | 0                          | 0                          | 0                           | 0                            |                          |
|     |                                      | 0   | 0                         | 0                         | 0                         | 0                         | 0                         | 0                         | $\frac{\sqrt{210}i}{50}$     | 0                           | 0                          | 0                          | 0                           | 0                            |                          |
|     |                                      | 0   | 0                         | 0                         | 0                         | $-\frac{3\sqrt{35}i}{70}$ | 0                         | 0                         | 0                            | 0                           | 0                          | 0                          | $-\frac{\sqrt{14}i}{140}$   | 0                            |                          |
|     |                                      | 0   | 0                         | 0                         | 0                         | 0                         | $\frac{3\sqrt{35}i}{70}$  | 0                         | 0                            | 0                           | 0                          | 0                          | $-\frac{\sqrt{210}i}{2100}$ | 0                            |                          |
|     |                                      | 0   | 0                         | 0                         | 0                         | 0                         | 0                         | 0                         | 0                            | 0                           | 0                          | 0                          | 0                           | $\frac{\sqrt{15}i}{150}$     |                          |
|     |                                      | 0   | 0                         | 0                         | 0                         | 0                         | 0                         | $\frac{\sqrt{15}i}{150}$  | 0                            | 0                           | 0                          | 0                          | 0                           | 0                            |                          |
|     |                                      | $-\frac{3\sqrt{35}i}{70}$                         | 0                         | 0                         | 0                         | 0                         | 0                         | 0                         | $-\frac{\sqrt{210}i}{2100}$  | 0                           | 0                          | 0                          | 0                           | 0                            |                          |
|     |                                      | 0   | $\frac{3\sqrt{35}i}{70}$  | 0                         | 0                         | 0                         | 0                         | 0                         | 0                            | $-\frac{\sqrt{14}i}{140}$   | 0                          | 0                          | 0                           | 0                            |                          |
| 746 | symmetry                             | $\frac{\sqrt{105}x(y-z)(y+z)(2x^2-y^2-z^2)}{4}$   |                           |                           |                           |                           |                           |                           |                              |                             |                            |                            |                             |                              |                          |

continued ...

Table 9

| No. | multipole                         | matrix   |                            |                           |                           |                            |                            |                           |                               |                              |                             |                              |                               |                              |                          |
|-----|-----------------------------------|--|----------------------------|---------------------------|---------------------------|----------------------------|----------------------------|---------------------------|-------------------------------|------------------------------|-----------------------------|------------------------------|-------------------------------|------------------------------|--------------------------|
|     | $\mathbb{T}_{5,0}^{(1,0;a)}(T_2)$ | 0  | 0                          | 0                         | 0                         | 0                          | 0                          | 0                         | $\frac{\sqrt{70}i}{200}$      | 0                            | $-\frac{\sqrt{14}i}{40}$    | 0                            | $\frac{\sqrt{210}i}{200}$     | 0                            | $\frac{3\sqrt{10}i}{40}$ |
|     |                                   | 0  | 0                          | 0                         | 0                         | 0                          | 0                          | $\frac{\sqrt{30}i}{200}$  | 0                             | $-\frac{3\sqrt{70}i}{200}$   | 0                           | $\frac{\sqrt{42}i}{40}$      | 0                             | $-\frac{\sqrt{210}i}{200}$   | 0                        |
|     |                                   | 0  | 0                          | 0                         | 0                         | 0                          | 0                          | 0                         | $-\frac{\sqrt{210}i}{200}$    | 0                            | $\frac{\sqrt{42}i}{40}$     | 0                            | $-\frac{3\sqrt{70}i}{200}$    | 0                            | $\frac{\sqrt{30}i}{200}$ |
|     |                                   | 0  | 0                          | 0                         | 0                         | 0                          | 0                          | $\frac{3\sqrt{10}i}{40}$  | 0                             | $\frac{\sqrt{210}i}{200}$    | 0                           | $-\frac{\sqrt{14}i}{40}$     | 0                             | $\frac{\sqrt{70}i}{200}$     | 0                        |
|     |                                   | 0  | $-\frac{\sqrt{105}i}{280}$ | 0                         | $\frac{\sqrt{210}i}{280}$ | 0                          | $\frac{3\sqrt{21}i}{56}$   | $\frac{\sqrt{2}i}{480}$   | 0                             | $-\frac{\sqrt{42}i}{672}$    | 0                           | $\frac{\sqrt{70}i}{1120}$    | 0                             | $\frac{\sqrt{14}i}{224}$     | 0                        |
|     |                                   | $-\frac{\sqrt{105}i}{280}$                       | 0                          | $\frac{\sqrt{42}i}{56}$   | 0                         | $-\frac{\sqrt{21}i}{56}$   | 0                          | 0                         | $-\frac{23\sqrt{70}i}{16800}$ | 0                            | $\frac{13\sqrt{14}i}{3360}$ | 0                            | $-\frac{\sqrt{210}i}{5600}$   | 0                            | $\frac{\sqrt{10}i}{160}$ |
|     |                                   | 0  | $\frac{\sqrt{42}i}{56}$    | 0                         | $-\frac{\sqrt{21}i}{28}$  | 0                          | $\frac{\sqrt{210}i}{280}$  | $-\frac{\sqrt{5}i}{400}$  | 0                             | $\frac{11\sqrt{105}i}{8400}$ | 0                           | $-\frac{\sqrt{7}i}{1680}$    | 0                             | $-\frac{3\sqrt{35}i}{2800}$  | 0                        |
|     |                                   | $\frac{\sqrt{210}i}{280}$                        | 0                          | $-\frac{\sqrt{21}i}{28}$  | 0                         | $\frac{\sqrt{42}i}{56}$    | 0                          | 0                         | $\frac{3\sqrt{35}i}{2800}$    | 0                            | $\frac{\sqrt{7}i}{1680}$    | 0                            | $-\frac{11\sqrt{105}i}{8400}$ | 0                            | $\frac{\sqrt{5}i}{400}$  |
|     |                                   | 0  | $-\frac{\sqrt{21}i}{56}$   | 0                         | $\frac{\sqrt{42}i}{56}$   | 0                          | $-\frac{\sqrt{105}i}{280}$ | $-\frac{\sqrt{10}i}{160}$ | 0                             | $\frac{\sqrt{210}i}{5600}$   | 0                           | $-\frac{13\sqrt{14}i}{3360}$ | 0                             | $\frac{23\sqrt{70}i}{16800}$ | 0                        |
|     |                                   | $\frac{3\sqrt{21}i}{56}$                         | 0                          | $\frac{\sqrt{210}i}{280}$ | 0                         | $-\frac{\sqrt{105}i}{280}$ | 0                          | 0                         | $-\frac{\sqrt{14}i}{224}$     | 0                            | $-\frac{\sqrt{70}i}{1120}$  | 0                            | $\frac{\sqrt{42}i}{672}$      | 0                            | $-\frac{\sqrt{2}i}{480}$ |
| 747 | symmetry                          | $\frac{\sqrt{105}y(x-z)(x+z)(x^2-2y^2+z^2)}{4}$  |                            |                           |                           |                            |                            |                           |                               |                              |                             |                              |                               |                              |                          |
|     | $\mathbb{T}_{5,1}^{(1,0;a)}(T_2)$ | 0  | 0                          | 0                         | 0                         | 0                          | 0                          | 0                         | $\frac{\sqrt{70}}{200}$       | 0                            | $\frac{\sqrt{14}}{40}$      | 0                            | $\frac{\sqrt{210}}{200}$      | 0                            | $-\frac{3\sqrt{10}}{40}$ |
|     |                                   | 0  | 0                          | 0                         | 0                         | 0                          | 0                          | $-\frac{\sqrt{30}}{200}$  | 0                             | $-\frac{3\sqrt{70}}{200}$    | 0                           | $-\frac{\sqrt{42}}{40}$      | 0                             | $-\frac{\sqrt{210}}{200}$    | 0                        |
|     |                                   | 0  | 0                          | 0                         | 0                         | 0                          | 0                          | 0                         | $\frac{\sqrt{210}}{200}$      | 0                            | $\frac{\sqrt{42}}{40}$      | 0                            | $\frac{3\sqrt{70}}{200}$      | 0                            | $\frac{\sqrt{30}}{200}$  |
|     |                                   | 0  | 0                          | 0                         | 0                         | 0                          | 0                          | $\frac{3\sqrt{10}}{40}$   | 0                             | $-\frac{\sqrt{210}}{200}$    | 0                           | $-\frac{\sqrt{14}}{40}$      | 0                             | $-\frac{\sqrt{70}}{200}$     | 0                        |
|     |                                   | 0  | $\frac{\sqrt{105}}{280}$   | 0                         | $\frac{\sqrt{210}}{280}$  | 0                          | $-\frac{3\sqrt{21}}{56}$   | $\frac{\sqrt{2}}{480}$    | 0                             | $\frac{\sqrt{42}}{672}$      | 0                           | $\frac{\sqrt{70}}{1120}$     | 0                             | $-\frac{\sqrt{14}}{224}$     | 0                        |
|     |                                   | $-\frac{\sqrt{105}}{280}$                        | 0                          | $-\frac{\sqrt{42}}{56}$   | 0                         | $-\frac{\sqrt{21}}{56}$    | 0                          | 0                         | $-\frac{23\sqrt{70}}{16800}$  | 0                            | $-\frac{13\sqrt{14}}{3360}$ | 0                            | $-\frac{\sqrt{210}}{5600}$    | 0                            | $-\frac{\sqrt{10}}{160}$ |
|     |                                   | 0  | $\frac{\sqrt{42}}{56}$     | 0                         | $\frac{\sqrt{21}}{28}$    | 0                          | $\frac{\sqrt{210}}{280}$   | $\frac{\sqrt{5}}{400}$    | 0                             | $\frac{11\sqrt{105}}{8400}$  | 0                           | $\frac{\sqrt{7}}{1680}$      | 0                             | $-\frac{3\sqrt{35}}{2800}$   | 0                        |
|     |                                   | $-\frac{\sqrt{210}}{280}$                        | 0                          | $-\frac{\sqrt{21}}{28}$   | 0                         | $-\frac{\sqrt{42}}{56}$    | 0                          | 0                         | $-\frac{3\sqrt{35}}{2800}$    | 0                            | $\frac{\sqrt{7}}{1680}$     | 0                            | $\frac{11\sqrt{105}}{8400}$   | 0                            | $\frac{\sqrt{5}}{400}$   |
|     |                                   | 0  | $\frac{\sqrt{21}}{56}$     | 0                         | $\frac{\sqrt{42}}{56}$    | 0                          | $\frac{\sqrt{105}}{280}$   | $-\frac{\sqrt{10}}{160}$  | 0                             | $-\frac{\sqrt{210}}{5600}$   | 0                           | $-\frac{13\sqrt{14}}{3360}$  | 0                             | $-\frac{23\sqrt{70}}{16800}$ | 0                        |
|     |                                   | $\frac{3\sqrt{21}}{56}$                          | 0                          | $-\frac{\sqrt{210}}{280}$ | 0                         | $-\frac{\sqrt{105}}{280}$  | 0                          | 0                         | $-\frac{\sqrt{14}}{224}$      | 0                            | $\frac{\sqrt{70}}{1120}$    | 0                            | $\frac{\sqrt{42}}{672}$       | 0                            | $\frac{\sqrt{2}}{480}$   |
| 748 | symmetry                          | $-\frac{\sqrt{105}z(x-y)(x+y)(x^2+y^2-2z^2)}{4}$ |                            |                           |                           |                            |                            |                           |                               |                              |                             |                              |                               |                              |                          |

continued ...

Table 9

| No. | multipole                         | matrix                     |                          |                            |                           |                          |                           |                           |                            |                            |                           |                           |                            |                            |                          |
|-----|-----------------------------------|----------------------------|--------------------------|----------------------------|---------------------------|--------------------------|---------------------------|---------------------------|----------------------------|----------------------------|---------------------------|---------------------------|----------------------------|----------------------------|--------------------------|
|     | $\mathbb{T}_{5,2}^{(1,0;a)}(T_2)$ | 0                          | 0                        | 0                          | 0                         | 0                        | 0                         | $-\frac{\sqrt{10}i}{100}$ | 0                          | 0                          | 0                         | $-\frac{\sqrt{14}i}{20}$  | 0                          | 0                          | 0                        |
|     |                                   | 0                          | 0                        | 0                          | 0                         | 0                        | 0                         | 0                         | $\frac{\sqrt{210}i}{100}$  | 0                          | 0                         | 0                         | $\frac{3\sqrt{70}i}{100}$  | 0                          | 0                        |
|     |                                   | 0                          | 0                        | 0                          | 0                         | 0                        | 0                         | 0                         | 0                          | $-\frac{3\sqrt{70}i}{100}$ | 0                         | 0                         | 0                          | $-\frac{\sqrt{210}i}{100}$ | 0                        |
|     |                                   | 0                          | 0                        | 0                          | 0                         | 0                        | 0                         | 0                         | 0                          | 0                          | $\frac{\sqrt{14}i}{20}$   | 0                         | 0                          | 0                          | $\frac{\sqrt{10}i}{100}$ |
|     |                                   | 0                          | 0                        | $-\frac{\sqrt{210}i}{140}$ | 0                         | 0                        | 0                         | 0                         | 0                          | 0                          | $-\frac{\sqrt{70}i}{420}$ | 0                         | 0                          | 0                          | 0                        |
|     |                                   | 0                          | 0                        | 0                          | $\frac{\sqrt{42}i}{28}$   | 0                        | 0                         | $\frac{\sqrt{10}i}{300}$  | 0                          | 0                          | 0                         | $\frac{\sqrt{14}i}{210}$  | 0                          | 0                          | 0                        |
|     |                                   | $-\frac{\sqrt{210}i}{140}$ | 0                        | 0                          | 0                         | $-\frac{\sqrt{42}i}{28}$ | 0                         | 0                         | $-\frac{2\sqrt{35}i}{525}$ | 0                          | 0                         | 0                         | $\frac{\sqrt{105}i}{1050}$ | 0                          | 0                        |
|     |                                   | 0                          | $\frac{\sqrt{42}i}{28}$  | 0                          | 0                         | 0                        | $\frac{\sqrt{210}i}{140}$ | 0                         | 0                          | $\frac{\sqrt{105}i}{1050}$ | 0                         | 0                         | 0                          | $-\frac{2\sqrt{35}i}{525}$ | 0                        |
|     |                                   | 0                          | 0                        | $-\frac{\sqrt{42}i}{28}$   | 0                         | 0                        | 0                         | 0                         | 0                          | 0                          | $\frac{\sqrt{14}i}{210}$  | 0                         | 0                          | 0                          | $\frac{\sqrt{10}i}{300}$ |
|     |                                   | 0                          | 0                        | 0                          | $\frac{\sqrt{210}i}{140}$ | 0                        | 0                         | 0                         | 0                          | 0                          | 0                         | $-\frac{\sqrt{70}i}{420}$ | 0                          | 0                          | 0                        |
| 749 | symmetry                          | $x$                        |                          |                            |                           |                          |                           |                           |                            |                            |                           |                           |                            |                            |                          |
|     | $\mathbb{T}_{1,0}^{(1,1;a)}(T_1)$ | $\frac{\sqrt{5}i}{10}$     | 0                        | $-\frac{\sqrt{2}i}{20}$    | 0                         | 0                        | 0                         | 0                         | 0                          | 0                          | 0                         | 0                         | 0                          | 0                          | 0                        |
|     |                                   | 0                          | $\frac{\sqrt{3}i}{10}$   | 0                          | $-\frac{\sqrt{6}i}{20}$   | 0                        | 0                         | 0                         | 0                          | 0                          | 0                         | 0                         | 0                          | 0                          | 0                        |
|     |                                   | 0                          | 0                        | $\frac{\sqrt{6}i}{20}$     | 0                         | $-\frac{\sqrt{3}i}{10}$  | 0                         | 0                         | 0                          | 0                          | 0                         | 0                         | 0                          | 0                          | 0                        |
|     |                                   | 0                          | 0                        | 0                          | $\frac{\sqrt{2}i}{20}$    | 0                        | $-\frac{\sqrt{5}i}{10}$   | 0                         | 0                          | 0                          | 0                         | 0                         | 0                          | 0                          | 0                        |
|     |                                   | 0                          | $-\frac{2\sqrt{5}i}{35}$ | 0                          | 0                         | 0                        | 0                         | $-\frac{\sqrt{42}i}{56}$  | 0                          | $\frac{\sqrt{2}i}{56}$     | 0                         | 0                         | 0                          | 0                          | 0                        |
|     |                                   | $-\frac{2\sqrt{5}i}{35}$   | 0                        | $-\frac{4\sqrt{2}i}{35}$   | 0                         | 0                        | 0                         | 0                         | $-\frac{\sqrt{30}i}{56}$   | 0                          | $\frac{\sqrt{6}i}{56}$    | 0                         | 0                          | 0                          | 0                        |
|     |                                   | 0                          | $-\frac{4\sqrt{2}i}{35}$ | 0                          | $-\frac{6i}{35}$          | 0                        | 0                         | 0                         | 0                          | $-\frac{\sqrt{5}i}{28}$    | 0                         | $\frac{\sqrt{3}i}{28}$    | 0                          | 0                          | 0                        |
|     |                                   | 0                          | 0                        | $-\frac{6i}{35}$           | 0                         | $-\frac{4\sqrt{2}i}{35}$ | 0                         | 0                         | 0                          | 0                          | $-\frac{\sqrt{3}i}{28}$   | 0                         | $\frac{\sqrt{5}i}{28}$     | 0                          | 0                        |
|     |                                   | 0                          | 0                        | 0                          | $-\frac{4\sqrt{2}i}{35}$  | 0                        | $-\frac{2\sqrt{5}i}{35}$  | 0                         | 0                          | 0                          | 0                         | $-\frac{\sqrt{6}i}{56}$   | 0                          | $\frac{\sqrt{30}i}{56}$    | 0                        |
|     |                                   | 0                          | 0                        | 0                          | 0                         | $-\frac{2\sqrt{5}i}{35}$ | 0                         | 0                         | 0                          | 0                          | 0                         | 0                         | $-\frac{\sqrt{2}i}{56}$    | 0                          | $\frac{\sqrt{42}i}{56}$  |
| 750 | symmetry                          | $y$                        |                          |                            |                           |                          |                           |                           |                            |                            |                           |                           |                            |                            |                          |

continued ...

Table 9

| No. | multipole                         | matrix                 |                         |                         |                         |                         |                         |                        |                         |                        |                        |                         |                       |                        |                        |
|-----|-----------------------------------|------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|------------------------|-------------------------|------------------------|------------------------|-------------------------|-----------------------|------------------------|------------------------|
|     | $\mathbb{T}_{1,1}^{(1,1;a)}(T_1)$ | $-\frac{\sqrt{5}}{10}$ | 0                       | $-\frac{\sqrt{2}}{20}$  | 0                       | 0                       | 0                       | 0                      | 0                       | 0                      | 0                      | 0                       | 0                     | 0                      | 0                      |
|     |                                   | 0                      | $-\frac{\sqrt{3}}{10}$  | 0                       | $-\frac{\sqrt{6}}{20}$  | 0                       | 0                       | 0                      | 0                       | 0                      | 0                      | 0                       | 0                     | 0                      | 0                      |
|     |                                   | 0                      | 0                       | $-\frac{\sqrt{6}}{20}$  | 0                       | $-\frac{\sqrt{3}}{10}$  | 0                       | 0                      | 0                       | 0                      | 0                      | 0                       | 0                     | 0                      | 0                      |
|     |                                   | 0                      | 0                       | 0                       | $-\frac{\sqrt{2}}{20}$  | 0                       | $-\frac{\sqrt{5}}{10}$  | 0                      | 0                       | 0                      | 0                      | 0                       | 0                     | 0                      | 0                      |
|     |                                   | 0                      | $-\frac{2\sqrt{5}}{35}$ | 0                       | 0                       | 0                       | 0                       | $\frac{\sqrt{42}}{56}$ | 0                       | $\frac{\sqrt{2}}{56}$  | 0                      | 0                       | 0                     | 0                      | 0                      |
|     |                                   | $\frac{2\sqrt{5}}{35}$ | 0                       | $-\frac{4\sqrt{2}}{35}$ | 0                       | 0                       | 0                       | 0                      | $\frac{\sqrt{30}}{56}$  | 0                      | $\frac{\sqrt{6}}{56}$  | 0                       | 0                     | 0                      | 0                      |
|     |                                   | 0                      | $\frac{4\sqrt{2}}{35}$  | 0                       | $-\frac{6}{35}$         | 0                       | 0                       | 0                      | 0                       | $\frac{\sqrt{5}}{28}$  | 0                      | $\frac{\sqrt{3}}{28}$   | 0                     | 0                      | 0                      |
|     |                                   | 0                      | 0                       | $\frac{6}{35}$          | 0                       | $-\frac{4\sqrt{2}}{35}$ | 0                       | 0                      | 0                       | 0                      | $\frac{\sqrt{3}}{28}$  | 0                       | $\frac{\sqrt{5}}{28}$ | 0                      | 0                      |
|     |                                   | 0                      | 0                       | 0                       | $\frac{4\sqrt{2}}{35}$  | 0                       | $-\frac{2\sqrt{5}}{35}$ | 0                      | 0                       | 0                      | 0                      | $\frac{\sqrt{6}}{56}$   | 0                     | $\frac{\sqrt{30}}{56}$ | 0                      |
|     |                                   | 0                      | 0                       | 0                       | 0                       | $\frac{2\sqrt{5}}{35}$  | 0                       | 0                      | 0                       | 0                      | 0                      | 0                       | $\frac{\sqrt{2}}{56}$ | 0                      | $\frac{\sqrt{42}}{56}$ |
| 751 | symmetry                          | $z$                    |                         |                         |                         |                         |                         |                        |                         |                        |                        |                         |                       |                        |                        |
|     | $\mathbb{T}_{1,2}^{(1,1;a)}(T_1)$ | 0                      | $-\frac{i}{5}$          | 0                       | 0                       | 0                       | 0                       | 0                      | 0                       | 0                      | 0                      | 0                       | 0                     | 0                      | 0                      |
|     |                                   | 0                      | 0                       | $-\frac{\sqrt{6}i}{10}$ | 0                       | 0                       | 0                       | 0                      | 0                       | 0                      | 0                      | 0                       | 0                     | 0                      | 0                      |
|     |                                   | 0                      | 0                       | 0                       | $-\frac{\sqrt{6}i}{10}$ | 0                       | 0                       | 0                      | 0                       | 0                      | 0                      | 0                       | 0                     | 0                      | 0                      |
|     |                                   | 0                      | 0                       | 0                       | 0                       | $-\frac{i}{5}$          | 0                       | 0                      | 0                       | 0                      | 0                      | 0                       | 0                     | 0                      | 0                      |
|     |                                   | $-\frac{2i}{7}$        | 0                       | 0                       | 0                       | 0                       | 0                       | $\frac{\sqrt{6}i}{28}$ | 0                       | 0                      | 0                      | 0                       | 0                     | 0                      | 0                      |
|     |                                   | 0                      | $-\frac{6i}{35}$        | 0                       | 0                       | 0                       | 0                       | 0                      | $\frac{\sqrt{10}i}{28}$ | 0                      | 0                      | 0                       | 0                     | 0                      | 0                      |
|     |                                   | 0                      | 0                       | $-\frac{2i}{35}$        | 0                       | 0                       | 0                       | 0                      | 0                       | $\frac{\sqrt{3}i}{14}$ | 0                      | 0                       | 0                     | 0                      | 0                      |
|     |                                   | 0                      | 0                       | 0                       | $\frac{2i}{35}$         | 0                       | 0                       | 0                      | 0                       | 0                      | $\frac{\sqrt{3}i}{14}$ | 0                       | 0                     | 0                      | 0                      |
|     |                                   | 0                      | 0                       | 0                       | 0                       | $\frac{6i}{35}$         | 0                       | 0                      | 0                       | 0                      | 0                      | $\frac{\sqrt{10}i}{28}$ | 0                     | 0                      | 0                      |
|     |                                   | 0                      | 0                       | 0                       | 0                       | 0                       | $\frac{2i}{7}$          | 0                      | 0                       | 0                      | 0                      | 0                       | 0                     | $\frac{\sqrt{6}i}{28}$ | 0                      |
| 752 | symmetry                          | $\sqrt{15}xyz$         |                         |                         |                         |                         |                         |                        |                         |                        |                        |                         |                       |                        |                        |

*continued ...*



Table 9

| No. | multipole                         | matrix                         |                          |                            |                           |                         |                            |                           |                           |                           |                          |                           |                            |                            |                            |  |
|-----|-----------------------------------|--------------------------------|--------------------------|----------------------------|---------------------------|-------------------------|----------------------------|---------------------------|---------------------------|---------------------------|--------------------------|---------------------------|----------------------------|----------------------------|----------------------------|--|
|     | $\mathbb{T}_3^{(1,1;a)}(A_2)$     | 0                              | 0                        | 0                          | $\frac{3\sqrt{30}}{56}$   | 0                       | 0                          | $\frac{\sqrt{14}}{56}$    | 0                         | 0                         | 0                        | $-\frac{\sqrt{10}}{56}$   | 0                          | 0                          | 0                          |  |
|     |                                   | $\frac{15}{56}$                | 0                        | 0                          | 0                         | $\frac{3\sqrt{5}}{56}$  | 0                          | 0                         | $-\frac{\sqrt{6}}{56}$    | 0                         | 0                        | 0                         | $-\frac{3\sqrt{2}}{56}$    | 0                          | 0                          |  |
|     |                                   | 0                              | $-\frac{3\sqrt{5}}{56}$  | 0                          | 0                         | 0                       | $-\frac{15}{56}$           | 0                         | 0                         | $-\frac{3\sqrt{2}}{56}$   | 0                        | 0                         | 0                          | $-\frac{\sqrt{6}}{56}$     | 0                          |  |
|     |                                   | 0                              | 0                        | $-\frac{3\sqrt{30}}{56}$   | 0                         | 0                       | 0                          | 0                         | 0                         | 0                         | $-\frac{\sqrt{10}}{56}$  | 0                         | 0                          | 0                          | $\frac{\sqrt{14}}{56}$     |  |
|     |                                   | 0                              | 0                        | $\frac{5\sqrt{6}}{84}$     | 0                         | 0                       | 0                          | 0                         | 0                         | 0                         | $-\frac{\sqrt{2}}{28}$   | 0                         | 0                          | 0                          | 0                          |  |
|     |                                   | 0                              | 0                        | 0                          | $\frac{\sqrt{30}}{84}$    | 0                       | 0                          | $-\frac{\sqrt{14}}{56}$   | 0                         | 0                         | 0                        | $-\frac{\sqrt{10}}{56}$   | 0                          | 0                          | 0                          |  |
|     |                                   | $-\frac{5\sqrt{6}}{84}$        | 0                        | 0                          | 0                         | $-\frac{\sqrt{30}}{84}$ | 0                          | 0                         | $-\frac{1}{56}$           | 0                         | 0                        | 0                         | $-\frac{\sqrt{3}}{56}$     | 0                          | 0                          |  |
|     |                                   | 0                              | $-\frac{\sqrt{30}}{84}$  | 0                          | 0                         | 0                       | $-\frac{5\sqrt{6}}{84}$    | 0                         | 0                         | $\frac{\sqrt{3}}{56}$     | 0                        | 0                         | 0                          | $\frac{1}{56}$             | 0                          |  |
|     |                                   | 0                              | 0                        | $\frac{\sqrt{30}}{84}$     | 0                         | 0                       | 0                          | 0                         | 0                         | 0                         | $\frac{\sqrt{10}}{56}$   | 0                         | 0                          | 0                          | $\frac{\sqrt{14}}{56}$     |  |
|     |                                   | 0                              | 0                        | 0                          | $\frac{5\sqrt{6}}{84}$    | 0                       | 0                          | 0                         | 0                         | 0                         | 0                        | $\frac{\sqrt{2}}{28}$     | 0                          | 0                          | 0                          |  |
| 753 | symmetry                          | $\frac{x(2x^2-3y^2-3z^2)}{2}$  |                          |                            |                           |                         |                            |                           |                           |                           |                          |                           |                            |                            |                            |  |
|     | $\mathbb{T}_{3,0}^{(1,1;a)}(T_1)$ | $\frac{9\sqrt{5}i}{224}$       | 0                        | $-\frac{27\sqrt{2}i}{224}$ | 0                         | $\frac{45i}{224}$       | 0                          | 0                         | $-\frac{\sqrt{30}i}{112}$ | 0                         | $\frac{\sqrt{6}i}{56}$   | 0                         | $-\frac{\sqrt{10}i}{112}$  | 0                          | 0                          |  |
|     |                                   | 0                              | $-\frac{3\sqrt{3}i}{32}$ | 0                          | $\frac{3\sqrt{6}i}{224}$  | 0                       | $\frac{15\sqrt{15}i}{224}$ | $-\frac{\sqrt{70}i}{112}$ | 0                         | 0                         | 0                        | $\frac{3\sqrt{2}i}{112}$  | 0                          | $-\frac{\sqrt{10}i}{56}$   | 0                          |  |
|     |                                   | $-\frac{15\sqrt{15}i}{224}$    | 0                        | $-\frac{3\sqrt{6}i}{224}$  | 0                         | $\frac{3\sqrt{3}i}{32}$ | 0                          | 0                         | $-\frac{\sqrt{10}i}{56}$  | 0                         | $\frac{3\sqrt{2}i}{112}$ | 0                         | 0                          | 0                          | $-\frac{\sqrt{70}i}{112}$  |  |
|     |                                   | 0                              | $-\frac{45i}{224}$       | 0                          | $\frac{27\sqrt{2}i}{224}$ | 0                       | $-\frac{9\sqrt{5}i}{224}$  | 0                         | 0                         | $-\frac{\sqrt{10}i}{112}$ | 0                        | $\frac{\sqrt{6}i}{56}$    | 0                          | $-\frac{\sqrt{30}i}{112}$  | 0                          |  |
|     |                                   | 0                              | $-\frac{\sqrt{5}i}{28}$  | 0                          | $\frac{5\sqrt{10}i}{168}$ | 0                       | 0                          | $-\frac{\sqrt{42}i}{224}$ | 0                         | $\frac{3\sqrt{2}i}{112}$  | 0                        | $-\frac{\sqrt{30}i}{224}$ | 0                          | 0                          | 0                          |  |
|     |                                   | $-\frac{\sqrt{5}i}{28}$        | 0                        | $\frac{\sqrt{2}i}{56}$     | 0                         | $\frac{5i}{42}$         | 0                          | 0                         | $\frac{\sqrt{30}i}{224}$  | 0                         | $\frac{\sqrt{6}i}{112}$  | 0                         | $-\frac{3\sqrt{10}i}{224}$ | 0                          | 0                          |  |
|     |                                   | 0                              | $\frac{\sqrt{2}i}{56}$   | 0                          | $\frac{i}{14}$            | 0                       | $\frac{5\sqrt{10}i}{168}$  | $\frac{\sqrt{105}i}{224}$ | 0                         | $\frac{3\sqrt{5}i}{224}$  | 0                        | $-\frac{\sqrt{3}i}{224}$  | 0                          | $-\frac{3\sqrt{15}i}{224}$ | 0                          |  |
|     |                                   | $\frac{5\sqrt{10}i}{168}$      | 0                        | $\frac{i}{14}$             | 0                         | $\frac{\sqrt{2}i}{56}$  | 0                          | 0                         | $\frac{3\sqrt{15}i}{224}$ | 0                         | $\frac{\sqrt{3}i}{224}$  | 0                         | $-\frac{3\sqrt{5}i}{224}$  | 0                          | $-\frac{\sqrt{105}i}{224}$ |  |
|     |                                   | 0                              | $\frac{5i}{42}$          | 0                          | $\frac{\sqrt{2}i}{56}$    | 0                       | $-\frac{\sqrt{5}i}{28}$    | 0                         | 0                         | $\frac{3\sqrt{10}i}{224}$ | 0                        | $-\frac{\sqrt{6}i}{112}$  | 0                          | $-\frac{\sqrt{30}i}{224}$  | 0                          |  |
|     |                                   | 0                              | 0                        | $\frac{5\sqrt{10}i}{168}$  | 0                         | $-\frac{\sqrt{5}i}{28}$ | 0                          | 0                         | 0                         | 0                         | $\frac{\sqrt{30}i}{224}$ | 0                         | $-\frac{3\sqrt{2}i}{112}$  | 0                          | $\frac{\sqrt{42}i}{224}$   |  |
| 754 | symmetry                          | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ |                          |                            |                           |                         |                            |                           |                           |                           |                          |                           |                            |                            |                            |  |

continued ...

Table 9

| No. | multipole                         | matrix  |                        |                           |                           |                        |                            |                          |                          |                          |                          |                         |                          |                          |                          |
|-----|-----------------------------------|---|------------------------|---------------------------|---------------------------|------------------------|----------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|--------------------------|--------------------------|
|     | $\mathbb{T}_{3,1}^{(1,1;a)}(T_1)$ | $-\frac{9\sqrt{5}}{224}$  | 0                      | $-\frac{27\sqrt{2}}{224}$ | 0                         | $-\frac{45}{224}$      | 0                          | 0                        | $\frac{\sqrt{30}}{112}$  | 0                        | $\frac{\sqrt{6}}{56}$    | 0                       | $\frac{\sqrt{10}}{112}$  | 0                        | 0                        |
|     |                                   | 0   | $\frac{3\sqrt{3}}{32}$ | 0                         | $\frac{3\sqrt{6}}{224}$   | 0                      | $-\frac{15\sqrt{15}}{224}$ | $-\frac{\sqrt{70}}{112}$ | 0                        | 0                        | 0                        | $\frac{3\sqrt{2}}{112}$ | 0                        | $\frac{\sqrt{10}}{56}$   | 0                        |
|     |                                   | $-\frac{15\sqrt{15}}{224}$  | 0                      | $\frac{3\sqrt{6}}{224}$   | 0                         | $\frac{3\sqrt{3}}{32}$ | 0                          | 0                        | $-\frac{\sqrt{10}}{56}$  | 0                        | $-\frac{3\sqrt{2}}{112}$ | 0                       | 0                        | 0                        | $\frac{\sqrt{70}}{112}$  |
|     |                                   | 0   | $-\frac{45}{224}$      | 0                         | $-\frac{27\sqrt{2}}{224}$ | 0                      | $-\frac{9\sqrt{5}}{224}$   | 0                        | 0                        | $-\frac{\sqrt{10}}{112}$ | 0                        | $-\frac{\sqrt{6}}{56}$  | 0                        | $-\frac{\sqrt{30}}{112}$ | 0                        |
|     |                                   | 0   | $-\frac{\sqrt{5}}{28}$ | 0                         | $-\frac{5\sqrt{10}}{168}$ | 0                      | 0                          | $\frac{\sqrt{42}}{224}$  | 0                        | $\frac{3\sqrt{2}}{112}$  | 0                        | $\frac{\sqrt{30}}{224}$ | 0                        | 0                        | 0                        |
|     |                                   | $\frac{\sqrt{5}}{28}$   | 0                      | $\frac{\sqrt{2}}{56}$     | 0                         | $-\frac{5}{42}$        | 0                          | 0                        | $-\frac{\sqrt{30}}{224}$ | 0                        | $\frac{\sqrt{6}}{112}$   | 0                       | $\frac{3\sqrt{10}}{224}$ | 0                        | 0                        |
|     |                                   | 0   | $-\frac{\sqrt{2}}{56}$ | 0                         | $\frac{1}{14}$            | 0                      | $-\frac{5\sqrt{10}}{168}$  | $\frac{\sqrt{105}}{224}$ | 0                        | $-\frac{3\sqrt{5}}{224}$ | 0                        | $-\frac{\sqrt{3}}{224}$ | 0                        | $\frac{3\sqrt{15}}{224}$ | 0                        |
|     |                                   | $\frac{5\sqrt{10}}{168}$  | 0                      | $-\frac{1}{14}$           | 0                         | $\frac{\sqrt{2}}{56}$  | 0                          | 0                        | $\frac{3\sqrt{15}}{224}$ | 0                        | $-\frac{\sqrt{3}}{224}$  | 0                       | $-\frac{3\sqrt{5}}{224}$ | 0                        | $\frac{\sqrt{105}}{224}$ |
|     |                                   | 0   | $\frac{5}{42}$         | 0                         | $-\frac{\sqrt{2}}{56}$    | 0                      | $-\frac{\sqrt{5}}{28}$     | 0                        | 0                        | $\frac{3\sqrt{10}}{224}$ | 0                        | $\frac{\sqrt{6}}{112}$  | 0                        | $-\frac{\sqrt{30}}{224}$ | 0                        |
|     |                                   | 0   | 0                      | $\frac{5\sqrt{10}}{168}$  | 0                         | $\frac{\sqrt{5}}{28}$  | 0                          | 0                        | 0                        | 0                        | $\frac{\sqrt{30}}{224}$  | 0                       | $\frac{3\sqrt{2}}{112}$  | 0                        | $\frac{\sqrt{42}}{224}$  |
| 755 | symmetry                          | $-\frac{z(3x^2+3y^2-2z^2)}{2}$  |                        |                           |                           |                        |                            |                          |                          |                          |                          |                         |                          |                          |                          |
|     | $\mathbb{T}_{3,2}^{(1,1;a)}(T_1)$ | $\begin{bmatrix} 0 & \frac{9i}{28} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{10}i}{28} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{3\sqrt{6}i}{28} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{28} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{3\sqrt{6}i}{28} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{28} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{9i}{28} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{10}i}{28} & 0 & 0 & 0 \\ \frac{5i}{42} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{28} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{i}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{2i}{21} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{28} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{2i}{21} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{28} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{i}{6} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{5i}{42} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{28} & 0 & 0 \end{bmatrix}$ |                        |                           |                           |                        |                            |                          |                          |                          |                          |                         |                          |                          |                          |
| 756 | symmetry                          | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$  |                        |                           |                           |                        |                            |                          |                          |                          |                          |                         |                          |                          |                          |

continued ...

Table 9

| No. | multipole                         | matrix                            |                           |                            |                           |                            |                            |                           |                           |                           |                           |                           |                           |                           |                          |
|-----|-----------------------------------|-----------------------------------|---------------------------|----------------------------|---------------------------|----------------------------|----------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|--------------------------|
|     | $\mathbb{T}_{3,0}^{(1,1;a)}(T_2)$ | $\frac{15\sqrt{3}i}{224}$         | 0                         | $-\frac{9\sqrt{30}i}{224}$ | 0                         | $-\frac{9\sqrt{15}i}{224}$ | 0                          | 0                         | $-\frac{5\sqrt{2}i}{112}$ | 0                         | $\frac{\sqrt{10}i}{56}$   | 0                         | $\frac{\sqrt{6}i}{112}$   | 0                         | 0                        |
|     |                                   | 0                                 | $-\frac{3\sqrt{5}i}{32}$  | 0                          | $\frac{3\sqrt{10}i}{224}$ | 0                          | $-\frac{45i}{224}$         | $\frac{\sqrt{42}i}{112}$  | 0                         | 0                         | 0                         | $\frac{\sqrt{30}i}{112}$  | 0                         | $\frac{\sqrt{6}i}{56}$    | 0                        |
|     |                                   | $\frac{45i}{224}$                 | 0                         | $-\frac{3\sqrt{10}i}{224}$ | 0                         | $\frac{3\sqrt{5}i}{32}$    | 0                          | 0                         | $\frac{\sqrt{6}i}{56}$    | 0                         | $\frac{\sqrt{30}i}{112}$  | 0                         | 0                         | 0                         | $\frac{\sqrt{42}i}{112}$ |
|     |                                   | 0                                 | $\frac{9\sqrt{15}i}{224}$ | 0                          | $\frac{9\sqrt{30}i}{224}$ | 0                          | $-\frac{15\sqrt{3}i}{224}$ | 0                         | 0                         | $\frac{\sqrt{6}i}{112}$   | 0                         | $\frac{\sqrt{10}i}{56}$   | 0                         | $-\frac{5\sqrt{2}i}{112}$ | 0                        |
|     |                                   | 0                                 | $-\frac{5\sqrt{3}i}{84}$  | 0                          | $-\frac{5\sqrt{6}i}{168}$ | 0                          | 0                          | $-\frac{\sqrt{70}i}{224}$ | 0                         | $\frac{\sqrt{30}i}{112}$  | 0                         | $\frac{3\sqrt{2}i}{224}$  | 0                         | 0                         | 0                        |
|     |                                   | $-\frac{5\sqrt{3}i}{84}$          | 0                         | $\frac{\sqrt{30}i}{168}$   | 0                         | $-\frac{\sqrt{15}i}{42}$   | 0                          | 0                         | $\frac{5\sqrt{2}i}{224}$  | 0                         | $\frac{\sqrt{10}i}{112}$  | 0                         | $\frac{3\sqrt{6}i}{224}$  | 0                         | 0                        |
|     |                                   | 0                                 | $\frac{\sqrt{30}i}{168}$  | 0                          | $\frac{\sqrt{15}i}{42}$   | 0                          | $-\frac{5\sqrt{6}i}{168}$  | $-\frac{3\sqrt{7}i}{224}$ | 0                         | $\frac{5\sqrt{3}i}{224}$  | 0                         | $-\frac{\sqrt{5}i}{224}$  | 0                         | $\frac{9i}{224}$          | 0                        |
|     |                                   | $-\frac{5\sqrt{6}i}{168}$         | 0                         | $\frac{\sqrt{15}i}{42}$    | 0                         | $\frac{\sqrt{30}i}{168}$   | 0                          | 0                         | $-\frac{9i}{224}$         | 0                         | $\frac{\sqrt{5}i}{224}$   | 0                         | $-\frac{5\sqrt{3}i}{224}$ | 0                         | $\frac{3\sqrt{7}i}{224}$ |
|     |                                   | 0                                 | $-\frac{\sqrt{15}i}{42}$  | 0                          | $\frac{\sqrt{30}i}{168}$  | 0                          | $-\frac{5\sqrt{3}i}{84}$   | 0                         | 0                         | $-\frac{3\sqrt{6}i}{224}$ | 0                         | $-\frac{\sqrt{10}i}{112}$ | 0                         | $-\frac{5\sqrt{2}i}{224}$ | 0                        |
|     |                                   | 0                                 | 0                         | $-\frac{5\sqrt{6}i}{168}$  | 0                         | $-\frac{5\sqrt{3}i}{84}$   | 0                          | 0                         | 0                         | 0                         | $-\frac{3\sqrt{2}i}{224}$ | 0                         | $-\frac{\sqrt{30}i}{112}$ | 0                         | $\frac{\sqrt{70}i}{224}$ |
| 757 | symmetry                          | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |                           |                            |                           |                            |                            |                           |                           |                           |                           |                           |                           |                           |                          |
|     | $\mathbb{T}_{3,1}^{(1,1;a)}(T_2)$ | $\frac{15\sqrt{3}}{224}$          | 0                         | $\frac{9\sqrt{30}}{224}$   | 0                         | $-\frac{9\sqrt{15}}{224}$  | 0                          | 0                         | $-\frac{5\sqrt{2}}{112}$  | 0                         | $-\frac{\sqrt{10}}{56}$   | 0                         | $\frac{\sqrt{6}}{112}$    | 0                         | 0                        |
|     |                                   | 0                                 | $-\frac{3\sqrt{5}}{32}$   | 0                          | $-\frac{3\sqrt{10}}{224}$ | 0                          | $-\frac{45}{224}$          | $-\frac{\sqrt{42}}{112}$  | 0                         | 0                         | 0                         | $-\frac{\sqrt{30}}{112}$  | 0                         | $\frac{\sqrt{6}}{56}$     | 0                        |
|     |                                   | $-\frac{45}{224}$                 | 0                         | $-\frac{3\sqrt{10}}{224}$  | 0                         | $-\frac{3\sqrt{5}}{32}$    | 0                          | 0                         | $-\frac{\sqrt{6}}{56}$    | 0                         | $\frac{\sqrt{30}}{112}$   | 0                         | 0                         | 0                         | $\frac{\sqrt{42}}{112}$  |
|     |                                   | 0                                 | $-\frac{9\sqrt{15}}{224}$ | 0                          | $\frac{9\sqrt{30}}{224}$  | 0                          | $\frac{15\sqrt{3}}{224}$   | 0                         | 0                         | $-\frac{\sqrt{6}}{112}$   | 0                         | $\frac{\sqrt{10}}{56}$    | 0                         | $\frac{5\sqrt{2}}{112}$   | 0                        |
|     |                                   | 0                                 | $\frac{5\sqrt{3}}{84}$    | 0                          | $-\frac{5\sqrt{6}}{168}$  | 0                          | 0                          | $-\frac{\sqrt{70}}{224}$  | 0                         | $-\frac{\sqrt{30}}{112}$  | 0                         | $\frac{3\sqrt{2}}{224}$   | 0                         | 0                         | 0                        |
|     |                                   | $-\frac{5\sqrt{3}}{84}$           | 0                         | $-\frac{\sqrt{30}}{168}$   | 0                         | $-\frac{\sqrt{15}}{42}$    | 0                          | 0                         | $\frac{5\sqrt{2}}{224}$   | 0                         | $-\frac{\sqrt{10}}{112}$  | 0                         | $\frac{3\sqrt{6}}{224}$   | 0                         | 0                        |
|     |                                   | 0                                 | $\frac{\sqrt{30}}{168}$   | 0                          | $-\frac{\sqrt{15}}{42}$   | 0                          | $-\frac{5\sqrt{6}}{168}$   | $\frac{3\sqrt{7}}{224}$   | 0                         | $\frac{5\sqrt{3}}{224}$   | 0                         | $\frac{\sqrt{5}}{224}$    | 0                         | $\frac{9}{224}$           | 0                        |
|     |                                   | $\frac{5\sqrt{6}}{168}$           | 0                         | $\frac{\sqrt{15}}{42}$     | 0                         | $-\frac{\sqrt{30}}{168}$   | 0                          | 0                         | $\frac{9}{224}$           | 0                         | $\frac{\sqrt{5}}{224}$    | 0                         | $\frac{5\sqrt{3}}{224}$   | 0                         | $\frac{3\sqrt{7}}{224}$  |
|     |                                   | 0                                 | $\frac{\sqrt{15}}{42}$    | 0                          | $\frac{\sqrt{30}}{168}$   | 0                          | $\frac{5\sqrt{3}}{84}$     | 0                         | 0                         | $\frac{3\sqrt{6}}{224}$   | 0                         | $-\frac{\sqrt{10}}{112}$  | 0                         | $\frac{5\sqrt{2}}{224}$   | 0                        |
|     |                                   | 0                                 | 0                         | $\frac{5\sqrt{6}}{168}$    | 0                         | $-\frac{5\sqrt{3}}{84}$    | 0                          | 0                         | 0                         | 0                         | $\frac{3\sqrt{2}}{224}$   | 0                         | $-\frac{\sqrt{30}}{112}$  | 0                         | $-\frac{\sqrt{70}}{224}$ |
| 758 | symmetry                          | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$  |                           |                            |                           |                            |                            |                           |                           |                           |                           |                           |                           |                           |                          |

continued ...

Table 9

| No. | multipole                         | matrix                                 |                         |                          |                          |                          |                          |                          |                        |                         |                          |                          |                          |                         |                         |  |
|-----|-----------------------------------|--|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|------------------------|-------------------------|--------------------------|--------------------------|--------------------------|-------------------------|-------------------------|--|
|     | $\mathbb{T}_{3,2}^{(1,1;a)}(T_2)$ | 0                                      | 0                       | 0                        | $\frac{3\sqrt{30}i}{56}$ | 0                        | 0                        | $-\frac{\sqrt{14}i}{56}$ | 0                      | 0                       | 0                        | $-\frac{\sqrt{10}i}{56}$ | 0                        | 0                       | 0                       |  |
|     |                                   | $-\frac{15i}{56}$                      | 0                       | 0                        | 0                        | $\frac{3\sqrt{5}i}{56}$  | 0                        | 0                        | $\frac{\sqrt{6}i}{56}$ | 0                       | 0                        | 0                        | $-\frac{3\sqrt{2}i}{56}$ | 0                       | 0                       |  |
|     |                                   | 0                                      | $\frac{3\sqrt{5}i}{56}$ | 0                        | 0                        | 0                        | $-\frac{15i}{56}$        | 0                        | 0                      | $\frac{3\sqrt{2}i}{56}$ | 0                        | 0                        | 0                        | $-\frac{\sqrt{6}i}{56}$ | 0                       |  |
|     |                                   | 0                                      | 0                       | $\frac{3\sqrt{30}i}{56}$ | 0                        | 0                        | 0                        | 0                        | 0                      | 0                       | $\frac{\sqrt{10}i}{56}$  | 0                        | 0                        | 0                       | $\frac{\sqrt{14}i}{56}$ |  |
|     |                                   | 0                                      | 0                       | $\frac{5\sqrt{6}i}{84}$  | 0                        | 0                        | 0                        | 0                        | 0                      | 0                       | $-\frac{\sqrt{2}i}{28}$  | 0                        | 0                        | 0                       | 0                       |  |
|     |                                   | 0                                      | 0                       | 0                        | $\frac{\sqrt{30}i}{84}$  | 0                        | 0                        | $\frac{\sqrt{14}i}{56}$  | 0                      | 0                       | 0                        | $-\frac{\sqrt{10}i}{56}$ | 0                        | 0                       | 0                       |  |
|     |                                   | $\frac{5\sqrt{6}i}{84}$                | 0                       | 0                        | 0                        | $-\frac{\sqrt{30}i}{84}$ | 0                        | 0                        | $\frac{i}{56}$         | 0                       | 0                        | 0                        | $-\frac{\sqrt{3}i}{56}$  | 0                       | 0                       |  |
|     |                                   | 0                                      | $\frac{\sqrt{30}i}{84}$ | 0                        | 0                        | 0                        | $-\frac{5\sqrt{6}i}{84}$ | 0                        | 0                      | $-\frac{\sqrt{3}i}{56}$ | 0                        | 0                        | 0                        | $\frac{i}{56}$          | 0                       |  |
|     |                                   | 0                                      | 0                       | $-\frac{\sqrt{30}i}{84}$ | 0                        | 0                        | 0                        | 0                        | 0                      | 0                       | $-\frac{\sqrt{10}i}{56}$ | 0                        | 0                        | 0                       | $\frac{\sqrt{14}i}{56}$ |  |
|     |                                   | 0                                      | 0                       | 0                        | $-\frac{5\sqrt{6}i}{84}$ | 0                        | 0                        | 0                        | 0                      | 0                       | 0                        | $-\frac{\sqrt{2}i}{28}$  | 0                        | 0                       | 0                       |  |
| 759 | symmetry                          | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |                         |                          |                          |                          |                          |                          |                        |                         |                          |                          |                          |                         |                         |  |
|     | $\mathbb{M}_{2,0}^{(a)}(E)$       | 0                                      | $\frac{3\sqrt{10}}{35}$ | 0                        | 0                        | 0                        | 0                        | 0                        | 0                      | $\frac{1}{14}$          | 0                        | 0                        | 0                        | 0                       | 0                       |  |
|     |                                   | 0                                      | 0                       | $\frac{\sqrt{15}}{35}$   | 0                        | 0                        | 0                        | 0                        | 0                      | 0                       | $\frac{3\sqrt{5}}{70}$   | 0                        | 0                        | 0                       | 0                       |  |
|     |                                   | 0                                      | 0                       | 0                        | $-\frac{\sqrt{15}}{35}$  | 0                        | 0                        | 0                        | 0                      | 0                       | 0                        | $\frac{3\sqrt{5}}{70}$   | 0                        | 0                       | 0                       |  |
|     |                                   | 0                                      | 0                       | 0                        | 0                        | $-\frac{3\sqrt{10}}{35}$ | 0                        | 0                        | 0                      | 0                       | 0                        | 0                        | $\frac{1}{14}$           | 0                       | 0                       |  |
|     |                                   | $-\frac{\sqrt{10}}{28}$                | 0                       | 0                        | 0                        | 0                        | 0                        | 0                        | $\frac{\sqrt{15}}{14}$ | 0                       | 0                        | 0                        | 0                        | 0                       | 0                       |  |
|     |                                   | 0                                      | $\frac{\sqrt{10}}{140}$ | 0                        | 0                        | 0                        | 0                        | 0                        | 0                      | $\frac{3}{14}$          | 0                        | 0                        | 0                        | 0                       | 0                       |  |
|     |                                   | 0                                      | 0                       | $\frac{\sqrt{10}}{35}$   | 0                        | 0                        | 0                        | 0                        | 0                      | 0                       | $\frac{\sqrt{30}}{70}$   | 0                        | 0                        | 0                       | 0                       |  |
|     |                                   | 0                                      | 0                       | 0                        | $\frac{\sqrt{10}}{35}$   | 0                        | 0                        | 0                        | 0                      | 0                       | 0                        | $-\frac{\sqrt{30}}{70}$  | 0                        | 0                       | 0                       |  |
|     |                                   | 0                                      | 0                       | 0                        | 0                        | $\frac{\sqrt{10}}{140}$  | 0                        | 0                        | 0                      | 0                       | 0                        | 0                        | $-\frac{3}{14}$          | 0                       | 0                       |  |
|     |                                   | 0                                      | 0                       | 0                        | 0                        | 0                        | $-\frac{\sqrt{10}}{28}$  | 0                        | 0                      | 0                       | 0                        | 0                        | 0                        | $-\frac{\sqrt{15}}{14}$ | 0                       |  |
| 760 | symmetry                          | $\frac{\sqrt{3}(x-y)(x+y)}{2}$         |                         |                          |                          |                          |                          |                          |                        |                         |                          |                          |                          |                         |                         |  |

continued ...

Table 9

| No. | multipole                     | matrix                  |                           |                           |                           |                           |                         |                          |                       |                          |                            |                           |                         |                       |                         |
|-----|-------------------------------|-------------------------|---------------------------|---------------------------|---------------------------|---------------------------|-------------------------|--------------------------|-----------------------|--------------------------|----------------------------|---------------------------|-------------------------|-----------------------|-------------------------|
|     | $\mathbb{M}_{2,1}^{(a)}(E)$   | 0                       | 0                         | 0                         | $\frac{\sqrt{15}}{35}$    | 0                         | 0                       | $\frac{\sqrt{7}}{28}$    | 0                     | 0                        | 0                          | $\frac{\sqrt{5}}{140}$    | 0                       | 0                     | 0                       |
|     |                               | $-\frac{\sqrt{2}}{7}$   | 0                         | 0                         | 0                         | $\frac{2\sqrt{10}}{35}$   | 0                       | 0                        | $\frac{\sqrt{3}}{28}$ | 0                        | 0                          | 0                         | $\frac{1}{28}$          | 0                     | 0                       |
|     |                               | 0                       | $-\frac{2\sqrt{10}}{35}$  | 0                         | 0                         | 0                         | $\frac{\sqrt{2}}{7}$    | 0                        | 0                     | $\frac{1}{28}$           | 0                          | 0                         | 0                       | $\frac{\sqrt{3}}{28}$ | 0                       |
|     |                               | 0                       | 0                         | $-\frac{\sqrt{15}}{35}$   | 0                         | 0                         | 0                       | 0                        | 0                     | 0                        | $\frac{\sqrt{5}}{140}$     | 0                         | 0                       | 0                     | $\frac{\sqrt{7}}{28}$   |
|     |                               | 0                       | 0                         | $-\frac{\sqrt{3}}{28}$    | 0                         | 0                         | 0                       | 0                        | 0                     | 0                        | $\frac{1}{14}$             | 0                         | 0                       | 0                     | 0                       |
|     |                               | 0                       | 0                         | 0                         | $-\frac{3\sqrt{15}}{140}$ | 0                         | 0                       | $-\frac{\sqrt{7}}{14}$   | 0                     | 0                        | 0                          | $\frac{2\sqrt{5}}{35}$    | 0                       | 0                     | 0                       |
|     |                               | $-\frac{\sqrt{3}}{28}$  | 0                         | 0                         | 0                         | $-\frac{3\sqrt{15}}{140}$ | 0                       | 0                        | $-\frac{\sqrt{2}}{7}$ | 0                        | 0                          | 0                         | $\frac{\sqrt{6}}{14}$   | 0                     | 0                       |
|     |                               | 0                       | $-\frac{3\sqrt{15}}{140}$ | 0                         | 0                         | 0                         | $-\frac{\sqrt{3}}{28}$  | 0                        | 0                     | $-\frac{\sqrt{6}}{14}$   | 0                          | 0                         | 0                       | $\frac{\sqrt{2}}{7}$  | 0                       |
|     |                               | 0                       | 0                         | $-\frac{3\sqrt{15}}{140}$ | 0                         | 0                         | 0                       | 0                        | 0                     | 0                        | $-\frac{2\sqrt{5}}{35}$    | 0                         | 0                       | 0                     | $\frac{\sqrt{7}}{14}$   |
|     |                               | 0                       | 0                         | 0                         | $-\frac{\sqrt{3}}{28}$    | 0                         | 0                       | 0                        | 0                     | 0                        | 0                          | $-\frac{1}{14}$           | 0                       | 0                     | 0                       |
| 761 | symmetry                      | $\sqrt{3}yz$            |                           |                           |                           |                           |                         |                          |                       |                          |                            |                           |                         |                       |                         |
|     | $\mathbb{M}_{2,0}^{(a)}(T_2)$ | $-\frac{\sqrt{6}i}{14}$ | 0                         | $-\frac{3\sqrt{15}i}{70}$ | 0                         | 0                         | 0                       | 0                        | $-\frac{i}{14}$       | 0                        | $-\frac{\sqrt{5}i}{70}$    | 0                         | 0                       | 0                     | 0                       |
|     |                               | 0                       | $\frac{\sqrt{10}i}{70}$   | 0                         | $-\frac{\sqrt{5}i}{14}$   | 0                         | 0                       | 0                        | 0                     | $-\frac{i}{14}$          | 0                          | $-\frac{\sqrt{15}i}{70}$  | 0                       | 0                     | 0                       |
|     |                               | 0                       | 0                         | $\frac{\sqrt{5}i}{14}$    | 0                         | $-\frac{\sqrt{10}i}{70}$  | 0                       | 0                        | 0                     | 0                        | $-\frac{\sqrt{15}i}{70}$   | 0                         | $-\frac{i}{14}$         | 0                     | 0                       |
|     |                               | 0                       | 0                         | 0                         | $\frac{3\sqrt{15}i}{70}$  | 0                         | $\frac{\sqrt{6}i}{14}$  | 0                        | 0                     | 0                        | 0                          | $-\frac{\sqrt{5}i}{70}$   | 0                       | $-\frac{i}{14}$       | 0                       |
|     |                               | 0                       | $\frac{\sqrt{6}i}{28}$    | 0                         | 0                         | 0                         | 0                       | $-\frac{\sqrt{35}i}{28}$ | 0                     | $-\frac{\sqrt{15}i}{28}$ | 0                          | 0                         | 0                       | 0                     | 0                       |
|     |                               | $-\frac{\sqrt{6}i}{28}$ | 0                         | $\frac{\sqrt{15}i}{70}$   | 0                         | 0                         | 0                       | 0                        | $-\frac{i}{28}$       | 0                        | $-\frac{11\sqrt{5}i}{140}$ | 0                         | 0                       | 0                     | 0                       |
|     |                               | 0                       | $-\frac{\sqrt{15}i}{70}$  | 0                         | 0                         | 0                         | 0                       | 0                        | 0                     | $\frac{\sqrt{6}i}{28}$   | 0                          | $-\frac{\sqrt{10}i}{20}$  | 0                       | 0                     | 0                       |
|     |                               | 0                       | 0                         | 0                         | 0                         | $-\frac{\sqrt{15}i}{70}$  | 0                       | 0                        | 0                     | 0                        | $\frac{\sqrt{10}i}{20}$    | 0                         | $-\frac{\sqrt{6}i}{28}$ | 0                     | 0                       |
|     |                               | 0                       | 0                         | 0                         | $\frac{\sqrt{15}i}{70}$   | 0                         | $-\frac{\sqrt{6}i}{28}$ | 0                        | 0                     | 0                        | 0                          | $\frac{11\sqrt{5}i}{140}$ | 0                       | $\frac{i}{28}$        | 0                       |
|     |                               | 0                       | 0                         | 0                         | 0                         | $\frac{\sqrt{6}i}{28}$    | 0                       | 0                        | 0                     | 0                        | 0                          | 0                         | $\frac{\sqrt{15}i}{28}$ | 0                     | $\frac{\sqrt{35}i}{28}$ |
| 762 | symmetry                      | $\sqrt{3}xz$            |                           |                           |                           |                           |                         |                          |                       |                          |                            |                           |                         |                       |                         |

continued ...

Table 9

| No. | multipole                     | matrix   |                            |                            |                           |                           |                        |                         |                        |                         |                          |                          |                         |                         |                         |
|-----|-------------------------------|--|----------------------------|----------------------------|---------------------------|---------------------------|------------------------|-------------------------|------------------------|-------------------------|--------------------------|--------------------------|-------------------------|-------------------------|-------------------------|
|     | $\mathbb{M}_{2,1}^{(a)}(T_2)$ | $-\frac{\sqrt{6}}{14}$                                     | 0                          | $\frac{3\sqrt{15}}{70}$    | 0                         | 0                         | 0                      | 0                       | $-\frac{1}{14}$        | 0                       | $\frac{\sqrt{5}}{70}$    | 0                        | 0                       | 0                       | 0                       |
|     |                               | 0  | $\frac{\sqrt{10}}{70}$     | 0                          | $\frac{\sqrt{5}}{14}$     | 0                         | 0                      | 0                       | 0                      | $-\frac{1}{14}$         | 0                        | $\frac{\sqrt{15}}{70}$   | 0                       | 0                       | 0                       |
|     |                               | 0  | 0                          | $\frac{\sqrt{5}}{14}$      | 0                         | $\frac{\sqrt{10}}{70}$    | 0                      | 0                       | 0                      | 0                       | $-\frac{\sqrt{15}}{70}$  | 0                        | $\frac{1}{14}$          | 0                       | 0                       |
|     |                               | 0  | 0                          | 0                          | $\frac{3\sqrt{15}}{70}$   | 0                         | $-\frac{\sqrt{6}}{14}$ | 0                       | 0                      | 0                       | 0                        | $-\frac{\sqrt{5}}{70}$   | 0                       | $\frac{1}{14}$          | 0                       |
|     |                               | 0  | $-\frac{\sqrt{6}}{28}$     | 0                          | 0                         | 0                         | 0                      | $-\frac{\sqrt{35}}{28}$ | 0                      | $\frac{\sqrt{15}}{28}$  | 0                        | 0                        | 0                       | 0                       | 0                       |
|     |                               | $-\frac{\sqrt{6}}{28}$                                     | 0                          | $-\frac{\sqrt{15}}{70}$    | 0                         | 0                         | 0                      | 0                       | $-\frac{1}{28}$        | 0                       | $\frac{11\sqrt{5}}{140}$ | 0                        | 0                       | 0                       | 0                       |
|     |                               | 0  | $-\frac{\sqrt{15}}{70}$    | 0                          | 0                         | 0                         | 0                      | 0                       | 0                      | $\frac{\sqrt{6}}{28}$   | 0                        | $\frac{\sqrt{10}}{20}$   | 0                       | 0                       | 0                       |
|     |                               | 0  | 0                          | 0                          | 0                         | $\frac{\sqrt{15}}{70}$    | 0                      | 0                       | 0                      | 0                       | $\frac{\sqrt{10}}{20}$   | 0                        | $\frac{\sqrt{6}}{28}$   | 0                       | 0                       |
|     |                               | 0  | 0                          | 0                          | $\frac{\sqrt{15}}{70}$    | 0                         | $\frac{\sqrt{6}}{28}$  | 0                       | 0                      | 0                       | 0                        | $\frac{11\sqrt{5}}{140}$ | 0                       | $-\frac{1}{28}$         | 0                       |
|     |                               | 0  | 0                          | 0                          | 0                         | $\frac{\sqrt{6}}{28}$     | 0                      | 0                       | 0                      | 0                       | 0                        | $\frac{\sqrt{15}}{28}$   | 0                       | $-\frac{\sqrt{35}}{28}$ |                         |
| 763 | symmetry                      | $\sqrt{3}xy$   |                            |                            |                           |                           |                        |                         |                        |                         |                          |                          |                         |                         |                         |
|     | $\mathbb{M}_{2,2}^{(a)}(T_2)$ | 0  | 0                          | 0                          | $-\frac{\sqrt{15}i}{35}$  | 0                         | 0                      | $\frac{\sqrt{7}i}{28}$  | 0                      | 0                       | 0                        | $-\frac{\sqrt{5}i}{140}$ | 0                       | 0                       | 0                       |
|     |                               | $-\frac{\sqrt{2}i}{7}$                                     | 0                          | 0                          | 0                         | $-\frac{2\sqrt{10}i}{35}$ | 0                      | 0                       | $\frac{\sqrt{3}i}{28}$ | 0                       | 0                        | 0                        | $-\frac{i}{28}$         | 0                       | 0                       |
|     |                               | 0  | $-\frac{2\sqrt{10}i}{35}$  | 0                          | 0                         | 0                         | $-\frac{\sqrt{2}i}{7}$ | 0                       | 0                      | $\frac{i}{28}$          | 0                        | 0                        | 0                       | $-\frac{\sqrt{3}i}{28}$ | 0                       |
|     |                               | 0  | 0                          | $-\frac{\sqrt{15}i}{35}$   | 0                         | 0                         | 0                      | 0                       | 0                      | 0                       | $\frac{\sqrt{5}i}{140}$  | 0                        | 0                       | 0                       | $-\frac{\sqrt{7}i}{28}$ |
|     |                               | 0  | 0                          | $\frac{\sqrt{3}i}{28}$     | 0                         | 0                         | 0                      | 0                       | 0                      | 0                       | $-\frac{i}{14}$          | 0                        | 0                       | 0                       | 0                       |
|     |                               | 0  | 0                          | 0                          | $\frac{3\sqrt{15}i}{140}$ | 0                         | 0                      | $-\frac{\sqrt{7}i}{14}$ | 0                      | 0                       | 0                        | $-\frac{2\sqrt{5}i}{35}$ | 0                       | 0                       | 0                       |
|     |                               | $-\frac{\sqrt{3}i}{28}$                                    | 0                          | 0                          | 0                         | $\frac{3\sqrt{15}i}{140}$ | 0                      | 0                       | $-\frac{\sqrt{2}i}{7}$ | 0                       | 0                        | 0                        | $-\frac{\sqrt{6}i}{14}$ | 0                       | 0                       |
|     |                               | 0  | $-\frac{3\sqrt{15}i}{140}$ | 0                          | 0                         | 0                         | $\frac{\sqrt{3}i}{28}$ | 0                       | 0                      | $-\frac{\sqrt{6}i}{14}$ | 0                        | 0                        | 0                       | $-\frac{\sqrt{2}i}{7}$  | 0                       |
|     |                               | 0  | 0                          | $-\frac{3\sqrt{15}i}{140}$ | 0                         | 0                         | 0                      | 0                       | 0                      | 0                       | $-\frac{2\sqrt{5}i}{35}$ | 0                        | 0                       | 0                       | $-\frac{\sqrt{7}i}{14}$ |
|     |                               | 0  | 0                          | 0                          | $-\frac{\sqrt{3}i}{28}$   | 0                         | 0                      | 0                       | 0                      | 0                       | 0                        | $-\frac{i}{14}$          | 0                       | 0                       | 0                       |
| 764 | symmetry                      | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$ |                            |                            |                           |                           |                        |                         |                        |                         |                          |                          |                         |                         |                         |

continued ...

Table 9

| No. | multipole                   | matrix   |                         |                        |                         |                         |                          |                         |                           |                            |                        |                        |                            |                           |                         |
|-----|-----------------------------|--|-------------------------|------------------------|-------------------------|-------------------------|--------------------------|-------------------------|---------------------------|----------------------------|------------------------|------------------------|----------------------------|---------------------------|-------------------------|
|     | $\mathbb{M}_4^{(a)}(A_1)$   | 0  | $-\frac{\sqrt{21}}{84}$ | 0                      | 0                       | 0                       | $-\frac{\sqrt{105}}{84}$ | 0                       | 0                         | $-\frac{3\sqrt{210}}{280}$ | 0                      | 0                      | 0                          | $-\frac{3\sqrt{70}}{280}$ | 0                       |
|     |                             | 0  | 0                       | $\frac{\sqrt{14}}{28}$ | 0                       | 0                       | 0                        | 0                       | 0                         | 0                          | $\frac{\sqrt{42}}{56}$ | 0                      | 0                          | 0                         | $-\frac{\sqrt{30}}{40}$ |
|     |                             | 0  | 0                       | 0                      | $-\frac{\sqrt{14}}{28}$ | 0                       | 0                        | $-\frac{\sqrt{30}}{40}$ | 0                         | 0                          | 0                      | $\frac{\sqrt{42}}{56}$ | 0                          | 0                         | 0                       |
|     |                             | $\frac{\sqrt{105}}{84}$  | 0                       | 0                      | 0                       | $\frac{\sqrt{21}}{84}$  | 0                        | 0                       | $-\frac{3\sqrt{70}}{280}$ | 0                          | 0                      | 0                      | $-\frac{3\sqrt{210}}{280}$ | 0                         | 0                       |
|     |                             | $\frac{\sqrt{21}}{84}$   | 0                       | 0                      | 0                       | $\frac{\sqrt{105}}{84}$ | 0                        | 0                       | $-\frac{\sqrt{14}}{28}$   | 0                          | 0                      | 0                      | $-\frac{\sqrt{42}}{84}$    | 0                         | 0                       |
|     |                             | 0  | $-\frac{\sqrt{21}}{28}$ | 0                      | 0                       | 0                       | $\frac{\sqrt{105}}{84}$  | 0                       | 0                         | $\frac{\sqrt{210}}{105}$   | 0                      | 0                      | 0                          | $-\frac{\sqrt{70}}{70}$   | 0                       |
|     |                             | 0  | 0                       | $\frac{\sqrt{21}}{42}$ | 0                       | 0                       | 0                        | 0                       | 0                         | 0                          | $\frac{\sqrt{7}}{28}$  | 0                      | 0                          | 0                         | $-\frac{\sqrt{5}}{20}$  |
|     |                             | 0  | 0                       | 0                      | $\frac{\sqrt{21}}{42}$  | 0                       | 0                        | $\frac{\sqrt{5}}{20}$   | 0                         | 0                          | 0                      | $-\frac{\sqrt{7}}{28}$ | 0                          | 0                         | 0                       |
|     |                             | $\frac{\sqrt{105}}{84}$  | 0                       | 0                      | 0                       | $-\frac{\sqrt{21}}{28}$ | 0                        | 0                       | $\frac{\sqrt{70}}{70}$    | 0                          | 0                      | 0                      | $-\frac{\sqrt{210}}{105}$  | 0                         | 0                       |
|     |                             | 0  | $\frac{\sqrt{105}}{84}$ | 0                      | 0                       | 0                       | $\frac{\sqrt{21}}{84}$   | 0                       | 0                         | $\frac{\sqrt{42}}{84}$     | 0                      | 0                      | 0                          | $\frac{\sqrt{14}}{28}$    | 0                       |
| 765 | symmetry                    | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ |                         |                        |                         |                         |                          |                         |                           |                            |                        |                        |                            |                           |                         |
|     | $\mathbb{M}_{4,0}^{(a)}(E)$ | 0  | $-\frac{\sqrt{15}}{84}$ | 0                      | 0                       | 0                       | $\frac{\sqrt{3}}{12}$    | 0                       | 0                         | $-\frac{3\sqrt{6}}{56}$    | 0                      | 0                      | 0                          | $\frac{3\sqrt{2}}{40}$    | 0                       |
|     |                             | 0  | 0                       | $\frac{\sqrt{10}}{28}$ | 0                       | 0                       | 0                        | 0                       | 0                         | 0                          | $\frac{\sqrt{30}}{56}$ | 0                      | 0                          | 0                         | $\frac{\sqrt{42}}{40}$  |
|     |                             | 0  | 0                       | 0                      | $-\frac{\sqrt{10}}{28}$ | 0                       | 0                        | $\frac{\sqrt{42}}{40}$  | 0                         | 0                          | 0                      | $\frac{\sqrt{30}}{56}$ | 0                          | 0                         | 0                       |
|     |                             | $-\frac{\sqrt{3}}{12}$   | 0                       | 0                      | 0                       | $\frac{\sqrt{15}}{84}$  | 0                        | 0                       | $\frac{3\sqrt{2}}{40}$    | 0                          | 0                      | 0                      | $-\frac{3\sqrt{6}}{56}$    | 0                         | 0                       |
|     |                             | $\frac{\sqrt{15}}{84}$   | 0                       | 0                      | 0                       | $-\frac{\sqrt{3}}{12}$  | 0                        | 0                       | $-\frac{\sqrt{10}}{28}$   | 0                          | 0                      | 0                      | $\frac{\sqrt{30}}{60}$     | 0                         | 0                       |
|     |                             | 0  | $-\frac{\sqrt{15}}{28}$ | 0                      | 0                       | 0                       | $-\frac{\sqrt{3}}{12}$   | 0                       | 0                         | $\frac{\sqrt{6}}{21}$      | 0                      | 0                      | 0                          | $\frac{\sqrt{2}}{10}$     | 0                       |
|     |                             | 0  | 0                       | $\frac{\sqrt{15}}{42}$ | 0                       | 0                       | 0                        | 0                       | 0                         | 0                          | $\frac{\sqrt{5}}{28}$  | 0                      | 0                          | 0                         | $\frac{\sqrt{7}}{20}$   |
|     |                             | 0  | 0                       | 0                      | $\frac{\sqrt{15}}{42}$  | 0                       | 0                        | $-\frac{\sqrt{7}}{20}$  | 0                         | 0                          | 0                      | $-\frac{\sqrt{5}}{28}$ | 0                          | 0                         | 0                       |
|     |                             | $-\frac{\sqrt{3}}{12}$   | 0                       | 0                      | 0                       | $-\frac{\sqrt{15}}{28}$ | 0                        | 0                       | $-\frac{\sqrt{2}}{10}$    | 0                          | 0                      | 0                      | $-\frac{\sqrt{6}}{21}$     | 0                         | 0                       |
|     |                             | 0  | $-\frac{\sqrt{3}}{12}$  | 0                      | 0                       | 0                       | $\frac{\sqrt{15}}{84}$   | 0                       | 0                         | $-\frac{\sqrt{30}}{60}$    | 0                      | 0                      | 0                          | $\frac{\sqrt{10}}{28}$    | 0                       |
| 766 | symmetry                    | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$                   |                         |                        |                         |                         |                          |                         |                           |                            |                        |                        |                            |                           |                         |

continued ...

Table 9

| No. | multipole                     | matrix                             |                           |                            |                           |                            |                          |                           |                            |                            |                             |                             |                            |                             |                          |
|-----|-------------------------------|------------------------------------|---------------------------|----------------------------|---------------------------|----------------------------|--------------------------|---------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|----------------------------|-----------------------------|--------------------------|
|     | $\mathbb{M}_{4,1}^{(a)}(E)$   | 0                                  | 0                         | 0                          | $\frac{\sqrt{10}}{28}$    | 0                          | 0                        | $\frac{3\sqrt{42}}{280}$  | 0                          | 0                          | 0                           | $\frac{9\sqrt{30}}{280}$    | 0                          | 0                           | 0                        |
|     |                               | $-\frac{\sqrt{3}}{28}$             | 0                         | 0                          | 0                         | $-\frac{\sqrt{15}}{28}$    | 0                        | 0                         | $-\frac{33\sqrt{2}}{280}$  | 0                          | 0                           | 0                           | $\frac{3\sqrt{6}}{280}$    | 0                           | 0                        |
|     |                               | 0                                  | $\frac{\sqrt{15}}{28}$    | 0                          | 0                         | 0                          | $\frac{\sqrt{3}}{28}$    | 0                         | 0                          | $\frac{3\sqrt{6}}{280}$    | 0                           | 0                           | 0                          | $-\frac{33\sqrt{2}}{280}$   | 0                        |
|     |                               | 0                                  | 0                         | $-\frac{\sqrt{10}}{28}$    | 0                         | 0                          | 0                        | 0                         | 0                          | $\frac{9\sqrt{30}}{280}$   | 0                           | 0                           | 0                          | 0                           | $\frac{3\sqrt{42}}{280}$ |
|     |                               | 0                                  | 0                         | $-\frac{3\sqrt{2}}{28}$    | 0                         | 0                          | 0                        | 0                         | 0                          | $\frac{\sqrt{6}}{14}$      | 0                           | 0                           | 0                          | 0                           | 0                        |
|     |                               | 0                                  | 0                         | 0                          | $\frac{\sqrt{10}}{28}$    | 0                          | 0                        | $-\frac{3\sqrt{42}}{140}$ | 0                          | 0                          | 0                           | $\frac{\sqrt{30}}{140}$     | 0                          | 0                           | 0                        |
|     |                               | $-\frac{3\sqrt{2}}{28}$            | 0                         | 0                          | 0                         | $\frac{\sqrt{10}}{28}$     | 0                        | 0                         | $\frac{9\sqrt{3}}{140}$    | 0                          | 0                           | 0                           | $-\frac{17}{140}$          | 0                           | 0                        |
|     |                               | 0                                  | $\frac{\sqrt{10}}{28}$    | 0                          | 0                         | 0                          | $-\frac{3\sqrt{2}}{28}$  | 0                         | 0                          | $\frac{17}{140}$           | 0                           | 0                           | 0                          | $-\frac{9\sqrt{3}}{140}$    | 0                        |
|     |                               | 0                                  | 0                         | $\frac{\sqrt{10}}{28}$     | 0                         | 0                          | 0                        | 0                         | 0                          | 0                          | $-\frac{\sqrt{30}}{140}$    | 0                           | 0                          | 0                           | $\frac{3\sqrt{42}}{140}$ |
|     |                               | 0                                  | 0                         | 0                          | $-\frac{3\sqrt{2}}{28}$   | 0                          | 0                        | 0                         | 0                          | 0                          | 0                           | $-\frac{\sqrt{6}}{14}$      | 0                          | 0                           | 0                        |
| 767 | symmetry                      | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$  |                           |                            |                           |                            |                          |                           |                            |                            |                             |                             |                            |                             |                          |
|     | $\mathbb{M}_{4,0}^{(a)}(T_1)$ | $-\frac{\sqrt{7}i}{112}$           | 0                         | $-\frac{\sqrt{70}i}{112}$  | 0                         | $-\frac{\sqrt{35}i}{112}$  | 0                        | 0                         | $-\frac{9\sqrt{42}i}{560}$ | 0                          | $-\frac{3\sqrt{210}i}{280}$ | 0                           | $-\frac{9\sqrt{14}i}{560}$ | 0                           | 0                        |
|     |                               | 0                                  | $\frac{\sqrt{105}i}{112}$ | 0                          | $\frac{\sqrt{210}i}{112}$ | 0                          | $\frac{\sqrt{21}i}{112}$ | $\frac{3\sqrt{2}i}{80}$   | 0                          | $\frac{3\sqrt{42}i}{140}$  | 0                           | $\frac{3\sqrt{70}i}{560}$   | 0                          | $-\frac{3\sqrt{14}i}{280}$  | 0                        |
|     |                               | $-\frac{\sqrt{21}i}{112}$          | 0                         | $-\frac{\sqrt{210}i}{112}$ | 0                         | $-\frac{\sqrt{105}i}{112}$ | 0                        | 0                         | $-\frac{3\sqrt{14}i}{280}$ | 0                          | $\frac{3\sqrt{70}i}{560}$   | 0                           | $\frac{3\sqrt{42}i}{140}$  | 0                           | $\frac{3\sqrt{2}i}{80}$  |
|     |                               | 0                                  | $\frac{\sqrt{35}i}{112}$  | 0                          | $\frac{\sqrt{70}i}{112}$  | 0                          | $\frac{\sqrt{7}i}{112}$  | 0                         | 0                          | $-\frac{9\sqrt{14}i}{560}$ | 0                           | $-\frac{3\sqrt{210}i}{280}$ | 0                          | $-\frac{9\sqrt{42}i}{560}$  | 0                        |
|     |                               | 0                                  | $\frac{\sqrt{7}i}{28}$    | 0                          | $\frac{\sqrt{14}i}{56}$   | 0                          | 0                        | $-\frac{\sqrt{30}i}{80}$  | 0                          | $-\frac{\sqrt{70}i}{56}$   | 0                           | $-\frac{\sqrt{42}i}{112}$   | 0                          | 0                           | 0                        |
|     |                               | $-\frac{\sqrt{7}i}{28}$            | 0                         | $-\frac{\sqrt{70}i}{56}$   | 0                         | 0                          | 0                        | 0                         | $\frac{13\sqrt{42}i}{560}$ | 0                          | $\frac{\sqrt{210}i}{280}$   | 0                           | $-\frac{\sqrt{14}i}{80}$   | 0                           | 0                        |
|     |                               | 0                                  | $\frac{\sqrt{70}i}{56}$   | 0                          | 0                         | 0                          | $-\frac{\sqrt{14}i}{56}$ | $-\frac{3\sqrt{3}i}{80}$  | 0                          | $-\frac{\sqrt{7}i}{560}$   | 0                           | $\frac{\sqrt{105}i}{80}$    | 0                          | $\frac{\sqrt{21}i}{560}$    | 0                        |
|     |                               | $-\frac{\sqrt{14}i}{56}$           | 0                         | 0                          | 0                         | $\frac{\sqrt{70}i}{56}$    | 0                        | 0                         | $-\frac{\sqrt{21}i}{560}$  | 0                          | $-\frac{\sqrt{105}i}{80}$   | 0                           | $\frac{\sqrt{7}i}{560}$    | 0                           | $\frac{3\sqrt{3}i}{80}$  |
|     |                               | 0                                  | 0                         | 0                          | $-\frac{\sqrt{70}i}{56}$  | 0                          | $-\frac{\sqrt{7}i}{28}$  | 0                         | 0                          | $\frac{\sqrt{14}i}{80}$    | 0                           | $-\frac{\sqrt{210}i}{280}$  | 0                          | $-\frac{13\sqrt{42}i}{560}$ | 0                        |
|     |                               | 0                                  | 0                         | $\frac{\sqrt{14}i}{56}$    | 0                         | $\frac{\sqrt{7}i}{28}$     | 0                        | 0                         | 0                          | 0                          | $\frac{\sqrt{42}i}{112}$    | 0                           | $\frac{\sqrt{70}i}{56}$    | 0                           | $\frac{\sqrt{30}i}{80}$  |
| 768 | symmetry                      | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ |                           |                            |                           |                            |                          |                           |                            |                            |                             |                             |                            |                             |                          |

continued ...



Table 9

| No. | multipole                     | matrix   |                           |                          |                          |                           |                          |                         |                            |                           |                            |                           |                          |                            |                         |  |
|-----|-------------------------------|--|---------------------------|--------------------------|--------------------------|---------------------------|--------------------------|-------------------------|----------------------------|---------------------------|----------------------------|---------------------------|--------------------------|----------------------------|-------------------------|--|
|     | $\mathbb{M}_{4,1}^{(a)}(T_1)$ | $\frac{\sqrt{7}}{112}$   | 0                         | $-\frac{\sqrt{70}}{112}$ | 0                        | $\frac{\sqrt{35}}{112}$   | 0                        | 0                       | $\frac{9\sqrt{42}}{560}$   | 0                         | $-\frac{3\sqrt{210}}{280}$ | 0                         | $\frac{9\sqrt{14}}{560}$ | 0                          | 0                       |  |
|     |                               | 0  | $-\frac{\sqrt{105}}{112}$ | 0                        | $\frac{\sqrt{210}}{112}$ | 0                         | $-\frac{\sqrt{21}}{112}$ | $\frac{3\sqrt{2}}{80}$  | 0                          | $-\frac{3\sqrt{42}}{140}$ | 0                          | $\frac{3\sqrt{70}}{560}$  | 0                        | $\frac{3\sqrt{14}}{280}$   | 0                       |  |
|     |                               | $-\frac{\sqrt{21}}{112}$   | 0                         | $\frac{\sqrt{210}}{112}$ | 0                        | $-\frac{\sqrt{105}}{112}$ | 0                        | 0                       | $-\frac{3\sqrt{14}}{280}$  | 0                         | $-\frac{3\sqrt{70}}{560}$  | 0                         | $\frac{3\sqrt{42}}{140}$ | 0                          | $-\frac{3\sqrt{2}}{80}$ |  |
|     |                               | 0  | $\frac{\sqrt{35}}{112}$   | 0                        | $-\frac{\sqrt{70}}{112}$ | 0                         | $\frac{\sqrt{7}}{112}$   | 0                       | 0                          | $-\frac{9\sqrt{14}}{560}$ | 0                          | $\frac{3\sqrt{210}}{280}$ | 0                        | $-\frac{9\sqrt{42}}{560}$  | 0                       |  |
|     |                               | 0  | $\frac{\sqrt{7}}{28}$     | 0                        | $-\frac{\sqrt{14}}{56}$  | 0                         | 0                        | $\frac{\sqrt{30}}{80}$  | 0                          | $-\frac{\sqrt{70}}{56}$   | 0                          | $\frac{\sqrt{42}}{112}$   | 0                        | 0                          | 0                       |  |
|     |                               | $\frac{\sqrt{7}}{28}$  | 0                         | $-\frac{\sqrt{70}}{56}$  | 0                        | 0                         | 0                        | 0                       | $-\frac{13\sqrt{42}}{560}$ | 0                         | $\frac{\sqrt{210}}{280}$   | 0                         | $\frac{\sqrt{14}}{80}$   | 0                          | 0                       |  |
|     |                               | 0  | $-\frac{\sqrt{70}}{56}$   | 0                        | 0                        | 0                         | $\frac{\sqrt{14}}{56}$   | $-\frac{3\sqrt{3}}{80}$ | 0                          | $\frac{\sqrt{7}}{560}$    | 0                          | $\frac{\sqrt{105}}{80}$   | 0                        | $-\frac{\sqrt{21}}{560}$   | 0                       |  |
|     |                               | $-\frac{\sqrt{14}}{56}$  | 0                         | 0                        | 0                        | $\frac{\sqrt{70}}{56}$    | 0                        | 0                       | $-\frac{\sqrt{21}}{560}$   | 0                         | $\frac{\sqrt{105}}{80}$    | 0                         | $\frac{\sqrt{7}}{560}$   | 0                          | $-\frac{3\sqrt{3}}{80}$ |  |
|     |                               | 0  | 0                         | 0                        | $\frac{\sqrt{70}}{56}$   | 0                         | $-\frac{\sqrt{7}}{28}$   | 0                       | 0                          | $\frac{\sqrt{14}}{80}$    | 0                          | $\frac{\sqrt{210}}{280}$  | 0                        | $-\frac{13\sqrt{42}}{560}$ | 0                       |  |
|     |                               | 0  | 0                         | $\frac{\sqrt{14}}{56}$   | 0                        | $-\frac{\sqrt{7}}{28}$    | 0                        | 0                       | 0                          | 0                         | $\frac{\sqrt{42}}{112}$    | 0                         | $-\frac{\sqrt{70}}{56}$  | 0                          | $\frac{\sqrt{30}}{80}$  |  |
| 769 | symmetry                      | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$  |                           |                          |                          |                           |                          |                         |                            |                           |                            |                           |                          |                            |                         |  |
|     | $\mathbb{M}_{4,2}^{(a)}(T_1)$ | $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{7}i}{14} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{3\sqrt{42}i}{140} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{3\sqrt{2}i}{20} \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{2}i}{20} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{7}i}{14} & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{3\sqrt{42}i}{140} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{7}i}{14} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{70}i}{70} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}i}{14} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{42}i}{35} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{10} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}i}{10} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{7}i}{14} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{42}i}{35} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{7}i}{14} & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{70}i}{70} & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ |                           |                          |                          |                           |                          |                         |                            |                           |                            |                           |                          |                            |                         |  |
| 770 | symmetry                      | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$   |                           |                          |                          |                           |                          |                         |                            |                           |                            |                           |                          |                            |                         |  |

continued ...

Table 9

| No. | multipole                     | matrix                                |                          |                           |                          |                           |                         |                            |                           |                          |                            |                            |                          |                            |                           |
|-----|-------------------------------|---------------------------------------|--------------------------|---------------------------|--------------------------|---------------------------|-------------------------|----------------------------|---------------------------|--------------------------|----------------------------|----------------------------|--------------------------|----------------------------|---------------------------|
|     | $\mathbb{M}_{4,0}^{(a)}(T_2)$ | $-\frac{i}{112}$                      | 0                        | $-\frac{\sqrt{10}i}{112}$ | 0                        | $\frac{\sqrt{5}i}{16}$    | 0                       | 0                          | $-\frac{9\sqrt{6}i}{560}$ | 0                        | $-\frac{3\sqrt{30}i}{280}$ | 0                          | $\frac{9\sqrt{2}i}{80}$  | 0                          | 0                         |
|     |                               | 0                                     | $\frac{\sqrt{15}i}{112}$ | 0                         | $\frac{\sqrt{30}i}{112}$ | 0                         | $-\frac{\sqrt{3}i}{16}$ | $-\frac{3\sqrt{14}i}{80}$  | 0                         | $\frac{3\sqrt{6}i}{140}$ | 0                          | $\frac{3\sqrt{10}i}{560}$  | 0                        | $\frac{3\sqrt{2}i}{40}$    | 0                         |
|     |                               | $\frac{\sqrt{3}i}{16}$                | 0                        | $-\frac{\sqrt{30}i}{112}$ | 0                        | $-\frac{\sqrt{15}i}{112}$ | 0                       | 0                          | $\frac{3\sqrt{2}i}{40}$   | 0                        | $\frac{3\sqrt{10}i}{560}$  | 0                          | $\frac{3\sqrt{6}i}{140}$ | 0                          | $-\frac{3\sqrt{14}i}{80}$ |
|     |                               | 0                                     | $-\frac{\sqrt{5}i}{16}$  | 0                         | $\frac{\sqrt{10}i}{112}$ | 0                         | $\frac{i}{112}$         | 0                          | 0                         | $\frac{9\sqrt{2}i}{80}$  | 0                          | $-\frac{3\sqrt{30}i}{280}$ | 0                        | $-\frac{9\sqrt{6}i}{560}$  | 0                         |
|     |                               | 0                                     | $\frac{i}{28}$           | 0                         | $-\frac{\sqrt{2}i}{8}$   | 0                         | 0                       | $-\frac{\sqrt{210}i}{560}$ | 0                         | $-\frac{\sqrt{10}i}{56}$ | 0                          | $\frac{\sqrt{6}i}{16}$     | 0                        | 0                          | 0                         |
|     |                               | $-\frac{i}{28}$                       | 0                        | $-\frac{\sqrt{10}i}{56}$  | 0                        | 0                         | 0                       | 0                          | $\frac{13\sqrt{6}i}{560}$ | 0                        | $\frac{\sqrt{30}i}{280}$   | 0                          | $\frac{7\sqrt{2}i}{80}$  | 0                          | 0                         |
|     |                               | 0                                     | $\frac{\sqrt{10}i}{56}$  | 0                         | 0                        | 0                         | $\frac{\sqrt{2}i}{8}$   | $\frac{3\sqrt{21}i}{80}$   | 0                         | $-\frac{i}{560}$         | 0                          | $\frac{\sqrt{15}i}{80}$    | 0                        | $-\frac{\sqrt{3}i}{80}$    | 0                         |
|     |                               | $\frac{\sqrt{2}i}{8}$                 | 0                        | 0                         | 0                        | $\frac{\sqrt{10}i}{56}$   | 0                       | 0                          | $\frac{\sqrt{3}i}{80}$    | 0                        | $-\frac{\sqrt{15}i}{80}$   | 0                          | $\frac{i}{560}$          | 0                          | $-\frac{3\sqrt{21}i}{80}$ |
|     |                               | 0                                     | 0                        | 0                         | $-\frac{\sqrt{10}i}{56}$ | 0                         | $-\frac{i}{28}$         | 0                          | 0                         | $-\frac{7\sqrt{2}i}{80}$ | 0                          | $-\frac{\sqrt{30}i}{280}$  | 0                        | $-\frac{13\sqrt{6}i}{560}$ | 0                         |
|     |                               | 0                                     | 0                        | $-\frac{\sqrt{2}i}{8}$    | 0                        | $\frac{i}{28}$            | 0                       | 0                          | 0                         | $-\frac{\sqrt{6}i}{16}$  | 0                          | $\frac{\sqrt{10}i}{56}$    | 0                        | $\frac{\sqrt{210}i}{560}$  |                           |
| 771 | symmetry                      | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ |                          |                           |                          |                           |                         |                            |                           |                          |                            |                            |                          |                            |                           |
|     | $\mathbb{M}_{4,1}^{(a)}(T_2)$ | $-\frac{1}{112}$                      | 0                        | $\frac{\sqrt{10}}{112}$   | 0                        | $\frac{\sqrt{5}}{16}$     | 0                       | 0                          | $-\frac{9\sqrt{6}}{560}$  | 0                        | $\frac{3\sqrt{30}}{280}$   | 0                          | $\frac{9\sqrt{2}}{80}$   | 0                          | 0                         |
|     |                               | 0                                     | $\frac{\sqrt{15}}{112}$  | 0                         | $-\frac{\sqrt{30}}{112}$ | 0                         | $-\frac{\sqrt{3}}{16}$  | $\frac{3\sqrt{14}}{80}$    | 0                         | $\frac{3\sqrt{6}}{140}$  | 0                          | $-\frac{3\sqrt{10}}{560}$  | 0                        | $\frac{3\sqrt{2}}{40}$     | 0                         |
|     |                               | $-\frac{\sqrt{3}}{16}$                | 0                        | $-\frac{\sqrt{30}}{112}$  | 0                        | $\frac{\sqrt{15}}{112}$   | 0                       | 0                          | $-\frac{3\sqrt{2}}{40}$   | 0                        | $\frac{3\sqrt{10}}{560}$   | 0                          | $-\frac{3\sqrt{6}}{140}$ | 0                          | $-\frac{3\sqrt{14}}{80}$  |
|     |                               | 0                                     | $\frac{\sqrt{5}}{16}$    | 0                         | $\frac{\sqrt{10}}{112}$  | 0                         | $-\frac{1}{112}$        | 0                          | 0                         | $-\frac{9\sqrt{2}}{80}$  | 0                          | $-\frac{3\sqrt{30}}{280}$  | 0                        | $\frac{9\sqrt{6}}{560}$    | 0                         |
|     |                               | 0                                     | $-\frac{1}{28}$          | 0                         | $-\frac{\sqrt{2}}{8}$    | 0                         | 0                       | $-\frac{\sqrt{210}}{560}$  | 0                         | $\frac{\sqrt{10}}{56}$   | 0                          | $\frac{\sqrt{6}}{16}$      | 0                        | 0                          | 0                         |
|     |                               | $-\frac{1}{28}$                       | 0                        | $\frac{\sqrt{10}}{56}$    | 0                        | 0                         | 0                       | 0                          | $\frac{13\sqrt{6}}{560}$  | 0                        | $-\frac{\sqrt{30}}{280}$   | 0                          | $\frac{7\sqrt{2}}{80}$   | 0                          | 0                         |
|     |                               | 0                                     | $\frac{\sqrt{10}}{56}$   | 0                         | 0                        | 0                         | $\frac{\sqrt{2}}{8}$    | $-\frac{3\sqrt{21}}{80}$   | 0                         | $-\frac{1}{560}$         | 0                          | $-\frac{\sqrt{15}}{80}$    | 0                        | $-\frac{\sqrt{3}}{80}$     | 0                         |
|     |                               | $-\frac{\sqrt{2}}{8}$                 | 0                        | 0                         | 0                        | $-\frac{\sqrt{10}}{56}$   | 0                       | 0                          | $-\frac{\sqrt{3}}{80}$    | 0                        | $-\frac{\sqrt{15}}{80}$    | 0                          | $-\frac{1}{560}$         | 0                          | $-\frac{3\sqrt{21}}{80}$  |
|     |                               | 0                                     | 0                        | 0                         | $-\frac{\sqrt{10}}{56}$  | 0                         | $\frac{1}{28}$          | 0                          | 0                         | $\frac{7\sqrt{2}}{80}$   | 0                          | $-\frac{\sqrt{30}}{280}$   | 0                        | $\frac{13\sqrt{6}}{560}$   | 0                         |
|     |                               | 0                                     | 0                        | $\frac{\sqrt{2}}{8}$      | 0                        | $\frac{1}{28}$            | 0                       | 0                          | 0                         | $\frac{\sqrt{6}}{16}$    | 0                          | $\frac{\sqrt{10}}{56}$     | 0                        | $-\frac{\sqrt{210}}{560}$  |                           |
| 772 | symmetry                      | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ |                          |                           |                          |                           |                         |                            |                           |                          |                            |                            |                          |                            |                           |

continued ...

Table 9

| No. | multipole                        | matrix                                 |                          |                          |                          |                          |                          |                            |                           |                           |                            |                           |                          |                            |                           |
|-----|----------------------------------|--|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|----------------------------|---------------------------|---------------------------|----------------------------|---------------------------|--------------------------|----------------------------|---------------------------|
|     | $\mathbb{M}_{4,2}^{(a)}(T_2)$    | 0                                      | 0                        | 0                        | $\frac{\sqrt{10}i}{28}$  | 0                        | 0                        | $-\frac{3\sqrt{42}i}{280}$ | 0                         | 0                         | 0                          | $\frac{9\sqrt{30}i}{280}$ | 0                        | 0                          | 0                         |
|     |                                  | $\frac{\sqrt{3}i}{28}$                 | 0                        | 0                        | 0                        | $-\frac{\sqrt{15}i}{28}$ | 0                        | 0                          | $\frac{33\sqrt{2}i}{280}$ | 0                         | 0                          | 0                         | $\frac{3\sqrt{6}i}{280}$ | 0                          | 0                         |
|     |                                  | 0                                      | $-\frac{\sqrt{15}i}{28}$ | 0                        | 0                        | 0                        | $\frac{\sqrt{3}i}{28}$   | 0                          | 0                         | $-\frac{3\sqrt{6}i}{280}$ | 0                          | 0                         | 0                        | $-\frac{33\sqrt{2}i}{280}$ | 0                         |
|     |                                  | 0                                      | 0                        | $\frac{\sqrt{10}i}{28}$  | 0                        | 0                        | 0                        | 0                          | 0                         | 0                         | $-\frac{9\sqrt{30}i}{280}$ | 0                         | 0                        | 0                          | $\frac{3\sqrt{42}i}{280}$ |
|     |                                  | 0                                      | 0                        | $-\frac{3\sqrt{2}i}{28}$ | 0                        | 0                        | 0                        | 0                          | 0                         | 0                         | $\frac{\sqrt{6}i}{14}$     | 0                         | 0                        | 0                          | 0                         |
|     |                                  | 0                                      | 0                        | 0                        | $\frac{\sqrt{10}i}{28}$  | 0                        | 0                        | $\frac{3\sqrt{42}i}{140}$  | 0                         | 0                         | 0                          | $\frac{\sqrt{30}i}{140}$  | 0                        | 0                          | 0                         |
|     |                                  | $\frac{3\sqrt{2}i}{28}$                | 0                        | 0                        | 0                        | $\frac{\sqrt{10}i}{28}$  | 0                        | 0                          | $-\frac{9\sqrt{3}i}{140}$ | 0                         | 0                          | 0                         | $-\frac{17i}{140}$       | 0                          | 0                         |
|     |                                  | 0                                      | $-\frac{\sqrt{10}i}{28}$ | 0                        | 0                        | 0                        | $-\frac{3\sqrt{2}i}{28}$ | 0                          | 0                         | $-\frac{17i}{140}$        | 0                          | 0                         | 0                        | $-\frac{9\sqrt{3}i}{140}$  | 0                         |
|     |                                  | 0                                      | 0                        | $-\frac{\sqrt{10}i}{28}$ | 0                        | 0                        | 0                        | 0                          | 0                         | 0                         | $\frac{\sqrt{30}i}{140}$   | 0                         | 0                        | 0                          | $\frac{3\sqrt{42}i}{140}$ |
|     |                                  | 0                                      | 0                        | 0                        | $\frac{3\sqrt{2}i}{28}$  | 0                        | 0                        | 0                          | 0                         | 0                         | 0                          | $\frac{\sqrt{6}i}{14}$    | 0                        | 0                          | 0                         |
| 773 | symmetry                         | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |                          |                          |                          |                          |                          |                            |                           |                           |                            |                           |                          |                            |                           |
|     | $\mathbb{M}_{2,0}^{(1,-1;a)}(E)$ | 0                                      | $-\frac{3\sqrt{6}}{70}$  | 0                        | 0                        | 0                        | 0                        | 0                          | $-\frac{2\sqrt{15}}{35}$  | 0                         | 0                          | 0                         | 0                        | 0                          | 0                         |
|     |                                  | 0                                      | 0                        | $-\frac{3}{70}$          | 0                        | 0                        | 0                        | 0                          | 0                         | $-\frac{6\sqrt{3}}{35}$   | 0                          | 0                         | 0                        | 0                          | 0                         |
|     |                                  | 0                                      | 0                        | 0                        | $\frac{3}{70}$           | 0                        | 0                        | 0                          | 0                         | 0                         | $-\frac{6\sqrt{3}}{35}$    | 0                         | 0                        | 0                          | 0                         |
|     |                                  | 0                                      | 0                        | 0                        | 0                        | $\frac{3\sqrt{6}}{70}$   | 0                        | 0                          | 0                         | 0                         | 0                          | $-\frac{2\sqrt{15}}{35}$  | 0                        | 0                          | 0                         |
|     |                                  | $\frac{\sqrt{6}}{21}$                  | 0                        | 0                        | 0                        | 0                        | 0                        | 0                          | $\frac{3}{14}$            | 0                         | 0                          | 0                         | 0                        | 0                          | 0                         |
|     |                                  | 0                                      | $-\frac{\sqrt{6}}{105}$  | 0                        | 0                        | 0                        | 0                        | 0                          | $\frac{3\sqrt{15}}{70}$   | 0                         | 0                          | 0                         | 0                        | 0                          | 0                         |
|     |                                  | 0                                      | 0                        | $-\frac{4\sqrt{6}}{105}$ | 0                        | 0                        | 0                        | 0                          | 0                         | $\frac{3\sqrt{2}}{70}$    | 0                          | 0                         | 0                        | 0                          | 0                         |
|     |                                  | 0                                      | 0                        | 0                        | $-\frac{4\sqrt{6}}{105}$ | 0                        | 0                        | 0                          | 0                         | 0                         | $-\frac{3\sqrt{2}}{70}$    | 0                         | 0                        | 0                          | 0                         |
|     |                                  | 0                                      | 0                        | 0                        | 0                        | $-\frac{\sqrt{6}}{105}$  | 0                        | 0                          | 0                         | 0                         | 0                          | $-\frac{3\sqrt{15}}{70}$  | 0                        | 0                          | 0                         |
|     |                                  | 0                                      | 0                        | 0                        | 0                        | 0                        | $\frac{\sqrt{6}}{21}$    | 0                          | 0                         | 0                         | 0                          | 0                         | 0                        | $-\frac{3}{14}$            | 0                         |
| 774 | symmetry                         | $\frac{\sqrt{3}(x-y)(x+y)}{2}$         |                          |                          |                          |                          |                          |                            |                           |                           |                            |                           |                          |                            |                           |

continued ...

Table 9

| No. | multipole                          | matrix                    |                          |                         |                        |                          |                            |                          |                           |                           |                            |                           |                            |                          |                          |
|-----|------------------------------------|---------------------------|--------------------------|-------------------------|------------------------|--------------------------|----------------------------|--------------------------|---------------------------|---------------------------|----------------------------|---------------------------|----------------------------|--------------------------|--------------------------|
|     | $\mathbb{M}_{2,1}^{(1,-1;a)}(E)$   | 0                         | 0                        | 0                       | $-\frac{3}{70}$        | 0                        | 0                          | $-\frac{\sqrt{105}}{35}$ | 0                         | 0                         | 0                          | $-\frac{\sqrt{3}}{35}$    | 0                          | 0                        | 0                        |
|     |                                    | $\frac{\sqrt{30}}{70}$    | 0                        | 0                       | 0                      | $-\frac{\sqrt{6}}{35}$   | 0                          | 0                        | $-\frac{3\sqrt{5}}{35}$   | 0                         | 0                          | 0                         | $-\frac{\sqrt{15}}{35}$    | 0                        | 0                        |
|     |                                    | 0                         | $\frac{\sqrt{6}}{35}$    | 0                       | 0                      | 0                        | $-\frac{\sqrt{30}}{70}$    | 0                        | 0                         | $-\frac{\sqrt{15}}{35}$   | 0                          | 0                         | 0                          | $-\frac{3\sqrt{5}}{35}$  | 0                        |
|     |                                    | 0                         | 0                        | $\frac{3}{70}$          | 0                      | 0                        | 0                          | 0                        | 0                         | $-\frac{\sqrt{3}}{35}$    | 0                          | 0                         | 0                          | 0                        | $-\frac{\sqrt{105}}{35}$ |
|     |                                    | 0                         | 0                        | $\frac{\sqrt{5}}{35}$   | 0                      | 0                        | 0                          | 0                        | 0                         | $\frac{\sqrt{15}}{70}$    | 0                          | 0                         | 0                          | 0                        | 0                        |
|     |                                    | 0                         | 0                        | 0                       | $\frac{3}{35}$         | 0                        | 0                          | $-\frac{\sqrt{105}}{70}$ | 0                         | 0                         | 0                          | $\frac{2\sqrt{3}}{35}$    | 0                          | 0                        | 0                        |
|     |                                    | $\frac{\sqrt{5}}{35}$     | 0                        | 0                       | 0                      | $\frac{3}{35}$           | 0                          | 0                        | $-\frac{\sqrt{30}}{35}$   | 0                         | 0                          | 0                         | $\frac{3\sqrt{10}}{70}$    | 0                        | 0                        |
|     |                                    | 0                         | $\frac{3}{35}$           | 0                       | 0                      | 0                        | $\frac{\sqrt{5}}{35}$      | 0                        | 0                         | $-\frac{3\sqrt{10}}{70}$  | 0                          | 0                         | 0                          | $\frac{\sqrt{30}}{35}$   | 0                        |
|     |                                    | 0                         | 0                        | $\frac{3}{35}$          | 0                      | 0                        | 0                          | 0                        | 0                         | $-\frac{2\sqrt{3}}{35}$   | 0                          | 0                         | 0                          | 0                        | $\frac{\sqrt{105}}{70}$  |
|     |                                    | 0                         | 0                        | 0                       | $\frac{\sqrt{5}}{35}$  | 0                        | 0                          | 0                        | 0                         | 0                         | $-\frac{\sqrt{15}}{70}$    | 0                         | 0                          | 0                        | 0                        |
| 775 | symmetry                           | $\sqrt{3}yz$              |                          |                         |                        |                          |                            |                          |                           |                           |                            |                           |                            |                          |                          |
|     | $\mathbb{M}_{2,0}^{(1,-1;a)}(T_2)$ | $\frac{3\sqrt{10}i}{140}$ | 0                        | $\frac{9i}{140}$        | 0                      | 0                        | 0                          | 0                        | $\frac{2\sqrt{15}i}{35}$  | 0                         | $\frac{2\sqrt{3}i}{35}$    | 0                         | 0                          | 0                        | 0                        |
|     |                                    | 0                         | $-\frac{\sqrt{6}i}{140}$ | 0                       | $\frac{\sqrt{3}i}{28}$ | 0                        | 0                          | 0                        | 0                         | $\frac{2\sqrt{15}i}{35}$  | 0                          | $\frac{6i}{35}$           | 0                          | 0                        | 0                        |
|     |                                    | 0                         | 0                        | $-\frac{\sqrt{3}i}{28}$ | 0                      | $\frac{\sqrt{6}i}{140}$  | 0                          | 0                        | 0                         | 0                         | $\frac{6i}{35}$            | 0                         | $\frac{2\sqrt{15}i}{35}$   | 0                        | 0                        |
|     |                                    | 0                         | 0                        | 0                       | $-\frac{9i}{140}$      | 0                        | $-\frac{3\sqrt{10}i}{140}$ | 0                        | 0                         | 0                         | 0                          | $\frac{2\sqrt{3}i}{35}$   | 0                          | $\frac{2\sqrt{15}i}{35}$ | 0                        |
|     |                                    | 0                         | $-\frac{\sqrt{10}i}{35}$ | 0                       | 0                      | 0                        | 0                          | $-\frac{\sqrt{21}i}{28}$ | 0                         | $-\frac{3i}{28}$          | 0                          | 0                         | 0                          | 0                        | 0                        |
|     |                                    | $\frac{\sqrt{10}i}{35}$   | 0                        | $-\frac{2i}{35}$        | 0                      | 0                        | 0                          | 0                        | $-\frac{\sqrt{15}i}{140}$ | 0                         | $-\frac{11\sqrt{3}i}{140}$ | 0                         | 0                          | 0                        | 0                        |
|     |                                    | 0                         | $\frac{2i}{35}$          | 0                       | 0                      | 0                        | 0                          | 0                        | 0                         | $\frac{3\sqrt{10}i}{140}$ | 0                          | $-\frac{\sqrt{6}i}{20}$   | 0                          | 0                        | 0                        |
|     |                                    | 0                         | 0                        | 0                       | 0                      | $\frac{2i}{35}$          | 0                          | 0                        | 0                         | 0                         | $\frac{\sqrt{6}i}{20}$     | 0                         | $-\frac{3\sqrt{10}i}{140}$ | 0                        | 0                        |
|     |                                    | 0                         | 0                        | 0                       | $-\frac{2i}{35}$       | 0                        | $\frac{\sqrt{10}i}{35}$    | 0                        | 0                         | 0                         | 0                          | $\frac{11\sqrt{3}i}{140}$ | 0                          | $\frac{\sqrt{15}i}{140}$ | 0                        |
|     |                                    | 0                         | 0                        | 0                       | 0                      | $-\frac{\sqrt{10}i}{35}$ | 0                          | 0                        | 0                         | 0                         | 0                          | 0                         | $\frac{3i}{28}$            | 0                        | $\frac{\sqrt{21}i}{28}$  |
| 776 | symmetry                           | $\sqrt{3}xz$              |                          |                         |                        |                          |                            |                          |                           |                           |                            |                           |                            |                          |                          |

continued ...

Table 9

| No. | multipole                          | matrix   |                         |                         |                        |                         |                          |                           |                          |                           |                          |                          |                           |                          |                           |
|-----|------------------------------------|--|-------------------------|-------------------------|------------------------|-------------------------|--------------------------|---------------------------|--------------------------|---------------------------|--------------------------|--------------------------|---------------------------|--------------------------|---------------------------|
|     | $\mathbb{M}_{2,1}^{(1,-1;a)}(T_2)$ | $\frac{3\sqrt{10}}{140}$                                   | 0                       | $-\frac{9}{140}$        | 0                      | 0                       | 0                        | 0                         | $\frac{2\sqrt{15}}{35}$  | 0                         | $-\frac{2\sqrt{3}}{35}$  | 0                        | 0                         | 0                        | 0                         |
|     |                                    | 0  | $-\frac{\sqrt{6}}{140}$ | 0                       | $-\frac{\sqrt{3}}{28}$ | 0                       | 0                        | 0                         | 0                        | $\frac{2\sqrt{15}}{35}$   | 0                        | $-\frac{6}{35}$          | 0                         | 0                        | 0                         |
|     |                                    | 0  | 0                       | $-\frac{\sqrt{3}}{28}$  | 0                      | $-\frac{\sqrt{6}}{140}$ | 0                        | 0                         | 0                        | 0                         | $\frac{6}{35}$           | 0                        | $-\frac{2\sqrt{15}}{35}$  | 0                        | 0                         |
|     |                                    | 0  | 0                       | 0                       | $-\frac{9}{140}$       | 0                       | $\frac{3\sqrt{10}}{140}$ | 0                         | 0                        | 0                         | 0                        | $\frac{2\sqrt{3}}{35}$   | 0                         | $-\frac{2\sqrt{15}}{35}$ | 0                         |
|     |                                    | 0  | $\frac{\sqrt{10}}{35}$  | 0                       | 0                      | 0                       | 0                        | $-\frac{\sqrt{21}}{28}$   | 0                        | $\frac{3}{28}$            | 0                        | 0                        | 0                         | 0                        | 0                         |
|     |                                    | $\frac{\sqrt{10}}{35}$                                     | 0                       | $\frac{2}{35}$          | 0                      | 0                       | 0                        | 0                         | $-\frac{\sqrt{15}}{140}$ | 0                         | $\frac{11\sqrt{3}}{140}$ | 0                        | 0                         | 0                        | 0                         |
|     |                                    | 0  | $\frac{2}{35}$          | 0                       | 0                      | 0                       | 0                        | 0                         | 0                        | $\frac{3\sqrt{10}}{140}$  | 0                        | $\frac{\sqrt{6}}{20}$    | 0                         | 0                        | 0                         |
|     |                                    | 0  | 0                       | 0                       | 0                      | $-\frac{2}{35}$         | 0                        | 0                         | 0                        | 0                         | $\frac{\sqrt{6}}{20}$    | 0                        | $\frac{3\sqrt{10}}{140}$  | 0                        | 0                         |
|     |                                    | 0  | 0                       | 0                       | $-\frac{2}{35}$        | 0                       | $-\frac{\sqrt{10}}{35}$  | 0                         | 0                        | 0                         | 0                        | $\frac{11\sqrt{3}}{140}$ | 0                         | $-\frac{\sqrt{15}}{140}$ | 0                         |
|     |                                    | 0  | 0                       | 0                       | 0                      | $-\frac{\sqrt{10}}{35}$ | 0                        | 0                         | 0                        | 0                         | 0                        | 0                        | $\frac{3}{28}$            | 0                        | $-\frac{\sqrt{21}}{28}$   |
| 777 | symmetry                           | $\sqrt{3}xy$   |                         |                         |                        |                         |                          |                           |                          |                           |                          |                          |                           |                          |                           |
|     | $\mathbb{M}_{2,2}^{(1,-1;a)}(T_2)$ | 0  | 0                       | 0                       | $\frac{3i}{70}$        | 0                       | 0                        | $-\frac{\sqrt{105}i}{35}$ | 0                        | 0                         | 0                        | $\frac{\sqrt{3}i}{35}$   | 0                         | 0                        | 0                         |
|     |                                    | $\frac{\sqrt{30}i}{70}$                                    | 0                       | 0                       | 0                      | $\frac{\sqrt{6}i}{35}$  | 0                        | 0                         | $-\frac{3\sqrt{5}i}{35}$ | 0                         | 0                        | 0                        | $\frac{\sqrt{15}i}{35}$   | 0                        | 0                         |
|     |                                    | 0  | $\frac{\sqrt{6}i}{35}$  | 0                       | 0                      | 0                       | $\frac{\sqrt{30}i}{70}$  | 0                         | 0                        | $-\frac{\sqrt{15}i}{35}$  | 0                        | 0                        | 0                         | $\frac{3\sqrt{5}i}{35}$  | 0                         |
|     |                                    | 0  | 0                       | $\frac{3i}{70}$         | 0                      | 0                       | 0                        | 0                         | 0                        | $-\frac{\sqrt{3}i}{35}$   | 0                        | 0                        | 0                         | 0                        | $\frac{\sqrt{105}i}{35}$  |
|     |                                    | 0  | 0                       | $-\frac{\sqrt{5}i}{35}$ | 0                      | 0                       | 0                        | 0                         | 0                        | $-\frac{\sqrt{15}i}{70}$  | 0                        | 0                        | 0                         | 0                        | 0                         |
|     |                                    | 0  | 0                       | 0                       | $-\frac{3i}{35}$       | 0                       | 0                        | $-\frac{\sqrt{105}i}{70}$ | 0                        | 0                         | 0                        | $-\frac{2\sqrt{3}i}{35}$ | 0                         | 0                        | 0                         |
|     |                                    | $\frac{\sqrt{5}i}{35}$                                     | 0                       | 0                       | 0                      | $-\frac{3i}{35}$        | 0                        | 0                         | $-\frac{\sqrt{30}i}{35}$ | 0                         | 0                        | 0                        | $-\frac{3\sqrt{10}i}{70}$ | 0                        | 0                         |
|     |                                    | 0  | $\frac{3i}{35}$         | 0                       | 0                      | 0                       | $-\frac{\sqrt{5}i}{35}$  | 0                         | 0                        | $-\frac{3\sqrt{10}i}{70}$ | 0                        | 0                        | 0                         | $-\frac{\sqrt{30}i}{35}$ | 0                         |
|     |                                    | 0  | 0                       | $\frac{3i}{35}$         | 0                      | 0                       | 0                        | 0                         | 0                        | $-\frac{2\sqrt{3}i}{35}$  | 0                        | 0                        | 0                         | 0                        | $-\frac{\sqrt{105}i}{70}$ |
|     |                                    | 0  | 0                       | 0                       | $\frac{\sqrt{5}i}{35}$ | 0                       | 0                        | 0                         | 0                        | 0                         | 0                        | $-\frac{\sqrt{15}i}{70}$ | 0                         | 0                        | 0                         |
| 778 | symmetry                           | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$ |                         |                         |                        |                         |                          |                           |                          |                           |                          |                          |                           |                          |                           |

continued ...

Table 9

| No. | multipole                        | matrix   |                         |                          |                         |                         |                         |                         |                           |                           |                           |   |                           |                          |
|-----|----------------------------------|--|-------------------------|--------------------------|-------------------------|-------------------------|-------------------------|-------------------------|---------------------------|---------------------------|---------------------------|---|---------------------------|--------------------------|
|     | $\mathbb{M}_4^{(1,-1;a)}(A_1)$   | 0  | $\frac{\sqrt{7}}{168}$  | 0                        | 0                       | 0                       | $\frac{\sqrt{35}}{168}$ | 0                       | 0                         | $\frac{\sqrt{70}}{56}$    | 0                         | 0 | 0                         | $\frac{\sqrt{210}}{168}$ |
|     |                                  | 0  | 0                       | $-\frac{\sqrt{42}}{168}$ | 0                       | 0                       | 0                       | 0                       | 0                         | $-\frac{5\sqrt{14}}{168}$ | 0                         | 0 | 0                         | $\frac{\sqrt{10}}{24}$   |
|     |                                  | 0  | 0                       | 0                        | $\frac{\sqrt{42}}{168}$ | 0                       | 0                       | $\frac{\sqrt{10}}{24}$  | 0                         | 0                         | $-\frac{5\sqrt{14}}{168}$ | 0 | 0                         | 0                        |
|     |                                  | $-\frac{\sqrt{35}}{168}$                                       | 0                       | 0                        | 0                       | $-\frac{\sqrt{7}}{168}$ | 0                       | 0                       | $\frac{\sqrt{210}}{168}$  | 0                         | 0                         | 0 | $\frac{\sqrt{70}}{56}$    | 0                        |
|     |                                  | $-\frac{\sqrt{7}}{84}$   | 0                       | 0                        | 0                       | $-\frac{\sqrt{35}}{84}$ | 0                       | 0                       | $-\frac{5\sqrt{42}}{168}$ | 0                         | 0                         | 0 | $-\frac{5\sqrt{14}}{168}$ | 0                        |
|     |                                  | 0  | $\frac{\sqrt{7}}{28}$   | 0                        | 0                       | 0                       | $-\frac{\sqrt{35}}{84}$ | 0                       | 0                         | $\frac{\sqrt{70}}{42}$    | 0                         | 0 | 0                         | $-\frac{\sqrt{210}}{84}$ |
|     |                                  | 0  | 0                       | $-\frac{\sqrt{7}}{42}$   | 0                       | 0                       | 0                       | 0                       | 0                         | $\frac{5\sqrt{21}}{168}$  | 0                         | 0 | 0                         | $-\frac{\sqrt{15}}{24}$  |
|     |                                  | 0  | 0                       | 0                        | $-\frac{\sqrt{7}}{42}$  | 0                       | 0                       | $\frac{\sqrt{15}}{24}$  | 0                         | 0                         | $-\frac{5\sqrt{21}}{168}$ | 0 | 0                         | 0                        |
|     |                                  | $-\frac{\sqrt{35}}{84}$  | 0                       | 0                        | 0                       | $\frac{\sqrt{7}}{28}$   | 0                       | 0                       | $\frac{\sqrt{210}}{84}$   | 0                         | 0                         | 0 | $-\frac{\sqrt{70}}{42}$   | 0                        |
|     |                                  | 0  | $-\frac{\sqrt{35}}{84}$ | 0                        | 0                       | 0                       | $-\frac{\sqrt{7}}{84}$  | 0                       | 0                         | $\frac{5\sqrt{14}}{168}$  | 0                         | 0 | 0                         | $\frac{5\sqrt{42}}{168}$ |
| 779 | symmetry                         | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ |                         |                          |                         |                         |                         |                         |                           |                           |                           |   |                           |                          |
|     | $\mathbb{M}_{4,0}^{(1,-1;a)}(E)$ | 0  | $\frac{\sqrt{5}}{168}$  | 0                        | 0                       | 0                       | $-\frac{1}{24}$         | 0                       | 0                         | $\frac{5\sqrt{2}}{56}$    | 0                         | 0 | 0                         | $-\frac{\sqrt{6}}{24}$   |
|     |                                  | 0  | 0                       | $-\frac{\sqrt{30}}{168}$ | 0                       | 0                       | 0                       | 0                       | 0                         | $-\frac{5\sqrt{10}}{168}$ | 0                         | 0 | 0                         | $-\frac{\sqrt{14}}{24}$  |
|     |                                  | 0  | 0                       | 0                        | $\frac{\sqrt{30}}{168}$ | 0                       | 0                       | $-\frac{\sqrt{14}}{24}$ | 0                         | 0                         | $-\frac{5\sqrt{10}}{168}$ | 0 | 0                         | 0                        |
|     |                                  | $\frac{1}{24}$   | 0                       | 0                        | 0                       | $-\frac{\sqrt{5}}{168}$ | 0                       | 0                       | $-\frac{\sqrt{6}}{24}$    | 0                         | 0                         | 0 | $\frac{5\sqrt{2}}{56}$    | 0                        |
|     |                                  | $-\frac{\sqrt{5}}{84}$   | 0                       | 0                        | 0                       | $\frac{1}{12}$          | 0                       | 0                       | $-\frac{5\sqrt{30}}{168}$ | 0                         | 0                         | 0 | $\frac{\sqrt{10}}{24}$    | 0                        |
|     |                                  | 0  | $\frac{\sqrt{5}}{28}$   | 0                        | 0                       | 0                       | $\frac{1}{12}$          | 0                       | 0                         | $\frac{5\sqrt{2}}{42}$    | 0                         | 0 | 0                         | $\frac{\sqrt{6}}{12}$    |
|     |                                  | 0  | 0                       | $-\frac{\sqrt{5}}{42}$   | 0                       | 0                       | 0                       | 0                       | 0                         | $\frac{5\sqrt{15}}{168}$  | 0                         | 0 | 0                         | $\frac{\sqrt{21}}{24}$   |
|     |                                  | 0  | 0                       | 0                        | $-\frac{\sqrt{5}}{42}$  | 0                       | 0                       | $-\frac{\sqrt{21}}{24}$ | 0                         | 0                         | $-\frac{5\sqrt{15}}{168}$ | 0 | 0                         | 0                        |
|     |                                  | $\frac{1}{12}$   | 0                       | 0                        | 0                       | $\frac{\sqrt{5}}{28}$   | 0                       | 0                       | $-\frac{\sqrt{6}}{12}$    | 0                         | 0                         | 0 | $-\frac{5\sqrt{2}}{42}$   | 0                        |
|     |                                  | 0  | $\frac{1}{12}$          | 0                        | 0                       | 0                       | $-\frac{\sqrt{5}}{84}$  | 0                       | 0                         | $-\frac{\sqrt{10}}{24}$   | 0                         | 0 | 0                         | $\frac{5\sqrt{30}}{168}$ |
| 780 | symmetry                         | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$                   |                         |                          |                         |                         |                         |                         |                           |                           |                           |   |                           |                          |

continued ...

Table 9

| No. | multipole                          | matrix                             |                            |                           |                            |                            |                           |                          |                            |                             |                            |                            |                            |                             |                         |
|-----|------------------------------------|------------------------------------|----------------------------|---------------------------|----------------------------|----------------------------|---------------------------|--------------------------|----------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|-------------------------|
|     | $\mathbb{M}_{4,1}^{(1,-1;a)}(E)$   | 0                                  | 0                          | 0                         | $-\frac{\sqrt{30}}{168}$   | 0                          | 0                         | $-\frac{\sqrt{14}}{56}$  | 0                          | 0                           | 0                          | $-\frac{3\sqrt{10}}{56}$   | 0                          | 0                           | 0                       |
|     |                                    | $\frac{1}{56}$                     | 0                          | 0                         | 0                          | $\frac{\sqrt{5}}{56}$      | 0                         | 0                        | $\frac{11\sqrt{6}}{168}$   | 0                           | 0                          | 0                          | $-\frac{\sqrt{2}}{56}$     | 0                           | 0                       |
|     |                                    | 0                                  | $-\frac{\sqrt{5}}{56}$     | 0                         | 0                          | 0                          | $-\frac{1}{56}$           | 0                        | 0                          | $-\frac{\sqrt{2}}{56}$      | 0                          | 0                          | 0                          | $\frac{11\sqrt{6}}{168}$    | 0                       |
|     |                                    | 0                                  | 0                          | $\frac{\sqrt{30}}{168}$   | 0                          | 0                          | 0                         | 0                        | 0                          | $-\frac{3\sqrt{10}}{56}$    | 0                          | 0                          | 0                          | 0                           | $-\frac{\sqrt{14}}{56}$ |
|     |                                    | 0                                  | 0                          | $\frac{\sqrt{6}}{28}$     | 0                          | 0                          | 0                         | 0                        | 0                          | $\frac{5\sqrt{2}}{28}$      | 0                          | 0                          | 0                          | 0                           | 0                       |
|     |                                    | 0                                  | 0                          | 0                         | $-\frac{\sqrt{30}}{84}$    | 0                          | 0                         | $-\frac{3\sqrt{14}}{56}$ | 0                          | 0                           | 0                          | $\frac{\sqrt{10}}{56}$     | 0                          | 0                           | 0                       |
|     |                                    | $\frac{\sqrt{6}}{28}$              | 0                          | 0                         | 0                          | $-\frac{\sqrt{30}}{84}$    | 0                         | 0                        | $\frac{9}{56}$             | 0                           | 0                          | 0                          | $-\frac{17\sqrt{3}}{168}$  | 0                           | 0                       |
|     |                                    | 0                                  | $-\frac{\sqrt{30}}{84}$    | 0                         | 0                          | 0                          | $\frac{\sqrt{6}}{28}$     | 0                        | 0                          | $\frac{17\sqrt{3}}{168}$    | 0                          | 0                          | 0                          | $-\frac{9}{56}$             | 0                       |
|     |                                    | 0                                  | 0                          | $-\frac{\sqrt{30}}{84}$   | 0                          | 0                          | 0                         | 0                        | 0                          | $-\frac{\sqrt{10}}{56}$     | 0                          | 0                          | 0                          | 0                           | $\frac{3\sqrt{14}}{56}$ |
|     |                                    | 0                                  | 0                          | 0                         | $\frac{\sqrt{6}}{28}$      | 0                          | 0                         | 0                        | 0                          | 0                           | $-\frac{5\sqrt{2}}{28}$    | 0                          | 0                          | 0                           | 0                       |
| 781 | symmetry                           | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$  |                            |                           |                            |                            |                           |                          |                            |                             |                            |                            |                            |                             |                         |
|     | $\mathbb{M}_{4,0}^{(1,-1;a)}(T_1)$ | $\frac{\sqrt{21}i}{672}$           | 0                          | $\frac{\sqrt{210}i}{672}$ | 0                          | $\frac{\sqrt{105}i}{672}$  | 0                         | 0                        | $\frac{3\sqrt{14}i}{112}$  | 0                           | $\frac{\sqrt{70}i}{56}$    | 0                          | $\frac{\sqrt{42}i}{112}$   | 0                           | 0                       |
|     |                                    | 0                                  | $-\frac{\sqrt{35}i}{224}$  | 0                         | $-\frac{\sqrt{70}i}{224}$  | 0                          | $-\frac{\sqrt{7}i}{224}$  | $-\frac{\sqrt{6}i}{48}$  | 0                          | $-\frac{\sqrt{14}i}{28}$    | 0                          | $-\frac{\sqrt{210}i}{336}$ | 0                          | $\frac{\sqrt{42}i}{168}$    | 0                       |
|     |                                    | $\frac{\sqrt{7}i}{224}$            | 0                          | $\frac{\sqrt{70}i}{224}$  | 0                          | $\frac{\sqrt{35}i}{224}$   | 0                         | 0                        | $\frac{\sqrt{42}i}{168}$   | 0                           | $-\frac{\sqrt{210}i}{336}$ | 0                          | $-\frac{\sqrt{14}i}{28}$   | 0                           | $-\frac{\sqrt{6}i}{48}$ |
|     |                                    | 0                                  | $-\frac{\sqrt{105}i}{672}$ | 0                         | $-\frac{\sqrt{210}i}{672}$ | 0                          | $-\frac{\sqrt{21}i}{672}$ | 0                        | 0                          | $\frac{\sqrt{42}i}{112}$    | 0                          | $\frac{\sqrt{70}i}{56}$    | 0                          | $\frac{3\sqrt{14}i}{112}$   | 0                       |
|     |                                    | 0                                  | $-\frac{\sqrt{21}i}{84}$   | 0                         | $-\frac{\sqrt{42}i}{168}$  | 0                          | 0                         | $-\frac{\sqrt{10}i}{32}$ | 0                          | $-\frac{5\sqrt{210}i}{336}$ | 0                          | $-\frac{5\sqrt{14}i}{224}$ | 0                          | 0                           | 0                       |
|     |                                    | $\frac{\sqrt{21}i}{84}$            | 0                          | $\frac{\sqrt{210}i}{168}$ | 0                          | 0                          | 0                         | 0                        | $\frac{13\sqrt{14}i}{224}$ | 0                           | $\frac{\sqrt{70}i}{112}$   | 0                          | $-\frac{\sqrt{42}i}{96}$   | 0                           | 0                       |
|     |                                    | 0                                  | $-\frac{\sqrt{210}i}{168}$ | 0                         | 0                          | 0                          | $\frac{\sqrt{42}i}{168}$  | $-\frac{3i}{32}$         | 0                          | $-\frac{\sqrt{21}i}{672}$   | 0                          | $\frac{\sqrt{35}i}{32}$    | 0                          | $\frac{\sqrt{7}i}{224}$     | 0                       |
|     |                                    | $\frac{\sqrt{42}i}{168}$           | 0                          | 0                         | 0                          | $-\frac{\sqrt{210}i}{168}$ | 0                         | 0                        | $-\frac{\sqrt{7}i}{224}$   | 0                           | $-\frac{\sqrt{35}i}{32}$   | 0                          | $\frac{\sqrt{21}i}{672}$   | 0                           | $\frac{3i}{32}$         |
|     |                                    | 0                                  | 0                          | 0                         | $\frac{\sqrt{210}i}{168}$  | 0                          | $\frac{\sqrt{21}i}{84}$   | 0                        | 0                          | $\frac{\sqrt{42}i}{96}$     | 0                          | $-\frac{\sqrt{70}i}{112}$  | 0                          | $-\frac{13\sqrt{14}i}{224}$ | 0                       |
|     |                                    | 0                                  | 0                          | $-\frac{\sqrt{42}i}{168}$ | 0                          | $-\frac{\sqrt{21}i}{84}$   | 0                         | 0                        | 0                          | 0                           | $\frac{5\sqrt{14}i}{224}$  | 0                          | $\frac{5\sqrt{210}i}{336}$ | 0                           | $\frac{\sqrt{10}i}{32}$ |
| 782 | symmetry                           | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ |                            |                           |                            |                            |                           |                          |                            |                             |                            |                            |                            |                             |                         |

continued ...

Table 9

| No. | multipole                          | matrix                               |                           |                          |                           |                           |                          |                        |                            |                            |                          |                           |                            |                            |                         |
|-----|------------------------------------|--------------------------------------|---------------------------|--------------------------|---------------------------|---------------------------|--------------------------|------------------------|----------------------------|----------------------------|--------------------------|---------------------------|----------------------------|----------------------------|-------------------------|
|     | $\mathbb{M}_{4,1}^{(1,-1;a)}(T_1)$ | $-\frac{\sqrt{21}}{672}$             | 0                         | $\frac{\sqrt{210}}{672}$ | 0                         | $-\frac{\sqrt{105}}{672}$ | 0                        | 0                      | $-\frac{3\sqrt{14}}{112}$  | 0                          | $\frac{\sqrt{70}}{56}$   | 0                         | $-\frac{\sqrt{42}}{112}$   | 0                          | 0                       |
|     |                                    | 0                                    | $\frac{\sqrt{35}}{224}$   | 0                        | $-\frac{\sqrt{70}}{224}$  | 0                         | $\frac{\sqrt{7}}{224}$   | $-\frac{\sqrt{6}}{48}$ | 0                          | $\frac{\sqrt{14}}{28}$     | 0                        | $-\frac{\sqrt{210}}{336}$ | 0                          | $-\frac{\sqrt{42}}{168}$   | 0                       |
|     |                                    | $\frac{\sqrt{7}}{224}$               | 0                         | $-\frac{\sqrt{70}}{224}$ | 0                         | $\frac{\sqrt{35}}{224}$   | 0                        | 0                      | $\frac{\sqrt{42}}{168}$    | 0                          | $\frac{\sqrt{210}}{336}$ | 0                         | $-\frac{\sqrt{14}}{28}$    | 0                          | $\frac{\sqrt{6}}{48}$   |
|     |                                    | 0                                    | $-\frac{\sqrt{105}}{672}$ | 0                        | $\frac{\sqrt{210}}{672}$  | 0                         | $-\frac{\sqrt{21}}{672}$ | 0                      | 0                          | $\frac{\sqrt{42}}{112}$    | 0                        | $-\frac{\sqrt{70}}{56}$   | 0                          | $\frac{3\sqrt{14}}{112}$   | 0                       |
|     |                                    | 0                                    | $-\frac{\sqrt{21}}{84}$   | 0                        | $\frac{\sqrt{42}}{168}$   | 0                         | 0                        | $\frac{\sqrt{10}}{32}$ | 0                          | $-\frac{5\sqrt{210}}{336}$ | 0                        | $\frac{5\sqrt{14}}{224}$  | 0                          | 0                          | 0                       |
|     |                                    | $-\frac{\sqrt{21}}{84}$              | 0                         | $\frac{\sqrt{210}}{168}$ | 0                         | 0                         | 0                        | 0                      | $-\frac{13\sqrt{14}}{224}$ | 0                          | $\frac{\sqrt{70}}{112}$  | 0                         | $\frac{\sqrt{42}}{96}$     | 0                          | 0                       |
|     |                                    | 0                                    | $\frac{\sqrt{210}}{168}$  | 0                        | 0                         | 0                         | $-\frac{\sqrt{42}}{168}$ | $-\frac{3}{32}$        | 0                          | $\frac{\sqrt{21}}{672}$    | 0                        | $\frac{\sqrt{35}}{32}$    | 0                          | $-\frac{\sqrt{7}}{224}$    | 0                       |
|     |                                    | $\frac{\sqrt{42}}{168}$              | 0                         | 0                        | 0                         | $-\frac{\sqrt{210}}{168}$ | 0                        | 0                      | $-\frac{\sqrt{7}}{224}$    | 0                          | $\frac{\sqrt{35}}{32}$   | 0                         | $\frac{\sqrt{21}}{672}$    | 0                          | $-\frac{3}{32}$         |
|     |                                    | 0                                    | 0                         | 0                        | $-\frac{\sqrt{210}}{168}$ | 0                         | $\frac{\sqrt{21}}{84}$   | 0                      | 0                          | $\frac{\sqrt{42}}{96}$     | 0                        | $\frac{\sqrt{70}}{112}$   | 0                          | $-\frac{13\sqrt{14}}{224}$ | 0                       |
|     |                                    | 0                                    | 0                         | $-\frac{\sqrt{42}}{168}$ | 0                         | $\frac{\sqrt{21}}{84}$    | 0                        | 0                      | 0                          | 0                          | $\frac{5\sqrt{14}}{224}$ | 0                         | $-\frac{5\sqrt{210}}{336}$ | 0                          | $\frac{\sqrt{10}}{32}$  |
| 783 | symmetry                           | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$    |                           |                          |                           |                           |                          |                        |                            |                            |                          |                           |                            |                            |                         |
|     | $\mathbb{M}_{4,2}^{(1,-1;a)}(T_1)$ | 0                                    | 0                         | 0                        | 0                         | 0                         | $-\frac{\sqrt{21}i}{84}$ | 0                      | 0                          | 0                          | 0                        | 0                         | 0                          | $-\frac{\sqrt{14}i}{28}$   | 0                       |
|     |                                    | 0                                    | 0                         | 0                        | 0                         | 0                         | 0                        | 0                      | 0                          | 0                          | 0                        | 0                         | 0                          | 0                          | $-\frac{\sqrt{6}i}{12}$ |
|     |                                    | 0                                    | 0                         | 0                        | 0                         | 0                         | 0                        | $\frac{\sqrt{6}i}{12}$ | 0                          | 0                          | 0                        | 0                         | 0                          | 0                          | 0                       |
|     |                                    | $-\frac{\sqrt{21}i}{84}$             | 0                         | 0                        | 0                         | 0                         | 0                        | 0                      | $\frac{\sqrt{14}i}{28}$    | 0                          | 0                        | 0                         | 0                          | 0                          | 0                       |
|     |                                    | 0                                    | 0                         | 0                        | 0                         | $\frac{\sqrt{21}i}{42}$   | 0                        | 0                      | 0                          | 0                          | 0                        | 0                         | $\frac{\sqrt{210}i}{84}$   | 0                          | 0                       |
|     |                                    | 0                                    | 0                         | 0                        | 0                         | 0                         | $\frac{\sqrt{21}i}{42}$  | 0                      | 0                          | 0                          | 0                        | 0                         | 0                          | $\frac{\sqrt{14}i}{14}$    | 0                       |
|     |                                    | 0                                    | 0                         | 0                        | 0                         | 0                         | 0                        | 0                      | 0                          | 0                          | 0                        | 0                         | 0                          | 0                          | $\frac{i}{4}$           |
|     |                                    | 0                                    | 0                         | 0                        | 0                         | 0                         | 0                        | $\frac{i}{4}$          | 0                          | 0                          | 0                        | 0                         | 0                          | 0                          | 0                       |
|     |                                    | $-\frac{\sqrt{21}i}{42}$             | 0                         | 0                        | 0                         | 0                         | 0                        | 0                      | $\frac{\sqrt{14}i}{14}$    | 0                          | 0                        | 0                         | 0                          | 0                          | 0                       |
|     |                                    | 0                                    | $-\frac{\sqrt{21}i}{42}$  | 0                        | 0                         | 0                         | 0                        | 0                      | 0                          | $\frac{\sqrt{210}i}{84}$   | 0                        | 0                         | 0                          | 0                          | 0                       |
| 784 | symmetry                           | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$ |                           |                          |                           |                           |                          |                        |                            |                            |                          |                           |                            |                            |                         |

continued ...



Table 9

| No. | multipole                          | matrix                                |                           |                          |                           |                           |                          |                           |                           |                            |                           |                           |                         |                            |                          |
|-----|------------------------------------|---------------------------------------|---------------------------|--------------------------|---------------------------|---------------------------|--------------------------|---------------------------|---------------------------|----------------------------|---------------------------|---------------------------|-------------------------|----------------------------|--------------------------|
|     | $\mathbb{M}_{4,0}^{(1,-1;a)}(T_2)$ | $\frac{\sqrt{3}i}{672}$               | 0                         | $\frac{\sqrt{30}i}{672}$ | 0                         | $-\frac{\sqrt{15}i}{96}$  | 0                        | 0                         | $\frac{3\sqrt{2}i}{112}$  | 0                          | $\frac{\sqrt{10}i}{56}$   | 0                         | $-\frac{\sqrt{6}i}{16}$ | 0                          | 0                        |
|     |                                    | 0                                     | $-\frac{\sqrt{5}i}{224}$  | 0                        | $-\frac{\sqrt{10}i}{224}$ | 0                         | $\frac{i}{32}$           | $\frac{\sqrt{42}i}{48}$   | 0                         | $-\frac{\sqrt{2}i}{28}$    | 0                         | $-\frac{\sqrt{30}i}{336}$ | 0                       | $-\frac{\sqrt{6}i}{24}$    | 0                        |
|     |                                    | $-\frac{i}{32}$                       | 0                         | $\frac{\sqrt{10}i}{224}$ | 0                         | $\frac{\sqrt{5}i}{224}$   | 0                        | 0                         | $-\frac{\sqrt{6}i}{24}$   | 0                          | $-\frac{\sqrt{30}i}{336}$ | 0                         | $-\frac{\sqrt{2}i}{28}$ | 0                          | $\frac{\sqrt{42}i}{48}$  |
|     |                                    | 0                                     | $\frac{\sqrt{15}i}{96}$   | 0                        | $-\frac{\sqrt{30}i}{672}$ | 0                         | $-\frac{\sqrt{3}i}{672}$ | 0                         | 0                         | $-\frac{\sqrt{6}i}{16}$    | 0                         | $\frac{\sqrt{10}i}{56}$   | 0                       | $\frac{3\sqrt{2}i}{112}$   | 0                        |
|     |                                    | 0                                     | $-\frac{\sqrt{3}i}{84}$   | 0                        | $\frac{\sqrt{6}i}{24}$    | 0                         | 0                        | $-\frac{\sqrt{70}i}{224}$ | 0                         | $-\frac{5\sqrt{30}i}{336}$ | 0                         | $\frac{5\sqrt{2}i}{32}$   | 0                       | 0                          | 0                        |
|     |                                    | $\frac{\sqrt{3}i}{84}$                | 0                         | $\frac{\sqrt{30}i}{168}$ | 0                         | 0                         | 0                        | 0                         | $\frac{13\sqrt{2}i}{224}$ | 0                          | $\frac{\sqrt{10}i}{112}$  | 0                         | $\frac{7\sqrt{6}i}{96}$ | 0                          | 0                        |
|     |                                    | 0                                     | $-\frac{\sqrt{30}i}{168}$ | 0                        | 0                         | 0                         | $-\frac{\sqrt{6}i}{24}$  | $\frac{3\sqrt{7}i}{32}$   | 0                         | $-\frac{\sqrt{3}i}{672}$   | 0                         | $\frac{\sqrt{5}i}{32}$    | 0                       | $-\frac{i}{32}$            | 0                        |
|     |                                    | $-\frac{\sqrt{6}i}{24}$               | 0                         | 0                        | 0                         | $-\frac{\sqrt{30}i}{168}$ | 0                        | 0                         | $\frac{i}{32}$            | 0                          | $-\frac{\sqrt{5}i}{32}$   | 0                         | $\frac{\sqrt{3}i}{672}$ | 0                          | $-\frac{3\sqrt{7}i}{32}$ |
|     |                                    | 0                                     | 0                         | 0                        | $\frac{\sqrt{30}i}{168}$  | 0                         | $\frac{\sqrt{3}i}{84}$   | 0                         | 0                         | $-\frac{7\sqrt{6}i}{96}$   | 0                         | $-\frac{\sqrt{10}i}{112}$ | 0                       | $-\frac{13\sqrt{2}i}{224}$ | 0                        |
|     |                                    | 0                                     | 0                         | $\frac{\sqrt{6}i}{24}$   | 0                         | $-\frac{\sqrt{3}i}{84}$   | 0                        | 0                         | 0                         | $-\frac{5\sqrt{2}i}{32}$   | 0                         | $\frac{5\sqrt{30}i}{336}$ | 0                       | $\frac{\sqrt{70}i}{224}$   |                          |
| 785 | symmetry                           | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ |                           |                          |                           |                           |                          |                           |                           |                            |                           |                           |                         |                            |                          |
|     | $\mathbb{M}_{4,1}^{(1,-1;a)}(T_2)$ | $\frac{\sqrt{3}}{672}$                | 0                         | $-\frac{\sqrt{30}}{672}$ | 0                         | $-\frac{\sqrt{15}}{96}$   | 0                        | 0                         | $\frac{3\sqrt{2}}{112}$   | 0                          | $-\frac{\sqrt{10}}{56}$   | 0                         | $-\frac{\sqrt{6}}{16}$  | 0                          | 0                        |
|     |                                    | 0                                     | $-\frac{\sqrt{5}}{224}$   | 0                        | $\frac{\sqrt{10}}{224}$   | 0                         | $\frac{1}{32}$           | $-\frac{\sqrt{42}}{48}$   | 0                         | $-\frac{\sqrt{2}}{28}$     | 0                         | $\frac{\sqrt{30}}{336}$   | 0                       | $-\frac{\sqrt{6}}{24}$     | 0                        |
|     |                                    | $\frac{1}{32}$                        | 0                         | $\frac{\sqrt{10}}{224}$  | 0                         | $-\frac{\sqrt{5}}{224}$   | 0                        | 0                         | $\frac{\sqrt{6}}{24}$     | 0                          | $-\frac{\sqrt{30}}{336}$  | 0                         | $\frac{\sqrt{2}}{28}$   | 0                          | $\frac{\sqrt{42}}{48}$   |
|     |                                    | 0                                     | $-\frac{\sqrt{15}}{96}$   | 0                        | $-\frac{\sqrt{30}}{672}$  | 0                         | $\frac{\sqrt{3}}{672}$   | 0                         | 0                         | $\frac{\sqrt{6}}{16}$      | 0                         | $\frac{\sqrt{10}}{56}$    | 0                       | $-\frac{3\sqrt{2}}{112}$   | 0                        |
|     |                                    | 0                                     | $\frac{\sqrt{3}}{84}$     | 0                        | $\frac{\sqrt{6}}{24}$     | 0                         | 0                        | $-\frac{\sqrt{70}}{224}$  | 0                         | $\frac{5\sqrt{30}}{336}$   | 0                         | $\frac{5\sqrt{2}}{32}$    | 0                       | 0                          | 0                        |
|     |                                    | $\frac{\sqrt{3}}{84}$                 | 0                         | $-\frac{\sqrt{30}}{168}$ | 0                         | 0                         | 0                        | 0                         | $\frac{13\sqrt{2}}{224}$  | 0                          | $-\frac{\sqrt{10}}{112}$  | 0                         | $\frac{7\sqrt{6}}{96}$  | 0                          | 0                        |
|     |                                    | 0                                     | $-\frac{\sqrt{30}}{168}$  | 0                        | 0                         | 0                         | $-\frac{\sqrt{6}}{24}$   | $-\frac{3\sqrt{7}}{32}$   | 0                         | $-\frac{\sqrt{3}}{672}$    | 0                         | $-\frac{\sqrt{5}}{32}$    | 0                       | $-\frac{1}{32}$            | 0                        |
|     |                                    | $\frac{\sqrt{6}}{24}$                 | 0                         | 0                        | 0                         | $\frac{\sqrt{30}}{168}$   | 0                        | 0                         | $-\frac{1}{32}$           | 0                          | $-\frac{\sqrt{5}}{32}$    | 0                         | $-\frac{\sqrt{3}}{672}$ | 0                          | $-\frac{3\sqrt{7}}{32}$  |
|     |                                    | 0                                     | 0                         | 0                        | $\frac{\sqrt{30}}{168}$   | 0                         | $-\frac{\sqrt{3}}{84}$   | 0                         | 0                         | $\frac{7\sqrt{6}}{96}$     | 0                         | $-\frac{\sqrt{10}}{112}$  | 0                       | $\frac{13\sqrt{2}}{224}$   | 0                        |
|     |                                    | 0                                     | 0                         | $-\frac{\sqrt{6}}{24}$   | 0                         | $-\frac{\sqrt{3}}{84}$    | 0                        | 0                         | 0                         | $\frac{5\sqrt{2}}{32}$     | 0                         | $\frac{5\sqrt{30}}{336}$  | 0                       | $-\frac{\sqrt{70}}{224}$   |                          |
| 786 | symmetry                           | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ |                           |                          |                           |                           |                          |                           |                           |                            |                           |                           |                         |                            |                          |

continued ...

Table 9

| No. | multipole                          | matrix  |                         |                           |                           |                          |                        |                            |                            |                            |                           |                           |                            |                            |                          |
|-----|------------------------------------|---|-------------------------|---------------------------|---------------------------|--------------------------|------------------------|----------------------------|----------------------------|----------------------------|---------------------------|---------------------------|----------------------------|----------------------------|--------------------------|
|     | $\mathbb{M}_{4,2}^{(1,-1;a)}(T_2)$ | 0   | 0                       | 0                         | $-\frac{\sqrt{30i}}{168}$ | 0                        | 0                      | $\frac{\sqrt{14i}}{56}$    | 0                          | 0                          | 0                         | $-\frac{3\sqrt{10i}}{56}$ | 0                          | 0                          | 0                        |
|     |                                    | $-\frac{i}{56}$   | 0                       | 0                         | 0                         | $\frac{\sqrt{5i}}{56}$   | 0                      | 0                          | $-\frac{11\sqrt{6i}}{168}$ | 0                          | 0                         | 0                         | $-\frac{\sqrt{2i}}{56}$    | 0                          | 0                        |
|     |                                    | 0   | $\frac{\sqrt{5i}}{56}$  | 0                         | 0                         | 0                        | $-\frac{i}{56}$        | 0                          | 0                          | $\frac{\sqrt{2i}}{56}$     | 0                         | 0                         | 0                          | $\frac{11\sqrt{6i}}{168}$  | 0                        |
|     |                                    | 0   | 0                       | $-\frac{\sqrt{30i}}{168}$ | 0                         | 0                        | 0                      | 0                          | 0                          | $\frac{3\sqrt{10i}}{56}$   | 0                         | 0                         | 0                          | 0                          | $-\frac{\sqrt{14i}}{56}$ |
|     |                                    | 0   | 0                       | $\frac{\sqrt{6i}}{28}$    | 0                         | 0                        | 0                      | 0                          | 0                          | $\frac{5\sqrt{2i}}{28}$    | 0                         | 0                         | 0                          | 0                          | 0                        |
|     |                                    | 0   | 0                       | 0                         | $-\frac{\sqrt{30i}}{84}$  | 0                        | 0                      | $\frac{3\sqrt{14i}}{56}$   | 0                          | 0                          | 0                         | $\frac{\sqrt{10i}}{56}$   | 0                          | 0                          | 0                        |
|     |                                    | $-\frac{\sqrt{6i}}{28}$   | 0                       | 0                         | 0                         | $-\frac{\sqrt{30i}}{84}$ | 0                      | 0                          | $-\frac{9i}{56}$           | 0                          | 0                         | 0                         | $-\frac{17\sqrt{3i}}{168}$ | 0                          | 0                        |
|     |                                    | 0   | $\frac{\sqrt{30i}}{84}$ | 0                         | 0                         | 0                        | $\frac{\sqrt{6i}}{28}$ | 0                          | 0                          | $-\frac{17\sqrt{3i}}{168}$ | 0                         | 0                         | 0                          | $-\frac{9i}{56}$           | 0                        |
|     |                                    | 0   | 0                       | $\frac{\sqrt{30i}}{84}$   | 0                         | 0                        | 0                      | 0                          | 0                          | $\frac{\sqrt{10i}}{56}$    | 0                         | 0                         | 0                          | 0                          | $\frac{3\sqrt{14i}}{56}$ |
|     |                                    | 0   | 0                       | 0                         | $-\frac{\sqrt{6i}}{28}$   | 0                        | 0                      | 0                          | 0                          | 0                          | $\frac{5\sqrt{2i}}{28}$   | 0                         | 0                          | 0                          | 0                        |
| 787 | symmetry                           | $\frac{\sqrt{2}(2x^6-15x^4y^2-15x^4z^2-15x^2y^4+180x^2y^2z^2-15x^2z^4+2y^6-15y^4z^2-15y^2z^4+2z^6)}{8}$ |                         |                           |                           |                          |                        |                            |                            |                            |                           |                           |                            |                            |                          |
|     | $\mathbb{M}_6^{(1,-1;a)}(A_1)$     | 0   | 0                       | 0                         | 0                         | 0                        | 0                      | 0                          | 0                          | 0                          | 0                         | 0                         | 0                          | 0                          | 0                        |
|     |                                    | 0   | 0                       | 0                         | 0                         | 0                        | 0                      | 0                          | 0                          | 0                          | 0                         | 0                         | 0                          | 0                          | 0                        |
|     |                                    | 0   | 0                       | 0                         | 0                         | 0                        | 0                      | 0                          | 0                          | 0                          | 0                         | 0                         | 0                          | 0                          | 0                        |
|     |                                    | 0   | 0                       | 0                         | 0                         | 0                        | 0                      | 0                          | 0                          | 0                          | 0                         | 0                         | 0                          | 0                          | 0                        |
|     |                                    | 0   | 0                       | 0                         | 0                         | 0                        | 0                      | $\frac{\sqrt{33}}{264}$    | 0                          | 0                          | 0                         | $-\frac{7\sqrt{11}}{88}$  | 0                          | 0                          | 0                        |
|     |                                    | 0   | 0                       | 0                         | 0                         | 0                        | 0                      | 0                          | $-\frac{\sqrt{55}}{88}$    | 0                          | 0                         | 0                         | $\frac{7\sqrt{165}}{264}$  | 0                          | 0                        |
|     |                                    | 0   | 0                       | 0                         | 0                         | 0                        | 0                      | 0                          | 0                          | $\frac{5\sqrt{66}}{264}$   | 0                         | 0                         | 0                          | $-\frac{\sqrt{2310}}{264}$ | 0                        |
|     |                                    | 0   | 0                       | 0                         | 0                         | 0                        | 0                      | $\frac{\sqrt{2310}}{264}$  | 0                          | 0                          | $-\frac{5\sqrt{66}}{264}$ | 0                         | 0                          | 0                          | 0                        |
|     |                                    | 0   | 0                       | 0                         | 0                         | 0                        | 0                      | $-\frac{7\sqrt{165}}{264}$ | 0                          | 0                          | 0                         | $\frac{\sqrt{55}}{88}$    | 0                          | 0                          | 0                        |
|     |                                    | 0   | 0                       | 0                         | 0                         | 0                        | 0                      | 0                          | $\frac{7\sqrt{11}}{88}$    | 0                          | 0                         | 0                         | $-\frac{\sqrt{33}}{264}$   | 0                          | 0                        |
| 788 | symmetry                           | $-\frac{\sqrt{2310}(x-y)(x+y)(x-z)(x+z)(y-z)(y+z)}{8}$  |                         |                           |                           |                          |                        |                            |                            |                            |                           |                           |                            |                            |                          |

continued ...

Table 9

| No. | multipole                      | matrix  |
|-----|--------------------------------|---|
|     | $\mathbb{M}_6^{(1,-1;a)}(A_2)$ | $ \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{7}}{24} & 0 & 0 & 0 & 0 & \frac{\sqrt{5}}{8} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{24} & 0 & 0 & 0 & 0 & \frac{\sqrt{35}}{24} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{14}}{24} & 0 & 0 & 0 & 0 & -\frac{\sqrt{42}}{24} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{42}}{24} & 0 & 0 & 0 & 0 & \frac{\sqrt{14}}{24} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{35}}{24} & 0 & 0 & 0 & 0 & -\frac{1}{24} \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{8} & 0 & 0 & 0 & 0 & \frac{\sqrt{7}}{24} & 0 & 0 & 0 \end{bmatrix} $  |
| 789 | symmetry                       | $ -\frac{\sqrt{14}(x^6-15x^4z^2+15x^2z^4+y^6-15y^4z^2+15y^2z^4-2z^6)}{8} $ $ \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{231}}{264} & 0 & 0 & 0 & \frac{\sqrt{77}}{88} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{385}}{88} & 0 & 0 & 0 & -\frac{\sqrt{1155}}{264} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{5\sqrt{462}}{264} & 0 & 0 & 0 & \frac{\sqrt{330}}{264} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{330}}{264} & 0 & 0 & 0 & -\frac{5\sqrt{462}}{264} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{1155}}{264} & 0 & 0 & 0 & \frac{\sqrt{385}}{88} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{77}}{88} & 0 & 0 & 0 & -\frac{\sqrt{231}}{264} & 0 & 0 \end{bmatrix} $ |
| 790 | symmetry                       | $ \frac{\sqrt{42}(x-y)(x+y)(x^4-9x^2y^2-5x^2z^2+y^4-5y^2z^2+5z^4)}{8} $   |

continued ...

Table 9

| No. | multipole                          | matrix   |   |   |   |   |   |                             |                            |                             |                          |                              |                           |                              |                         |
|-----|------------------------------------|--|---|---|---|---|---|-----------------------------|----------------------------|-----------------------------|--------------------------|------------------------------|---------------------------|------------------------------|-------------------------|
|     | $\mathbb{M}_{6,1}^{(1,-1;a)}(E)$   | 0  | 0 | 0 | 0 | 0 | 0 | 0                           | 0                          | 0                           | 0                        | 0                            | 0                         | 0                            | 0                       |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | 0                           | 0                          | 0                           | 0                        | 0                            | 0                         | 0                            | 0                       |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | 0                           | 0                          | 0                           | 0                        | 0                            | 0                         | 0                            | 0                       |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | 0                           | 0                          | 0                           | 0                        | 0                            | 0                         | 0                            | 0                       |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | 0                           | 0                          | $\frac{\sqrt{385}}{264}$    | 0                        | 0                            | 0                         | $\frac{\sqrt{11}}{8}$        |                         |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{55}}{264}$    | 0                          | 0                           | 0                        | $-\frac{5\sqrt{77}}{264}$    | 0                         | 0                            | 0                       |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{770}}{264}$    | 0                          | 0                           | 0                        | $\frac{\sqrt{2310}}{264}$    | 0                         | 0                            | 0                       |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | 0                           | $-\frac{\sqrt{2310}}{264}$ | 0                           | 0                        | 0                            | $-\frac{\sqrt{770}}{264}$ | 0                            | 0                       |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | 0                           | 0                          | 0                           | $\frac{5\sqrt{77}}{264}$ | 0                            | 0                         | 0                            | $\frac{\sqrt{55}}{264}$ |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{11}}{8}$      | 0                          | 0                           | 0                        | $-\frac{\sqrt{385}}{264}$    | 0                         | 0                            | 0                       |
| 791 | symmetry                           | $\frac{3\sqrt{7}yz(y-z)(y+z)(10x^2-y^2-z^2)}{4}$ |   |   |   |   |   |                             |                            |                             |                          |                              |                           |                              |                         |
|     | $\mathbb{M}_{6,0}^{(1,-1;a)}(T_1)$ | 0  | 0 | 0 | 0 | 0 | 0 | 0                           | 0                          | 0                           | 0                        | 0                            | 0                         | 0                            | 0                       |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | 0                           | 0                          | 0                           | 0                        | 0                            | 0                         | 0                            | 0                       |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | 0                           | 0                          | 0                           | 0                        | 0                            | 0                         | 0                            | 0                       |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | 0                           | 0                          | 0                           | 0                        | 0                            | 0                         | 0                            | 0                       |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{66i}}{1056}$  | 0                          | $-\frac{\sqrt{154i}}{352}$  | 0                        | $\frac{\sqrt{2310i}}{352}$   | 0                         | $\frac{\sqrt{462i}}{96}$     | 0                       |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2310i}}{1056}$ | 0                          | $\frac{5\sqrt{462i}}{1056}$ | 0                        | $-\frac{3\sqrt{770i}}{352}$  | 0                         | $-\frac{\sqrt{330i}}{96}$    | 0                       |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{165i}}{176}$   | 0                          | $-\frac{\sqrt{385i}}{176}$  | 0                        | $-\frac{5\sqrt{231i}}{528}$  | 0                         | $\frac{\sqrt{1155i}}{176}$   | 0                       |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155i}}{176}$ | 0                          | $\frac{5\sqrt{231i}}{528}$  | 0                        | $\frac{\sqrt{385i}}{176}$    | 0                         | $-\frac{\sqrt{165i}}{176}$   | 0                       |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{330i}}{96}$    | 0                          | $\frac{3\sqrt{770i}}{352}$  | 0                        | $-\frac{5\sqrt{462i}}{1056}$ | 0                         | $-\frac{\sqrt{2310i}}{1056}$ | 0                       |
|     |                                    | 0  | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{462i}}{96}$   | 0                          | $-\frac{\sqrt{2310i}}{352}$ | 0                        | $\frac{\sqrt{154i}}{352}$    | 0                         | $\frac{\sqrt{66i}}{1056}$    | 0                       |
| 792 | symmetry                           | $\frac{3\sqrt{7}xz(x-z)(x+z)(x^2-10y^2+z^2)}{4}$ |   |   |   |   |   |                             |                            |                             |                          |                              |                           |                              |                         |

continued ...

Table 9

| No. | multipole                          | matrix  |   |   |   |   |   |                             |                            |                            |   |                            |                            |                             |   |
|-----|------------------------------------|---|---|---|---|---|---|-----------------------------|----------------------------|----------------------------|---|----------------------------|----------------------------|-----------------------------|---|
|     | $\mathbb{M}_{6,1}^{(1,-1;a)}(T_1)$ | 0   | 0 | 0 | 0 | 0 | 0 | 0                           | 0                          | 0                          | 0 | 0                          | 0                          | 0                           | 0 |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | 0                           | 0                          | 0                          | 0 | 0                          | 0                          | 0                           | 0 |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | 0                           | 0                          | 0                          | 0 | 0                          | 0                          | 0                           | 0 |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | 0                           | 0                          | 0                          | 0 | 0                          | 0                          | 0                           | 0 |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{154}}{352}$   | 0                          | $-\frac{\sqrt{2310}}{352}$ | 0 | $\frac{\sqrt{462}}{96}$    | 0                          |                             |   |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{2310}}{1056}$ | 0                          | $\frac{5\sqrt{462}}{1056}$ | 0 | $\frac{3\sqrt{770}}{352}$  | 0                          | $-\frac{\sqrt{330}}{96}$    |   |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{165}}{176}$    | 0                          | $\frac{\sqrt{385}}{176}$   | 0 | $-\frac{5\sqrt{231}}{528}$ | 0                          | $-\frac{\sqrt{1155}}{176}$  | 0 |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1155}}{176}$  | 0                          | $-\frac{5\sqrt{231}}{528}$ | 0 | $\frac{\sqrt{385}}{176}$   | 0                          | $\frac{\sqrt{165}}{176}$    |   |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{330}}{96}$    | 0                          | $\frac{3\sqrt{770}}{352}$  | 0 | $\frac{5\sqrt{462}}{1056}$ | 0                          | $-\frac{\sqrt{2310}}{1056}$ | 0 |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{462}}{96}$     | 0                          | $-\frac{\sqrt{2310}}{352}$ | 0 | $-\frac{\sqrt{154}}{352}$  | 0                          | $\frac{\sqrt{66}}{1056}$    |   |
| 793 | symmetry                           | $-\frac{3\sqrt{7}xy(x-y)(x+y)(x^2+y^2-10z^2)}{4}$ |   |   |   |   |   |                             |                            |                            |   |                            |                            |                             |   |
|     | $\mathbb{M}_{6,2}^{(1,-1;a)}(T_1)$ | 0   | 0 | 0 | 0 | 0 | 0 | 0                           | 0                          | 0                          | 0 | 0                          | 0                          | 0                           | 0 |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | 0                           | 0                          | 0                          | 0 | 0                          | 0                          | 0                           | 0 |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | 0                           | 0                          | 0                          | 0 | 0                          | 0                          | 0                           | 0 |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | 0                           | 0                          | 0                          | 0 | 0                          | 0                          | 0                           | 0 |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | 0                           | 0                          | 0                          | 0 | $-\frac{\sqrt{154}i}{44}$  | 0                          | 0                           | 0 |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | 0                           | 0                          | 0                          | 0 | 0                          | $\frac{\sqrt{2310}i}{132}$ | 0                           | 0 |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | 0                           | 0                          | 0                          | 0 | 0                          | 0                          | $-\frac{\sqrt{165}i}{66}$   | 0 |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{165}i}{66}$   | 0                          | 0                          | 0 | 0                          | 0                          | 0                           | 0 |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | 0                           | $\frac{\sqrt{2310}i}{132}$ | 0                          | 0 | 0                          | 0                          | 0                           | 0 |
|     |                                    | 0   | 0 | 0 | 0 | 0 | 0 | 0                           | 0                          | $-\frac{\sqrt{154}i}{44}$  | 0 | 0                          | 0                          | 0                           | 0 |
| 794 | symmetry                           | $\frac{\sqrt{462}yz(y^2-3z^2)(3y^2-z^2)}{16}$     |   |   |   |   |   |                             |                            |                            |   |                            |                            |                             |   |

continued ...

Table 9

| No. | multipole                             | matrix  |   |   |   |   |   |                          |                         |                           |                          |                           |                          |                          |                         |
|-----|---------------------------------------|---|---|---|---|---|---|--------------------------|-------------------------|---------------------------|--------------------------|---------------------------|--------------------------|--------------------------|-------------------------|
|     | $\mathbb{M}_{6,0}^{(1,-1;a)}(T_2, 1)$ | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | 0                       | 0                         | 0                        | 0                         | 0                        | 0                        | 0                       |
|     |                                       | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | 0                       | 0                         | 0                        | 0                         | 0                        | 0                        | 0                       |
|     |                                       | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | 0                       | 0                         | 0                        | 0                         | 0                        | 0                        | 0                       |
|     |                                       | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | 0                       | 0                         | 0                        | 0                         | 0                        | 0                        | 0                       |
|     |                                       | 0   | 0 | 0 | 0 | 0 | 0 | $-\frac{i}{64}$          | 0                       | $-\frac{\sqrt{21}i}{64}$  | 0                        | $-\frac{\sqrt{35}i}{64}$  | 0                        | $-\frac{\sqrt{7}i}{64}$  | 0                       |
|     |                                       | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | $\frac{\sqrt{35}i}{64}$ | 0                         | $\frac{5\sqrt{7}i}{64}$  | 0                         | $\frac{\sqrt{105}i}{64}$ | 0                        | $\frac{\sqrt{5}i}{64}$  |
|     |                                       | 0   | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{10}i}{64}$ | 0                       | $-\frac{\sqrt{210}i}{64}$ | 0                        | $-\frac{5\sqrt{14}i}{64}$ | 0                        | $-\frac{\sqrt{70}i}{64}$ | 0                       |
|     |                                       | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | $\frac{\sqrt{70}i}{64}$ | 0                         | $\frac{5\sqrt{14}i}{64}$ | 0                         | $\frac{\sqrt{210}i}{64}$ | 0                        | $\frac{\sqrt{10}i}{64}$ |
|     |                                       | 0   | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{5}i}{64}$  | 0                       | $-\frac{\sqrt{105}i}{64}$ | 0                        | $-\frac{5\sqrt{7}i}{64}$  | 0                        | $-\frac{\sqrt{35}i}{64}$ | 0                       |
|     |                                       | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | $\frac{\sqrt{7}i}{64}$  | 0                         | $\frac{\sqrt{35}i}{64}$  | 0                         | $\frac{\sqrt{21}i}{64}$  | 0                        | $\frac{i}{64}$          |
| 795 | symmetry                              | $\frac{\sqrt{462}xz(x^2-3z^2)(3x^2-z^2)}{16}$ |   |   |   |   |   |                          |                         |                           |                          |                           |                          |                          |                         |
|     | $\mathbb{M}_{6,1}^{(1,-1;a)}(T_2, 1)$ | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | 0                       | 0                         | 0                        | 0                         | 0                        | 0                        | 0                       |
|     |                                       | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | 0                       | 0                         | 0                        | 0                         | 0                        | 0                        | 0                       |
|     |                                       | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | 0                       | 0                         | 0                        | 0                         | 0                        | 0                        | 0                       |
|     |                                       | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | 0                       | 0                         | 0                        | 0                         | 0                        | 0                        | 0                       |
|     |                                       | 0   | 0 | 0 | 0 | 0 | 0 | $-\frac{1}{64}$          | 0                       | $\frac{\sqrt{21}}{64}$    | 0                        | $-\frac{\sqrt{35}}{64}$   | 0                        | $\frac{\sqrt{7}}{64}$    | 0                       |
|     |                                       | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | $\frac{\sqrt{35}}{64}$  | 0                         | $-\frac{5\sqrt{7}}{64}$  | 0                         | $\frac{\sqrt{105}}{64}$  | 0                        | $-\frac{\sqrt{5}}{64}$  |
|     |                                       | 0   | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{10}}{64}$   | 0                       | $-\frac{\sqrt{210}}{64}$  | 0                        | $\frac{5\sqrt{14}}{64}$   | 0                        | $-\frac{\sqrt{70}}{64}$  | 0                       |
|     |                                       | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | $-\frac{\sqrt{70}}{64}$ | 0                         | $\frac{5\sqrt{14}}{64}$  | 0                         | $-\frac{\sqrt{210}}{64}$ | 0                        | $\frac{\sqrt{10}}{64}$  |
|     |                                       | 0   | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{5}}{64}$   | 0                       | $\frac{\sqrt{105}}{64}$   | 0                        | $-\frac{5\sqrt{7}}{64}$   | 0                        | $\frac{\sqrt{35}}{64}$   | 0                       |
|     |                                       | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | $\frac{\sqrt{7}}{64}$   | 0                         | $-\frac{\sqrt{35}}{64}$  | 0                         | $\frac{\sqrt{21}}{64}$   | 0                        | $-\frac{1}{64}$         |
| 796 | symmetry                              | $\frac{\sqrt{462}xy(x^2-3y^2)(3x^2-y^2)}{16}$ |   |   |   |   |   |                          |                         |                           |                          |                           |                          |                          |                         |

*continued ...*

Table 9

| No. | multipole                            | matrix   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----|--------------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
|     | $\mathbb{M}_{6,2}^{(1,-1;a)}(T_2,1)$ | <div><div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div></div><div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div></div><div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div></div><div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div></div><div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div><math>-\frac{i}{2}</math></div></div><div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div></div><div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div></div><div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div></div><div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div></div><div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div><math>-\frac{i}{2}</math></div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div></div></div>  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 797 | symmetry                             | <div><div><math display="block">\frac{\sqrt{210}yz(16x^4-16x^2y^2-16x^2z^2+y^4+2y^2z^2+z^4)}{16}</math></div><div><div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div></div><div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div></div><div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div></div><div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div></div><div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div><math>-\frac{\sqrt{55}i}{2112}</math></div><div>0</div><div><math>-\frac{\sqrt{1155}i}{2112}</math></div><div>0</div><div><math>\frac{9\sqrt{77}i}{704}</math></div><div>0</div><div><math>-\frac{\sqrt{385}i}{64}</math></div><div>0</div></div><div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div><math>\frac{5\sqrt{77}i}{2112}</math></div><div>0</div><div><math>\frac{5\sqrt{385}i}{2112}</math></div><div>0</div><div><math>-\frac{9\sqrt{231}i}{704}</math></div><div>0</div><div><math>\frac{5\sqrt{11}i}{64}</math></div><div>0</div></div><div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div><math>\frac{9\sqrt{22}i}{704}</math></div><div>0</div><div><math>-\frac{5\sqrt{462}i}{2112}</math></div><div>0</div><div><math>-\frac{5\sqrt{770}i}{2112}</math></div><div>0</div><div><math>\frac{9\sqrt{154}i}{704}</math></div><div>0</div></div><div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div><math>-\frac{9\sqrt{154}i}{704}</math></div><div>0</div><div><math>\frac{5\sqrt{770}i}{2112}</math></div><div>0</div><div><math>\frac{5\sqrt{462}i}{2112}</math></div><div>0</div><div><math>-\frac{9\sqrt{22}i}{704}</math></div><div>0</div></div><div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div><math>-\frac{5\sqrt{11}i}{64}</math></div><div>0</div><div><math>\frac{9\sqrt{231}i}{704}</math></div><div>0</div><div><math>-\frac{5\sqrt{385}i}{2112}</math></div><div>0</div><div><math>-\frac{5\sqrt{77}i}{2112}</math></div><div>0</div></div><div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div><div><math>\frac{\sqrt{385}i}{64}</math></div><div>0</div><div><math>-\frac{9\sqrt{77}i}{704}</math></div><div>0</div><div><math>\frac{\sqrt{1155}i}{2112}</math></div><div>0</div><div><math>\frac{\sqrt{55}i}{2112}</math></div><div>0</div></div></div></div> |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 798 | symmetry                             | <div><div><math display="block">\frac{\sqrt{210}xz(x^4-16x^2y^2+2x^2z^2+16y^4-16y^2z^2+z^4)}{16}</math></div></div>  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

continued ...

Table 9

| No. | multipole                             | matrix   |   |   |   |   |   |                           |                           |                             |   |                             |                          |                           |   |
|-----|---------------------------------------|--|---|---|---|---|---|---------------------------|---------------------------|-----------------------------|---|-----------------------------|--------------------------|---------------------------|---|
|     | $\mathbb{M}_{6,1}^{(1,-1;a)}(T_2, 2)$ | 0  | 0 | 0 | 0 | 0 | 0 | 0                         | 0                         | 0                           | 0 | 0                           | 0                        | 0                         | 0 |
|     |                                       | 0  | 0 | 0 | 0 | 0 | 0 | 0                         | 0                         | 0                           | 0 | 0                           | 0                        | 0                         | 0 |
|     |                                       | 0  | 0 | 0 | 0 | 0 | 0 | 0                         | 0                         | 0                           | 0 | 0                           | 0                        | 0                         | 0 |
|     |                                       | 0  | 0 | 0 | 0 | 0 | 0 | 0                         | 0                         | 0                           | 0 | 0                           | 0                        | 0                         | 0 |
|     |                                       | 0  | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{55}}{2112}$ | 0                         | $\frac{\sqrt{1155}}{2112}$  | 0 | $\frac{9\sqrt{77}}{704}$    | 0                        | $\frac{\sqrt{385}}{64}$   | 0 |
|     |                                       | 0  | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{77}}{2112}$ | 0                         | $-\frac{5\sqrt{385}}{2112}$ | 0 | $-\frac{9\sqrt{231}}{704}$  | 0                        | $-\frac{5\sqrt{11}}{64}$  | 0 |
|     |                                       | 0  | 0 | 0 | 0 | 0 | 0 | $-\frac{9\sqrt{22}}{704}$ | 0                         | $-\frac{5\sqrt{462}}{2112}$ | 0 | $\frac{5\sqrt{770}}{2112}$  | 0                        | $\frac{9\sqrt{154}}{704}$ | 0 |
|     |                                       | 0  | 0 | 0 | 0 | 0 | 0 | $\frac{9\sqrt{154}}{704}$ | 0                         | $\frac{5\sqrt{770}}{2112}$  | 0 | $-\frac{5\sqrt{462}}{2112}$ | 0                        | $-\frac{9\sqrt{22}}{704}$ | 0 |
|     |                                       | 0  | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{11}}{64}$  | 0                         | $-\frac{9\sqrt{231}}{704}$  | 0 | $-\frac{5\sqrt{385}}{2112}$ | 0                        | $\frac{5\sqrt{77}}{2112}$ | 0 |
|     |                                       | 0  | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{385}}{64}$   | 0                         | $\frac{9\sqrt{77}}{704}$    | 0 | $\frac{\sqrt{1155}}{2112}$  | 0                        | $-\frac{\sqrt{55}}{2112}$ | 0 |
| 799 | symmetry                              | $\frac{\sqrt{210}xy(x^4+2x^2y^2-16x^2z^2+y^4-16y^2z^2+16z^4)}{16}$ |   |   |   |   |   |                           |                           |                             |   |                             |                          |                           |   |
|     | $\mathbb{M}_{6,2}^{(1,-1;a)}(T_2, 2)$ | 0  | 0 | 0 | 0 | 0 | 0 | 0                         | 0                         | 0                           | 0 | 0                           | 0                        | 0                         | 0 |
|     |                                       | 0  | 0 | 0 | 0 | 0 | 0 | 0                         | 0                         | 0                           | 0 | 0                           | 0                        | 0                         | 0 |
|     |                                       | 0  | 0 | 0 | 0 | 0 | 0 | 0                         | 0                         | 0                           | 0 | 0                           | 0                        | 0                         | 0 |
|     |                                       | 0  | 0 | 0 | 0 | 0 | 0 | 0                         | 0                         | 0                           | 0 | 0                           | 0                        | 0                         | 0 |
|     |                                       | 0  | 0 | 0 | 0 | 0 | 0 | 0                         | 0                         | $-\frac{\sqrt{77}i}{66}$    | 0 | 0                           | 0                        | 0                         | 0 |
|     |                                       | 0  | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{11}i}{66}$  | 0                         | 0                           | 0 | $\frac{\sqrt{385}i}{66}$    | 0                        | 0                         | 0 |
|     |                                       | 0  | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{154}i}{66}$  | 0                         | 0                           | 0 | $-\frac{\sqrt{462}i}{66}$   | 0                        | 0                         | 0 |
|     |                                       | 0  | 0 | 0 | 0 | 0 | 0 | 0                         | $-\frac{\sqrt{462}i}{66}$ | 0                           | 0 | 0                           | $\frac{\sqrt{154}i}{66}$ | 0                         | 0 |
|     |                                       | 0  | 0 | 0 | 0 | 0 | 0 | 0                         | 0                         | $\frac{\sqrt{385}i}{66}$    | 0 | 0                           | 0                        | $-\frac{\sqrt{11}i}{66}$  | 0 |
|     |                                       | 0  | 0 | 0 | 0 | 0 | 0 | 0                         | 0                         | $-\frac{\sqrt{77}i}{66}$    | 0 | 0                           | 0                        | 0                         | 0 |
| 800 | symmetry                              | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$                             |   |   |   |   |   |                           |                           |                             |   |                             |                          |                           |   |

continued ...



Table 9

| No. | multipole                       | matrix                         |                          |                          |                          |                           |                        |                         |                        |                       |                          |                         |                        |                         |                        |
|-----|---------------------------------|--------------------------------|--------------------------|--------------------------|--------------------------|---------------------------|------------------------|-------------------------|------------------------|-----------------------|--------------------------|-------------------------|------------------------|-------------------------|------------------------|
|     | $\mathbb{M}_{2,0}^{(1,0;a)}(E)$ | 0                              | $-\frac{\sqrt{15}}{35}$  | 0                        | 0                        | 0                         | 0                      | 0                       | 0                      | $\frac{\sqrt{6}}{14}$ | 0                        | 0                       | 0                      | 0                       | 0                      |
|     |                                 | 0                              | 0                        | $-\frac{\sqrt{10}}{70}$  | 0                        | 0                         | 0                      | 0                       | 0                      | 0                     | $\frac{3\sqrt{30}}{70}$  | 0                       | 0                      | 0                       | 0                      |
|     |                                 | 0                              | 0                        | 0                        | $\frac{\sqrt{10}}{70}$   | 0                         | 0                      | 0                       | 0                      | 0                     | 0                        | $\frac{3\sqrt{30}}{70}$ | 0                      | 0                       | 0                      |
|     |                                 | 0                              | 0                        | 0                        | 0                        | $\frac{\sqrt{15}}{35}$    | 0                      | 0                       | 0                      | 0                     | 0                        | 0                       | $\frac{\sqrt{6}}{14}$  | 0                       | 0                      |
|     |                                 | $\frac{\sqrt{15}}{14}$         | 0                        | 0                        | 0                        | 0                         | 0                      | 0                       | $\frac{\sqrt{10}}{28}$ | 0                     | 0                        | 0                       | 0                      | 0                       | 0                      |
|     |                                 | 0                              | $-\frac{\sqrt{15}}{70}$  | 0                        | 0                        | 0                         | 0                      | 0                       | 0                      | $\frac{\sqrt{6}}{28}$ | 0                        | 0                       | 0                      | 0                       | 0                      |
|     |                                 | 0                              | 0                        | $-\frac{2\sqrt{15}}{35}$ | 0                        | 0                         | 0                      | 0                       | 0                      | 0                     | $\frac{\sqrt{5}}{70}$    | 0                       | 0                      | 0                       | 0                      |
|     |                                 | 0                              | 0                        | 0                        | $-\frac{2\sqrt{15}}{35}$ | 0                         | 0                      | 0                       | 0                      | 0                     | 0                        | $-\frac{\sqrt{5}}{70}$  | 0                      | 0                       | 0                      |
|     |                                 | 0                              | 0                        | 0                        | 0                        | $-\frac{\sqrt{15}}{70}$   | 0                      | 0                       | 0                      | 0                     | 0                        | 0                       | $-\frac{\sqrt{6}}{28}$ | 0                       | 0                      |
|     |                                 | 0                              | 0                        | 0                        | 0                        | 0                         | $\frac{\sqrt{15}}{14}$ | 0                       | 0                      | 0                     | 0                        | 0                       | 0                      | $-\frac{\sqrt{10}}{28}$ | 0                      |
| 801 | symmetry                        | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ |                          |                          |                          |                           |                        |                         |                        |                       |                          |                         |                        |                         |                        |
|     | $\mathbb{M}_{2,1}^{(1,0;a)}(E)$ | 0                              | 0                        | 0                        | $-\frac{\sqrt{10}}{70}$  | 0                         | 0                      | $\frac{\sqrt{42}}{28}$  | 0                      | 0                     | 0                        | $\frac{\sqrt{30}}{140}$ | 0                      | 0                       | 0                      |
|     |                                 | $\frac{\sqrt{3}}{21}$          | 0                        | 0                        | 0                        | $-\frac{2\sqrt{15}}{105}$ | 0                      | 0                       | $\frac{3\sqrt{2}}{28}$ | 0                     | 0                        | 0                       | $\frac{\sqrt{6}}{28}$  | 0                       | 0                      |
|     |                                 | 0                              | $\frac{2\sqrt{15}}{105}$ | 0                        | 0                        | 0                         | $-\frac{\sqrt{3}}{21}$ | 0                       | 0                      | $\frac{\sqrt{6}}{28}$ | 0                        | 0                       | 0                      | $\frac{3\sqrt{2}}{28}$  | 0                      |
|     |                                 | 0                              | 0                        | $\frac{\sqrt{10}}{70}$   | 0                        | 0                         | 0                      | 0                       | 0                      | 0                     | $\frac{\sqrt{30}}{140}$  | 0                       | 0                      | 0                       | $\frac{\sqrt{42}}{28}$ |
|     |                                 | 0                              | 0                        | $\frac{3\sqrt{2}}{28}$   | 0                        | 0                         | 0                      | 0                       | 0                      | 0                     | $\frac{\sqrt{6}}{84}$    | 0                       | 0                      | 0                       | 0                      |
|     |                                 | 0                              | 0                        | 0                        | $\frac{9\sqrt{10}}{140}$ | 0                         | 0                      | $-\frac{\sqrt{42}}{84}$ | 0                      | 0                     | 0                        | $\frac{\sqrt{30}}{105}$ | 0                      | 0                       | 0                      |
|     |                                 | $\frac{3\sqrt{2}}{28}$         | 0                        | 0                        | 0                        | $\frac{9\sqrt{10}}{140}$  | 0                      | 0                       | $-\frac{\sqrt{3}}{21}$ | 0                     | 0                        | 0                       | $\frac{1}{14}$         | 0                       | 0                      |
|     |                                 | 0                              | $\frac{9\sqrt{10}}{140}$ | 0                        | 0                        | 0                         | $\frac{3\sqrt{2}}{28}$ | 0                       | 0                      | $-\frac{1}{14}$       | 0                        | 0                       | 0                      | $\frac{\sqrt{3}}{21}$   | 0                      |
|     |                                 | 0                              | 0                        | $\frac{9\sqrt{10}}{140}$ | 0                        | 0                         | 0                      | 0                       | 0                      | 0                     | $-\frac{\sqrt{30}}{105}$ | 0                       | 0                      | 0                       | $\frac{\sqrt{42}}{84}$ |
|     |                                 | 0                              | 0                        | 0                        | $\frac{3\sqrt{2}}{28}$   | 0                         | 0                      | 0                       | 0                      | 0                     | 0                        | $-\frac{\sqrt{6}}{84}$  | 0                      | 0                       | 0                      |
| 802 | symmetry                        | $\sqrt{3}yz$                   |                          |                          |                          |                           |                        |                         |                        |                       |                          |                         |                        |                         |                        |

*continued ...*

Table 9

| No. | multipole                         | matrix          |                           |                           |                            |                          |                 |                            |                          |                          |                             |                            |                         |                         |                           |
|-----|-----------------------------------|-----------------|---------------------------|---------------------------|----------------------------|--------------------------|-----------------|----------------------------|--------------------------|--------------------------|-----------------------------|----------------------------|-------------------------|-------------------------|---------------------------|
|     | $\mathbb{M}_{2,0}^{(1,0;a)}(T_2)$ | $\frac{i}{14}$  | 0                         | $\frac{3\sqrt{10}i}{140}$ | 0                          | 0                        | 0               | 0                          | $-\frac{\sqrt{6}i}{14}$  | 0                        | $-\frac{\sqrt{30}i}{70}$    | 0                          | 0                       | 0                       | 0                         |
|     |                                   | 0               | $-\frac{\sqrt{15}i}{210}$ | 0                         | $\frac{\sqrt{30}i}{84}$    | 0                        | 0               | 0                          | 0                        | $-\frac{\sqrt{6}i}{14}$  | 0                           | $-\frac{3\sqrt{10}i}{70}$  | 0                       | 0                       | 0                         |
|     |                                   | 0               | 0                         | $-\frac{\sqrt{30}i}{84}$  | 0                          | $\frac{\sqrt{15}i}{210}$ | 0               | 0                          | 0                        | 0                        | $-\frac{3\sqrt{10}i}{70}$   | 0                          | $-\frac{\sqrt{6}i}{14}$ | 0                       | 0                         |
|     |                                   | 0               | 0                         | 0                         | $-\frac{3\sqrt{10}i}{140}$ | 0                        | $-\frac{i}{14}$ | 0                          | 0                        | 0                        | 0                           | $-\frac{\sqrt{30}i}{70}$   | 0                       | $-\frac{\sqrt{6}i}{14}$ | 0                         |
|     |                                   | 0               | $-\frac{3i}{14}$          | 0                         | 0                          | 0                        | 0               | $-\frac{\sqrt{210}i}{168}$ | 0                        | $-\frac{\sqrt{10}i}{56}$ | 0                           | 0                          | 0                       | 0                       | 0                         |
|     |                                   | $\frac{3i}{14}$ | 0                         | $-\frac{3\sqrt{10}i}{70}$ | 0                          | 0                        | 0               | 0                          | $-\frac{\sqrt{6}i}{168}$ | 0                        | $-\frac{11\sqrt{30}i}{840}$ | 0                          | 0                       | 0                       | 0                         |
|     |                                   | 0               | $\frac{3\sqrt{10}i}{70}$  | 0                         | 0                          | 0                        | 0               | 0                          | 0                        | $\frac{i}{28}$           | 0                           | $-\frac{\sqrt{15}i}{60}$   | 0                       | 0                       | 0                         |
|     |                                   | 0               | 0                         | 0                         | 0                          | $\frac{3\sqrt{10}i}{70}$ | 0               | 0                          | 0                        | 0                        | $\frac{\sqrt{15}i}{60}$     | 0                          | $-\frac{i}{28}$         | 0                       | 0                         |
|     |                                   | 0               | 0                         | 0                         | $-\frac{3\sqrt{10}i}{70}$  | 0                        | $\frac{3i}{14}$ | 0                          | 0                        | 0                        | 0                           | $\frac{11\sqrt{30}i}{840}$ | 0                       | $\frac{\sqrt{6}i}{168}$ | 0                         |
|     |                                   | 0               | 0                         | 0                         | 0                          | $-\frac{3i}{14}$         | 0               | 0                          | 0                        | 0                        | 0                           | 0                          | $\frac{\sqrt{10}i}{56}$ | 0                       | $\frac{\sqrt{210}i}{168}$ |
| 803 | symmetry                          | $\sqrt{3}xz$    |                           |                           |                            |                          |                 |                            |                          |                          |                             |                            |                         |                         |                           |
|     | $\mathbb{M}_{2,1}^{(1,0;a)}(T_2)$ | $\frac{1}{14}$  | 0                         | $-\frac{3\sqrt{10}}{140}$ | 0                          | 0                        | 0               | 0                          | $-\frac{\sqrt{6}}{14}$   | 0                        | $\frac{\sqrt{30}}{70}$      | 0                          | 0                       | 0                       | 0                         |
|     |                                   | 0               | $-\frac{\sqrt{15}}{210}$  | 0                         | $-\frac{\sqrt{30}}{84}$    | 0                        | 0               | 0                          | 0                        | $-\frac{\sqrt{6}}{14}$   | 0                           | $\frac{3\sqrt{10}}{70}$    | 0                       | 0                       | 0                         |
|     |                                   | 0               | 0                         | $-\frac{\sqrt{30}}{84}$   | 0                          | $-\frac{\sqrt{15}}{210}$ | 0               | 0                          | 0                        | 0                        | $-\frac{3\sqrt{10}}{70}$    | 0                          | $\frac{\sqrt{6}}{14}$   | 0                       | 0                         |
|     |                                   | 0               | 0                         | 0                         | $-\frac{3\sqrt{10}}{140}$  | 0                        | $\frac{1}{14}$  | 0                          | 0                        | 0                        | 0                           | $-\frac{\sqrt{30}}{70}$    | 0                       | $\frac{\sqrt{6}}{14}$   | 0                         |
|     |                                   | 0               | $\frac{3}{14}$            | 0                         | 0                          | 0                        | 0               | $-\frac{\sqrt{210}}{168}$  | 0                        | $\frac{\sqrt{10}}{56}$   | 0                           | 0                          | 0                       | 0                       | 0                         |
|     |                                   | $\frac{3}{14}$  | 0                         | $\frac{3\sqrt{10}}{70}$   | 0                          | 0                        | 0               | 0                          | $-\frac{\sqrt{6}}{168}$  | 0                        | $\frac{11\sqrt{30}}{840}$   | 0                          | 0                       | 0                       | 0                         |
|     |                                   | 0               | $\frac{3\sqrt{10}}{70}$   | 0                         | 0                          | 0                        | 0               | 0                          | 0                        | $\frac{1}{28}$           | 0                           | $\frac{\sqrt{15}}{60}$     | 0                       | 0                       | 0                         |
|     |                                   | 0               | 0                         | 0                         | 0                          | $-\frac{3\sqrt{10}}{70}$ | 0               | 0                          | 0                        | 0                        | $\frac{\sqrt{15}}{60}$      | 0                          | $\frac{1}{28}$          | 0                       | 0                         |
|     |                                   | 0               | 0                         | 0                         | $-\frac{3\sqrt{10}}{70}$   | 0                        | $-\frac{3}{14}$ | 0                          | 0                        | 0                        | 0                           | $\frac{11\sqrt{30}}{840}$  | 0                       | $-\frac{\sqrt{6}}{168}$ | 0                         |
|     |                                   | 0               | 0                         | 0                         | 0                          | $-\frac{3}{14}$          | 0               | 0                          | 0                        | 0                        | 0                           | 0                          | $\frac{\sqrt{10}}{56}$  | 0                       | $-\frac{\sqrt{210}}{168}$ |
| 804 | symmetry                          | $\sqrt{3}xy$    |                           |                           |                            |                          |                 |                            |                          |                          |                             |                            |                         |                         |                           |

*continued ...*

Table 9

| No. | multipole                         | matrix   |                           |                           |                            |                            |                           |                          |                           |                           |                           |                           |                           |                           |                          |
|-----|-----------------------------------|--|---------------------------|---------------------------|----------------------------|----------------------------|---------------------------|--------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|--------------------------|
|     | $\mathbb{M}_{2,2}^{(1,0;a)}(T_2)$ | 0  | 0                         | 0                         | $\frac{\sqrt{10}i}{70}$    | 0                          | 0                         | $\frac{\sqrt{42}i}{28}$  | 0                         | 0                         | 0                         | $-\frac{\sqrt{30}i}{140}$ | 0                         | 0                         | 0                        |
|     |                                   | $\frac{\sqrt{3}i}{21}$   | 0                         | 0                         | 0                          | $\frac{2\sqrt{15}i}{105}$  | 0                         | 0                        | $\frac{3\sqrt{2}i}{28}$   | 0                         | 0                         | 0                         | $-\frac{\sqrt{6}i}{28}$   | 0                         | 0                        |
|     |                                   | 0  | $\frac{2\sqrt{15}i}{105}$ | 0                         | 0                          | 0                          | $\frac{\sqrt{3}i}{21}$    | 0                        | 0                         | $\frac{\sqrt{6}i}{28}$    | 0                         | 0                         | 0                         | $-\frac{3\sqrt{2}i}{28}$  | 0                        |
|     |                                   | 0  | 0                         | $\frac{\sqrt{10}i}{70}$   | 0                          | 0                          | 0                         | 0                        | 0                         | 0                         | $\frac{\sqrt{30}i}{140}$  | 0                         | 0                         | 0                         | $-\frac{\sqrt{42}i}{28}$ |
|     |                                   | 0  | 0                         | $-\frac{3\sqrt{2}i}{28}$  | 0                          | 0                          | 0                         | 0                        | 0                         | 0                         | $-\frac{\sqrt{6}i}{84}$   | 0                         | 0                         | 0                         | 0                        |
|     |                                   | 0  | 0                         | 0                         | $-\frac{9\sqrt{10}i}{140}$ | 0                          | 0                         | $-\frac{\sqrt{42}i}{84}$ | 0                         | 0                         | 0                         | $-\frac{\sqrt{30}i}{105}$ | 0                         | 0                         | 0                        |
|     |                                   | $\frac{3\sqrt{2}i}{28}$  | 0                         | 0                         | 0                          | $-\frac{9\sqrt{10}i}{140}$ | 0                         | 0                        | $-\frac{\sqrt{3}i}{21}$   | 0                         | 0                         | 0                         | $-\frac{i}{14}$           | 0                         | 0                        |
|     |                                   | 0  | $\frac{9\sqrt{10}i}{140}$ | 0                         | 0                          | 0                          | $-\frac{3\sqrt{2}i}{28}$  | 0                        | 0                         | $-\frac{i}{14}$           | 0                         | 0                         | 0                         | $-\frac{\sqrt{3}i}{21}$   | 0                        |
|     |                                   | 0  | 0                         | $\frac{9\sqrt{10}i}{140}$ | 0                          | 0                          | 0                         | 0                        | 0                         | 0                         | $-\frac{\sqrt{30}i}{105}$ | 0                         | 0                         | 0                         | $-\frac{\sqrt{42}i}{84}$ |
|     |                                   | 0  | 0                         | 0                         | $\frac{3\sqrt{2}i}{28}$    | 0                          | 0                         | 0                        | 0                         | 0                         | 0                         | $-\frac{\sqrt{6}i}{84}$   | 0                         | 0                         | 0                        |
| 805 | symmetry                          | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$     |                           |                           |                            |                            |                           |                          |                           |                           |                           |                           |                           |                           |                          |
|     | $\mathbb{M}_4^{(1,0;a)}(A_1)$     | 0  | $\frac{\sqrt{105}}{840}$  | 0                         | 0                          | 0                          | $\frac{\sqrt{21}}{168}$   | 0                        | 0                         | $-\frac{9\sqrt{42}}{280}$ | 0                         | 0                         | 0                         | $-\frac{9\sqrt{14}}{280}$ | 0                        |
|     |                                   | 0  | 0                         | $-\frac{\sqrt{70}}{280}$  | 0                          | 0                          | 0                         | 0                        | 0                         | 0                         | $\frac{3\sqrt{210}}{280}$ | 0                         | 0                         | 0                         | $-\frac{3\sqrt{6}}{40}$  |
|     |                                   | 0  | 0                         | 0                         | $\frac{\sqrt{70}}{280}$    | 0                          | 0                         | $-\frac{3\sqrt{6}}{40}$  | 0                         | 0                         | 0                         | $\frac{3\sqrt{210}}{280}$ | 0                         | 0                         | 0                        |
|     |                                   | $-\frac{\sqrt{21}}{168}$                                       | 0                         | 0                         | 0                          | $-\frac{\sqrt{105}}{840}$  | 0                         | 0                        | $-\frac{9\sqrt{14}}{280}$ | 0                         | 0                         | 0                         | $-\frac{9\sqrt{42}}{280}$ | 0                         | 0                        |
|     |                                   | $-\frac{\sqrt{105}}{140}$                                      | 0                         | 0                         | 0                          | $-\frac{\sqrt{21}}{28}$    | 0                         | 0                        | $-\frac{\sqrt{70}}{280}$  | 0                         | 0                         | 0                         | $-\frac{\sqrt{210}}{840}$ | 0                         | 0                        |
|     |                                   | 0  | $\frac{3\sqrt{105}}{140}$ | 0                         | 0                          | 0                          | $-\frac{\sqrt{21}}{28}$   | 0                        | 0                         | $\frac{\sqrt{42}}{210}$   | 0                         | 0                         | 0                         | $-\frac{\sqrt{14}}{140}$  | 0                        |
|     |                                   | 0  | 0                         | $-\frac{\sqrt{105}}{70}$  | 0                          | 0                          | 0                         | 0                        | 0                         | 0                         | $\frac{\sqrt{35}}{280}$   | 0                         | 0                         | 0                         | $-\frac{1}{40}$          |
|     |                                   | 0  | 0                         | 0                         | $-\frac{\sqrt{105}}{70}$   | 0                          | 0                         | $\frac{1}{40}$           | 0                         | 0                         | 0                         | $-\frac{\sqrt{35}}{280}$  | 0                         | 0                         | 0                        |
|     |                                   | $-\frac{\sqrt{21}}{28}$  | 0                         | 0                         | 0                          | $\frac{3\sqrt{105}}{140}$  | 0                         | 0                        | $\frac{\sqrt{14}}{140}$   | 0                         | 0                         | 0                         | $-\frac{\sqrt{42}}{210}$  | 0                         | 0                        |
|     |                                   | 0  | $-\frac{\sqrt{21}}{28}$   | 0                         | 0                          | 0                          | $-\frac{\sqrt{105}}{140}$ | 0                        | 0                         | $\frac{\sqrt{210}}{840}$  | 0                         | 0                         | 0                         | $\frac{\sqrt{70}}{280}$   | 0                        |
| 806 | symmetry                          | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ |                           |                           |                            |                            |                           |                          |                           |                           |                           |                           |                           |                           |                          |

continued ...

Table 9

| No. | multipole                       | matrix                                       |                         |                          |                          |                         |                          |                             |                             |                           |                          |                          |                            |                             |                            |
|-----|---------------------------------|--|-------------------------|--------------------------|--------------------------|-------------------------|--------------------------|-----------------------------|-----------------------------|---------------------------|--------------------------|--------------------------|----------------------------|-----------------------------|----------------------------|
|     | $\mathbb{M}_{4,0}^{(1,0;a)}(E)$ | 0  | $\frac{\sqrt{3}}{168}$  | 0                        | 0                        | 0                       | $-\frac{\sqrt{15}}{120}$ | 0                           | 0                           | $-\frac{9\sqrt{30}}{280}$ | 0                        | 0                        | 0                          | $\frac{9\sqrt{10}}{200}$    | 0                          |
|     |                                 | 0  | 0                       | $-\frac{\sqrt{2}}{56}$   | 0                        | 0                       | 0                        | 0                           | 0                           | 0                         | $\frac{3\sqrt{6}}{56}$   | 0                        | 0                          | 0                           | $\frac{3\sqrt{210}}{200}$  |
|     |                                 | 0  | 0                       | 0                        | $\frac{\sqrt{2}}{56}$    | 0                       | 0                        | $\frac{3\sqrt{210}}{200}$   | 0                           | 0                         | 0                        | $\frac{3\sqrt{6}}{56}$   | 0                          | 0                           | 0                          |
|     |                                 | $\frac{\sqrt{15}}{120}$                      | 0                       | 0                        | 0                        | $-\frac{\sqrt{3}}{168}$ | 0                        | 0                           | $\frac{9\sqrt{10}}{200}$    | 0                         | 0                        | 0                        | $-\frac{9\sqrt{30}}{280}$  | 0                           | 0                          |
|     |                                 | $-\frac{\sqrt{3}}{28}$                       | 0                       | 0                        | 0                        | $\frac{\sqrt{15}}{20}$  | 0                        | 0                           | $-\frac{\sqrt{2}}{56}$      | 0                         | 0                        | 0                        | $\frac{\sqrt{6}}{120}$     | 0                           | 0                          |
|     |                                 | 0  | $\frac{3\sqrt{3}}{28}$  | 0                        | 0                        | 0                       | $\frac{\sqrt{15}}{20}$   | 0                           | 0                           | $\frac{\sqrt{30}}{210}$   | 0                        | 0                        | 0                          | $\frac{\sqrt{10}}{100}$     | 0                          |
|     |                                 | 0  | 0                       | $-\frac{\sqrt{3}}{14}$   | 0                        | 0                       | 0                        | 0                           | 0                           | 0                         | $\frac{1}{56}$           | 0                        | 0                          | 0                           | $\frac{\sqrt{35}}{200}$    |
|     |                                 | 0  | 0                       | 0                        | $-\frac{\sqrt{3}}{14}$   | 0                       | 0                        | $-\frac{\sqrt{35}}{200}$    | 0                           | 0                         | 0                        | $-\frac{1}{56}$          | 0                          | 0                           | 0                          |
|     |                                 | $\frac{\sqrt{15}}{20}$                       | 0                       | 0                        | 0                        | $\frac{3\sqrt{3}}{28}$  | 0                        | 0                           | $-\frac{\sqrt{10}}{100}$    | 0                         | 0                        | 0                        | $-\frac{\sqrt{30}}{210}$   | 0                           | 0                          |
|     |                                 | 0  | $\frac{\sqrt{15}}{20}$  | 0                        | 0                        | 0                       | $-\frac{\sqrt{3}}{28}$   | 0                           | 0                           | $-\frac{\sqrt{6}}{120}$   | 0                        | 0                        | 0                          | $\frac{\sqrt{2}}{56}$       | 0                          |
| 807 | symmetry                        | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ |                         |                          |                          |                         |                          |                             |                             |                           |                          |                          |                            |                             |                            |
|     | $\mathbb{M}_{4,1}^{(1,0;a)}(E)$ | 0  | 0                       | 0                        | $-\frac{\sqrt{2}}{56}$   | 0                       | 0                        | $\frac{9\sqrt{210}}{1400}$  | 0                           | 0                         | 0                        | $\frac{27\sqrt{6}}{280}$ | 0                          | 0                           | 0                          |
|     |                                 | $\frac{\sqrt{15}}{280}$                      | 0                       | 0                        | 0                        | $\frac{\sqrt{3}}{56}$   | 0                        | 0                           | $-\frac{99\sqrt{10}}{1400}$ | 0                         | 0                        | 0                        | $\frac{9\sqrt{30}}{1400}$  | 0                           | 0                          |
|     |                                 | 0  | $-\frac{\sqrt{3}}{56}$  | 0                        | 0                        | 0                       | $-\frac{\sqrt{15}}{280}$ | 0                           | 0                           | $\frac{9\sqrt{30}}{1400}$ | 0                        | 0                        | 0                          | $-\frac{99\sqrt{10}}{1400}$ | 0                          |
|     |                                 | 0  | 0                       | $\frac{\sqrt{2}}{56}$    | 0                        | 0                       | 0                        | 0                           | 0                           | 0                         | $\frac{27\sqrt{6}}{280}$ | 0                        | 0                          | 0                           | $\frac{9\sqrt{210}}{1400}$ |
|     |                                 | 0  | 0                       | $\frac{9\sqrt{10}}{140}$ | 0                        | 0                       | 0                        | 0                           | 0                           | 0                         | $\frac{\sqrt{30}}{140}$  | 0                        | 0                          | 0                           | 0                          |
|     |                                 | 0  | 0                       | 0                        | $-\frac{3\sqrt{2}}{28}$  | 0                       | 0                        | $-\frac{3\sqrt{210}}{1400}$ | 0                           | 0                         | 0                        | $\frac{\sqrt{6}}{280}$   | 0                          | 0                           | 0                          |
|     |                                 | $\frac{9\sqrt{10}}{140}$                     | 0                       | 0                        | 0                        | $-\frac{3\sqrt{2}}{28}$ | 0                        | 0                           | $\frac{9\sqrt{15}}{1400}$   | 0                         | 0                        | 0                        | $-\frac{17\sqrt{5}}{1400}$ | 0                           | 0                          |
|     |                                 | 0  | $-\frac{3\sqrt{2}}{28}$ | 0                        | 0                        | 0                       | $\frac{9\sqrt{10}}{140}$ | 0                           | 0                           | $\frac{17\sqrt{5}}{1400}$ | 0                        | 0                        | 0                          | $-\frac{9\sqrt{15}}{1400}$  | 0                          |
|     |                                 | 0  | 0                       | $-\frac{3\sqrt{2}}{28}$  | 0                        | 0                       | 0                        | 0                           | 0                           | 0                         | $-\frac{\sqrt{6}}{280}$  | 0                        | 0                          | 0                           | $\frac{3\sqrt{210}}{1400}$ |
|     |                                 | 0  | 0                       | 0                        | $\frac{9\sqrt{10}}{140}$ | 0                       | 0                        | 0                           | 0                           | 0                         | 0                        | $-\frac{\sqrt{30}}{140}$ | 0                          | 0                           | 0                          |
| 808 | symmetry                        | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$            |                         |                          |                          |                         |                          |                             |                             |                           |                          |                          |                            |                             |                            |

continued ...

Table 9

| No. | multipole                         | matrix                             |                            |                            |                            |                            |                             |                            |                               |                              |                            |                             |                              |                               |                           |
|-----|-----------------------------------|------------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|----------------------------|-------------------------------|------------------------------|----------------------------|-----------------------------|------------------------------|-------------------------------|---------------------------|
|     | $\mathbb{M}_{4,0}^{(1,0;a)}(T_1)$ | $\frac{\sqrt{35}i}{1120}$          | 0                          | $\frac{\sqrt{14}i}{224}$   | 0                          | $\frac{\sqrt{7}i}{224}$    | 0                           | 0                          | $-\frac{27\sqrt{210}i}{2800}$ | 0                            | $-\frac{9\sqrt{42}i}{280}$ | 0                           | $-\frac{27\sqrt{70}i}{2800}$ | 0                             | 0                         |
|     |                                   | 0                                  | $-\frac{\sqrt{21}i}{224}$  | 0                          | $-\frac{\sqrt{42}i}{224}$  | 0                          | $-\frac{\sqrt{105}i}{1120}$ | $\frac{9\sqrt{10}i}{400}$  | 0                             | $\frac{9\sqrt{210}i}{700}$   | 0                          | $\frac{9\sqrt{14}i}{560}$   | 0                            | $-\frac{9\sqrt{70}i}{1400}$   | 0                         |
|     |                                   | $\frac{\sqrt{105}i}{1120}$         | 0                          | $\frac{\sqrt{42}i}{224}$   | 0                          | $\frac{\sqrt{21}i}{224}$   | 0                           | 0                          | $-\frac{9\sqrt{70}i}{1400}$   | 0                            | $\frac{9\sqrt{14}i}{560}$  | 0                           | $\frac{9\sqrt{210}i}{700}$   | 0                             | $\frac{9\sqrt{10}i}{400}$ |
|     |                                   | 0                                  | $-\frac{\sqrt{7}i}{224}$   | 0                          | $-\frac{\sqrt{14}i}{224}$  | 0                          | $-\frac{\sqrt{35}i}{1120}$  | 0                          | 0                             | $-\frac{27\sqrt{70}i}{2800}$ | 0                          | $-\frac{9\sqrt{42}i}{280}$  | 0                            | $-\frac{27\sqrt{210}i}{2800}$ | 0                         |
|     |                                   | 0                                  | $-\frac{3\sqrt{35}i}{140}$ | 0                          | $-\frac{3\sqrt{70}i}{280}$ | 0                          | 0                           | $-\frac{\sqrt{6}i}{160}$   | 0                             | $-\frac{\sqrt{14}i}{112}$    | 0                          | $-\frac{\sqrt{210}i}{1120}$ | 0                            | 0                             | 0                         |
|     |                                   | $\frac{3\sqrt{35}i}{140}$          | 0                          | $\frac{3\sqrt{14}i}{56}$   | 0                          | 0                          | 0                           | 0                          | $\frac{13\sqrt{210}i}{5600}$  | 0                            | $\frac{\sqrt{42}i}{560}$   | 0                           | $-\frac{\sqrt{70}i}{800}$    | 0                             | 0                         |
|     |                                   | 0                                  | $-\frac{3\sqrt{14}i}{56}$  | 0                          | 0                          | 0                          | $\frac{3\sqrt{70}i}{280}$   | $-\frac{3\sqrt{15}i}{800}$ | 0                             | $-\frac{\sqrt{35}i}{5600}$   | 0                          | $\frac{\sqrt{21}i}{160}$    | 0                            | $\frac{\sqrt{105}i}{5600}$    | 0                         |
|     |                                   | $\frac{3\sqrt{70}i}{280}$          | 0                          | 0                          | 0                          | $-\frac{3\sqrt{14}i}{56}$  | 0                           | 0                          | $-\frac{\sqrt{105}i}{5600}$   | 0                            | $-\frac{\sqrt{21}i}{160}$  | 0                           | $\frac{\sqrt{35}i}{5600}$    | 0                             | $\frac{3\sqrt{15}i}{800}$ |
|     |                                   | 0                                  | 0                          | 0                          | $\frac{3\sqrt{14}i}{56}$   | 0                          | $\frac{3\sqrt{35}i}{140}$   | 0                          | 0                             | $\frac{\sqrt{70}i}{800}$     | 0                          | $-\frac{\sqrt{42}i}{560}$   | 0                            | $-\frac{13\sqrt{210}i}{5600}$ | 0                         |
|     |                                   | 0                                  | 0                          | $-\frac{3\sqrt{70}i}{280}$ | 0                          | $-\frac{3\sqrt{35}i}{140}$ | 0                           | 0                          | 0                             | 0                            | $\frac{\sqrt{210}i}{1120}$ | 0                           | $\frac{\sqrt{14}i}{112}$     | 0                             | $\frac{\sqrt{6}i}{160}$   |
| 809 | symmetry                          | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ |                            |                            |                            |                            |                             |                            |                               |                              |                            |                             |                              |                               |                           |
|     | $\mathbb{M}_{4,1}^{(1,0;a)}(T_1)$ | $-\frac{\sqrt{35}}{1120}$          | 0                          | $\frac{\sqrt{14}}{224}$    | 0                          | $-\frac{\sqrt{7}}{224}$    | 0                           | 0                          | $\frac{27\sqrt{210}}{2800}$   | 0                            | $-\frac{9\sqrt{42}}{280}$  | 0                           | $\frac{27\sqrt{70}}{2800}$   | 0                             | 0                         |
|     |                                   | 0                                  | $\frac{\sqrt{21}}{224}$    | 0                          | $-\frac{\sqrt{42}}{224}$   | 0                          | $\frac{\sqrt{105}}{1120}$   | $\frac{9\sqrt{10}}{400}$   | 0                             | $-\frac{9\sqrt{210}}{700}$   | 0                          | $\frac{9\sqrt{14}}{560}$    | 0                            | $\frac{9\sqrt{70}}{1400}$     | 0                         |
|     |                                   | $\frac{\sqrt{105}}{1120}$          | 0                          | $-\frac{\sqrt{42}}{224}$   | 0                          | $\frac{\sqrt{21}}{224}$    | 0                           | 0                          | $-\frac{9\sqrt{70}}{1400}$    | 0                            | $-\frac{9\sqrt{14}}{560}$  | 0                           | $\frac{9\sqrt{210}}{700}$    | 0                             | $-\frac{9\sqrt{10}}{400}$ |
|     |                                   | 0                                  | $-\frac{\sqrt{7}}{224}$    | 0                          | $\frac{\sqrt{14}}{224}$    | 0                          | $-\frac{\sqrt{35}}{1120}$   | 0                          | 0                             | $-\frac{27\sqrt{70}}{2800}$  | 0                          | $\frac{9\sqrt{42}}{280}$    | 0                            | $-\frac{27\sqrt{210}}{2800}$  | 0                         |
|     |                                   | 0                                  | $-\frac{3\sqrt{35}}{140}$  | 0                          | $\frac{3\sqrt{70}}{280}$   | 0                          | 0                           | $\frac{\sqrt{6}}{160}$     | 0                             | $-\frac{\sqrt{14}}{112}$     | 0                          | $\frac{\sqrt{210}}{1120}$   | 0                            | 0                             | 0                         |
|     |                                   | $-\frac{3\sqrt{35}}{140}$          | 0                          | $\frac{3\sqrt{14}}{56}$    | 0                          | 0                          | 0                           | 0                          | $-\frac{13\sqrt{210}}{5600}$  | 0                            | $\frac{\sqrt{42}}{560}$    | 0                           | $\frac{\sqrt{70}}{800}$      | 0                             | 0                         |
|     |                                   | 0                                  | $\frac{3\sqrt{14}}{56}$    | 0                          | 0                          | 0                          | $-\frac{3\sqrt{70}}{280}$   | $-\frac{3\sqrt{15}}{800}$  | 0                             | $\frac{\sqrt{35}}{5600}$     | 0                          | $\frac{\sqrt{21}}{160}$     | 0                            | $-\frac{\sqrt{105}}{5600}$    | 0                         |
|     |                                   | $\frac{3\sqrt{70}}{280}$           | 0                          | 0                          | 0                          | $-\frac{3\sqrt{14}}{56}$   | 0                           | 0                          | $-\frac{\sqrt{105}}{5600}$    | 0                            | $\frac{\sqrt{21}}{160}$    | 0                           | $\frac{\sqrt{35}}{5600}$     | 0                             | $-\frac{3\sqrt{15}}{800}$ |
|     |                                   | 0                                  | 0                          | 0                          | $-\frac{3\sqrt{14}}{56}$   | 0                          | $\frac{3\sqrt{35}}{140}$    | 0                          | 0                             | $\frac{\sqrt{70}}{800}$      | 0                          | $\frac{\sqrt{42}}{560}$     | 0                            | $-\frac{13\sqrt{210}}{5600}$  | 0                         |
|     |                                   | 0                                  | 0                          | $-\frac{3\sqrt{70}}{280}$  | 0                          | $\frac{3\sqrt{35}}{140}$   | 0                           | 0                          | 0                             | 0                            | $\frac{\sqrt{210}}{1120}$  | 0                           | $-\frac{\sqrt{14}}{112}$     | 0                             | $\frac{\sqrt{6}}{160}$    |
| 810 | symmetry                          | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$  |                            |                            |                            |                            |                             |                            |                               |                              |                            |                             |                              |                               |                           |

continued ...

Table 9

| No. | multipole                         | matrix                                |                           |                          |                          |                           |                           |                            |                              |                            |                           |                           |                            |                              |                             |  |
|-----|-----------------------------------|---------------------------------------|---------------------------|--------------------------|--------------------------|---------------------------|---------------------------|----------------------------|------------------------------|----------------------------|---------------------------|---------------------------|----------------------------|------------------------------|-----------------------------|--|
|     | $\mathbb{M}_{4,2}^{(1,0;a)}(T_1)$ | 0                                     | 0                         | 0                        | 0                        | 0                         | $-\frac{\sqrt{35}i}{140}$ | 0                          | 0                            | 0                          | 0                         | 0                         | 0                          | $\frac{9\sqrt{210}i}{700}$   | 0                           |  |
|     |                                   | 0                                     | 0                         | 0                        | 0                        | 0                         | 0                         | 0                          | 0                            | 0                          | 0                         | 0                         | 0                          | 0                            | $\frac{9\sqrt{10}i}{100}$   |  |
|     |                                   | 0                                     | 0                         | 0                        | 0                        | 0                         | 0                         | $-\frac{9\sqrt{10}i}{100}$ | 0                            | 0                          | 0                         | 0                         | 0                          | 0                            | 0                           |  |
|     |                                   | $-\frac{\sqrt{35}i}{140}$             | 0                         | 0                        | 0                        | 0                         | 0                         | 0                          | $-\frac{9\sqrt{210}i}{700}$  | 0                          | 0                         | 0                         | 0                          | 0                            | 0                           |  |
|     |                                   | 0                                     | 0                         | 0                        | 0                        | $\frac{3\sqrt{35}i}{70}$  | 0                         | 0                          | 0                            | 0                          | 0                         | 0                         | $\frac{\sqrt{14}i}{140}$   | 0                            | 0                           |  |
|     |                                   | 0                                     | 0                         | 0                        | 0                        | 0                         | $\frac{3\sqrt{35}i}{70}$  | 0                          | 0                            | 0                          | 0                         | 0                         | 0                          | $\frac{\sqrt{210}i}{350}$    | 0                           |  |
|     |                                   | 0                                     | 0                         | 0                        | 0                        | 0                         | 0                         | 0                          | 0                            | 0                          | 0                         | 0                         | 0                          | 0                            | $\frac{\sqrt{15}i}{100}$    |  |
|     |                                   | 0                                     | 0                         | 0                        | 0                        | 0                         | 0                         | $\frac{\sqrt{15}i}{100}$   | 0                            | 0                          | 0                         | 0                         | 0                          | 0                            | 0                           |  |
|     |                                   | $-\frac{3\sqrt{35}i}{70}$             | 0                         | 0                        | 0                        | 0                         | 0                         | 0                          | $\frac{\sqrt{210}i}{350}$    | 0                          | 0                         | 0                         | 0                          | 0                            | 0                           |  |
|     |                                   | 0                                     | $-\frac{3\sqrt{35}i}{70}$ | 0                        | 0                        | 0                         | 0                         | 0                          | 0                            | $\frac{\sqrt{14}i}{140}$   | 0                         | 0                         | 0                          | 0                            | 0                           |  |
| 811 | symmetry                          | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$  |                           |                          |                          |                           |                           |                            |                              |                            |                           |                           |                            |                              |                             |  |
|     | $\mathbb{M}_{4,0}^{(1,0;a)}(T_2)$ | $\frac{\sqrt{5}i}{1120}$              | 0                         | $\frac{\sqrt{2}i}{224}$  | 0                        | $-\frac{i}{32}$           | 0                         | 0                          | $-\frac{27\sqrt{30}i}{2800}$ | 0                          | $-\frac{9\sqrt{6}i}{280}$ | 0                         | $\frac{27\sqrt{10}i}{400}$ | 0                            | 0                           |  |
|     |                                   | 0                                     | $-\frac{\sqrt{3}i}{224}$  | 0                        | $-\frac{\sqrt{6}i}{224}$ | 0                         | $\frac{\sqrt{15}i}{160}$  | $-\frac{9\sqrt{70}i}{400}$ | 0                            | $\frac{9\sqrt{30}i}{700}$  | 0                         | $\frac{9\sqrt{2}i}{560}$  | 0                          | $\frac{9\sqrt{10}i}{200}$    | 0                           |  |
|     |                                   | $-\frac{\sqrt{15}i}{160}$             | 0                         | $\frac{\sqrt{6}i}{224}$  | 0                        | $\frac{\sqrt{3}i}{224}$   | 0                         | 0                          | $\frac{9\sqrt{10}i}{200}$    | 0                          | $\frac{9\sqrt{2}i}{560}$  | 0                         | $\frac{9\sqrt{30}i}{700}$  | 0                            | $-\frac{9\sqrt{70}i}{400}$  |  |
|     |                                   | 0                                     | $\frac{i}{32}$            | 0                        | $-\frac{\sqrt{2}i}{224}$ | 0                         | $-\frac{\sqrt{5}i}{1120}$ | 0                          | 0                            | $\frac{27\sqrt{10}i}{400}$ | 0                         | $-\frac{9\sqrt{6}i}{280}$ | 0                          | $-\frac{27\sqrt{30}i}{2800}$ | 0                           |  |
|     |                                   | 0                                     | $-\frac{3\sqrt{5}i}{140}$ | 0                        | $\frac{3\sqrt{10}i}{40}$ | 0                         | 0                         | $-\frac{\sqrt{42}i}{1120}$ | 0                            | $-\frac{\sqrt{2}i}{112}$   | 0                         | $\frac{\sqrt{30}i}{160}$  | 0                          | 0                            | 0                           |  |
|     |                                   | $\frac{3\sqrt{5}i}{140}$              | 0                         | $\frac{3\sqrt{2}i}{56}$  | 0                        | 0                         | 0                         | 0                          | $\frac{13\sqrt{30}i}{5600}$  | 0                          | $\frac{\sqrt{6}i}{560}$   | 0                         | $\frac{7\sqrt{10}i}{800}$  | 0                            | 0                           |  |
|     |                                   | 0                                     | $-\frac{3\sqrt{2}i}{56}$  | 0                        | 0                        | 0                         | $-\frac{3\sqrt{10}i}{40}$ | $\frac{3\sqrt{105}i}{800}$ | 0                            | $-\frac{\sqrt{5}i}{5600}$  | 0                         | $\frac{\sqrt{3}i}{160}$   | 0                          | $-\frac{\sqrt{15}i}{800}$    | 0                           |  |
|     |                                   | $-\frac{3\sqrt{10}i}{40}$             | 0                         | 0                        | 0                        | $-\frac{3\sqrt{2}i}{56}$  | 0                         | 0                          | $\frac{\sqrt{15}i}{800}$     | 0                          | $-\frac{\sqrt{3}i}{160}$  | 0                         | $\frac{\sqrt{5}i}{5600}$   | 0                            | $-\frac{3\sqrt{105}i}{800}$ |  |
|     |                                   | 0                                     | 0                         | 0                        | $\frac{3\sqrt{2}i}{56}$  | 0                         | $\frac{3\sqrt{5}i}{140}$  | 0                          | 0                            | $-\frac{7\sqrt{10}i}{800}$ | 0                         | $-\frac{\sqrt{6}i}{560}$  | 0                          | $-\frac{13\sqrt{30}i}{5600}$ | 0                           |  |
|     |                                   | 0                                     | 0                         | $\frac{3\sqrt{10}i}{40}$ | 0                        | $-\frac{3\sqrt{5}i}{140}$ | 0                         | 0                          | 0                            | 0                          | $-\frac{\sqrt{30}i}{160}$ | 0                         | $\frac{\sqrt{2}i}{112}$    | 0                            | $\frac{\sqrt{42}i}{1120}$   |  |
| 812 | symmetry                          | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ |                           |                          |                          |                           |                           |                            |                              |                            |                           |                           |                            |                              |                             |  |

continued ...

Table 9

| No. | multipole                         | matrix                                |                         |                           |                            |                          |                           |                              |                             |                             |                            |                           |                             |                              |                             |
|-----|-----------------------------------|---------------------------------------|-------------------------|---------------------------|----------------------------|--------------------------|---------------------------|------------------------------|-----------------------------|-----------------------------|----------------------------|---------------------------|-----------------------------|------------------------------|-----------------------------|
|     | $\mathbb{M}_{4,1}^{(1,0;a)}(T_2)$ | $\frac{\sqrt{5}}{1120}$               | 0                       | $-\frac{\sqrt{2}}{224}$   | 0                          | $-\frac{1}{32}$          | 0                         | 0                            | $-\frac{27\sqrt{30}}{2800}$ | 0                           | $\frac{9\sqrt{6}}{280}$    | 0                         | $\frac{27\sqrt{10}}{400}$   | 0                            | 0                           |
|     |                                   | 0                                     | $-\frac{\sqrt{3}}{224}$ | 0                         | $\frac{\sqrt{6}}{224}$     | 0                        | $\frac{\sqrt{15}}{160}$   | $\frac{9\sqrt{70}}{400}$     | 0                           | $\frac{9\sqrt{30}}{700}$    | 0                          | $-\frac{9\sqrt{2}}{560}$  | 0                           | $\frac{9\sqrt{10}}{200}$     | 0                           |
|     |                                   | $\frac{\sqrt{15}}{160}$               | 0                       | $\frac{\sqrt{6}}{224}$    | 0                          | $-\frac{\sqrt{3}}{224}$  | 0                         | 0                            | $-\frac{9\sqrt{10}}{200}$   | 0                           | $\frac{9\sqrt{2}}{560}$    | 0                         | $-\frac{9\sqrt{30}}{700}$   | 0                            | $-\frac{9\sqrt{70}}{400}$   |
|     |                                   | 0                                     | $-\frac{1}{32}$         | 0                         | $-\frac{\sqrt{2}}{224}$    | 0                        | $\frac{\sqrt{5}}{1120}$   | 0                            | 0                           | $-\frac{27\sqrt{10}}{400}$  | 0                          | $-\frac{9\sqrt{6}}{280}$  | 0                           | $\frac{27\sqrt{30}}{2800}$   | 0                           |
|     |                                   | 0                                     | $\frac{3\sqrt{5}}{140}$ | 0                         | $\frac{3\sqrt{10}}{40}$    | 0                        | 0                         | $-\frac{\sqrt{42}}{1120}$    | 0                           | $\frac{\sqrt{2}}{112}$      | 0                          | $\frac{\sqrt{30}}{160}$   | 0                           | 0                            | 0                           |
|     |                                   | $\frac{3\sqrt{5}}{140}$               | 0                       | $-\frac{3\sqrt{2}}{56}$   | 0                          | 0                        | 0                         | 0                            | $\frac{13\sqrt{30}}{5600}$  | 0                           | $-\frac{\sqrt{6}}{560}$    | 0                         | $\frac{7\sqrt{10}}{800}$    | 0                            | 0                           |
|     |                                   | 0                                     | $-\frac{3\sqrt{2}}{56}$ | 0                         | 0                          | 0                        | $-\frac{3\sqrt{10}}{40}$  | $-\frac{3\sqrt{105}}{800}$   | 0                           | $-\frac{\sqrt{5}}{5600}$    | 0                          | $-\frac{\sqrt{3}}{160}$   | 0                           | $-\frac{\sqrt{15}}{800}$     | 0                           |
|     |                                   | $\frac{3\sqrt{10}}{40}$               | 0                       | 0                         | 0                          | $\frac{3\sqrt{2}}{56}$   | 0                         | 0                            | $-\frac{\sqrt{15}}{800}$    | 0                           | $-\frac{\sqrt{3}}{160}$    | 0                         | $-\frac{\sqrt{5}}{5600}$    | 0                            | $-\frac{3\sqrt{105}}{800}$  |
|     |                                   | 0                                     | 0                       | 0                         | $\frac{3\sqrt{2}}{56}$     | 0                        | $-\frac{3\sqrt{5}}{140}$  | 0                            | 0                           | $\frac{7\sqrt{10}}{800}$    | 0                          | $-\frac{\sqrt{6}}{560}$   | 0                           | $\frac{13\sqrt{30}}{5600}$   | 0                           |
|     |                                   | 0                                     | 0                       | $-\frac{3\sqrt{10}}{40}$  | 0                          | $-\frac{3\sqrt{5}}{140}$ | 0                         | 0                            | 0                           | 0                           | $\frac{\sqrt{30}}{160}$    | 0                         | $\frac{\sqrt{2}}{112}$      | 0                            | $-\frac{\sqrt{42}}{1120}$   |
| 813 | symmetry                          | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ |                         |                           |                            |                          |                           |                              |                             |                             |                            |                           |                             |                              |                             |
|     | $\mathbb{M}_{4,2}^{(1,0;a)}(T_2)$ | 0                                     | 0                       | 0                         | $-\frac{\sqrt{2}i}{56}$    | 0                        | 0                         | $-\frac{9\sqrt{210}i}{1400}$ | 0                           | 0                           | 0                          | $\frac{27\sqrt{6}i}{280}$ | 0                           | 0                            | 0                           |
|     |                                   | $-\frac{\sqrt{15}i}{280}$             | 0                       | 0                         | 0                          | $\frac{\sqrt{3}i}{56}$   | 0                         | 0                            | $\frac{99\sqrt{10}i}{1400}$ | 0                           | 0                          | 0                         | $\frac{9\sqrt{30}i}{1400}$  | 0                            | 0                           |
|     |                                   | 0                                     | $\frac{\sqrt{3}i}{56}$  | 0                         | 0                          | 0                        | $-\frac{\sqrt{15}i}{280}$ | 0                            | 0                           | $-\frac{9\sqrt{30}i}{1400}$ | 0                          | 0                         | 0                           | $-\frac{99\sqrt{10}i}{1400}$ | 0                           |
|     |                                   | 0                                     | 0                       | $-\frac{\sqrt{2}i}{56}$   | 0                          | 0                        | 0                         | 0                            | 0                           | 0                           | $-\frac{27\sqrt{6}i}{280}$ | 0                         | 0                           | 0                            | $\frac{9\sqrt{210}i}{1400}$ |
|     |                                   | 0                                     | 0                       | $\frac{9\sqrt{10}i}{140}$ | 0                          | 0                        | 0                         | 0                            | 0                           | 0                           | $\frac{\sqrt{30}i}{140}$   | 0                         | 0                           | 0                            | 0                           |
|     |                                   | 0                                     | 0                       | 0                         | $-\frac{3\sqrt{2}i}{28}$   | 0                        | 0                         | $\frac{3\sqrt{210}i}{1400}$  | 0                           | 0                           | 0                          | $\frac{\sqrt{6}i}{280}$   | 0                           | 0                            | 0                           |
|     |                                   | $-\frac{9\sqrt{10}i}{140}$            | 0                       | 0                         | 0                          | $-\frac{3\sqrt{2}i}{28}$ | 0                         | 0                            | $-\frac{9\sqrt{15}i}{1400}$ | 0                           | 0                          | 0                         | $-\frac{17\sqrt{5}i}{1400}$ | 0                            | 0                           |
|     |                                   | 0                                     | $\frac{3\sqrt{2}i}{28}$ | 0                         | 0                          | 0                        | $\frac{9\sqrt{10}i}{140}$ | 0                            | 0                           | $-\frac{17\sqrt{5}i}{1400}$ | 0                          | 0                         | 0                           | $-\frac{9\sqrt{15}i}{1400}$  | 0                           |
|     |                                   | 0                                     | 0                       | $\frac{3\sqrt{2}i}{28}$   | 0                          | 0                        | 0                         | 0                            | 0                           | 0                           | $\frac{\sqrt{6}i}{280}$    | 0                         | 0                           | 0                            | $\frac{3\sqrt{210}i}{1400}$ |
|     |                                   | 0                                     | 0                       | 0                         | $-\frac{9\sqrt{10}i}{140}$ | 0                        | 0                         | 0                            | 0                           | 0                           | 0                          | $\frac{\sqrt{30}i}{140}$  | 0                           | 0                            | 0                           |
| 814 | symmetry                          | 1                                     |                         |                           |                            |                          |                           |                              |                             |                             |                            |                           |                             |                              |                             |

continued ...

Table 9

| No. | multipole                       | matrix                                 |                       |                        |                         |                       |                       |                        |                           |                          |                          |                           |   |                       |   |   |
|-----|---------------------------------|--|-----------------------|------------------------|-------------------------|-----------------------|-----------------------|------------------------|---------------------------|--------------------------|--------------------------|---------------------------|---|-----------------------|---|---|
|     | $\mathbb{M}_0^{(1,1;a)}(A_1)$   | 0                                      | 0                     | 0                      | 0                       | 0                     | 0                     | 0                      | 0                         | 0                        | 0                        | 0                         | 0 | 0                     | 0 | 0 |
|     |                                 | 0                                      | 0                     | 0                      | 0                       | 0                     | 0                     | 0                      | 0                         | 0                        | 0                        | 0                         | 0 | 0                     | 0 | 0 |
|     |                                 | 0                                      | 0                     | 0                      | 0                       | 0                     | 0                     | 0                      | 0                         | 0                        | 0                        | 0                         | 0 | 0                     | 0 | 0 |
|     |                                 | 0                                      | 0                     | 0                      | 0                       | 0                     | 0                     | 0                      | 0                         | 0                        | 0                        | 0                         | 0 | 0                     | 0 | 0 |
|     |                                 | $-\frac{\sqrt{3}}{6}$                  | 0                     | 0                      | 0                       | 0                     | 0                     | 0                      | 0                         | 0                        | 0                        | 0                         | 0 | 0                     | 0 | 0 |
|     |                                 | 0                                      | $-\frac{\sqrt{3}}{6}$ | 0                      | 0                       | 0                     | 0                     | 0                      | 0                         | 0                        | 0                        | 0                         | 0 | 0                     | 0 | 0 |
|     |                                 | 0                                      | 0                     | $-\frac{\sqrt{3}}{6}$  | 0                       | 0                     | 0                     | 0                      | 0                         | 0                        | 0                        | 0                         | 0 | 0                     | 0 | 0 |
|     |                                 | 0                                      | 0                     | 0                      | $-\frac{\sqrt{3}}{6}$   | 0                     | 0                     | 0                      | 0                         | 0                        | 0                        | 0                         | 0 | 0                     | 0 | 0 |
|     |                                 | 0                                      | 0                     | 0                      | 0                       | $-\frac{\sqrt{3}}{6}$ | 0                     | 0                      | 0                         | 0                        | 0                        | 0                         | 0 | 0                     | 0 | 0 |
|     |                                 | 0                                      | 0                     | 0                      | 0                       | 0                     | $-\frac{\sqrt{3}}{6}$ | 0                      | 0                         | 0                        | 0                        | 0                         | 0 | 0                     | 0 | 0 |
| 815 | symmetry                        | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |                       |                        |                         |                       |                       |                        |                           |                          |                          |                           |   |                       |   |   |
|     | $\mathbb{M}_{2,0}^{(1,1;a)}(E)$ | 0                                      | $\frac{12}{35}$       | 0                      | 0                       | 0                     | 0                     | 0                      | $-\frac{3\sqrt{10}}{140}$ | 0                        | 0                        | 0                         | 0 | 0                     | 0 | 0 |
|     |                                 | 0                                      | 0                     | $\frac{2\sqrt{6}}{35}$ | 0                       | 0                     | 0                     | 0                      | 0                         | $-\frac{9\sqrt{2}}{140}$ | 0                        | 0                         | 0 | 0                     | 0 | 0 |
|     |                                 | 0                                      | 0                     | 0                      | $-\frac{2\sqrt{6}}{35}$ | 0                     | 0                     | 0                      | 0                         | 0                        | $-\frac{9\sqrt{2}}{140}$ | 0                         | 0 | 0                     | 0 | 0 |
|     |                                 | 0                                      | 0                     | 0                      | 0                       | $-\frac{12}{35}$      | 0                     | 0                      | 0                         | 0                        | 0                        | $-\frac{3\sqrt{10}}{140}$ | 0 | 0                     | 0 | 0 |
|     |                                 | $\frac{3}{14}$                         | 0                     | 0                      | 0                       | 0                     | 0                     | $-\frac{\sqrt{6}}{21}$ | 0                         | 0                        | 0                        | 0                         | 0 | 0                     | 0 | 0 |
|     |                                 | 0                                      | $-\frac{3}{70}$       | 0                      | 0                       | 0                     | 0                     | 0                      | $-\frac{\sqrt{10}}{35}$   | 0                        | 0                        | 0                         | 0 | 0                     | 0 | 0 |
|     |                                 | 0                                      | 0                     | $-\frac{6}{35}$        | 0                       | 0                     | 0                     | 0                      | 0                         | $-\frac{2\sqrt{3}}{105}$ | 0                        | 0                         | 0 | 0                     | 0 | 0 |
|     |                                 | 0                                      | 0                     | 0                      | $-\frac{6}{35}$         | 0                     | 0                     | 0                      | 0                         | 0                        | $\frac{2\sqrt{3}}{105}$  | 0                         | 0 | 0                     | 0 | 0 |
|     |                                 | 0                                      | 0                     | 0                      | 0                       | $-\frac{3}{70}$       | 0                     | 0                      | 0                         | 0                        | 0                        | $\frac{\sqrt{10}}{35}$    | 0 | 0                     | 0 | 0 |
|     |                                 | 0                                      | 0                     | 0                      | 0                       | 0                     | $\frac{3}{14}$        | 0                      | 0                         | 0                        | 0                        | 0                         | 0 | $\frac{\sqrt{6}}{21}$ | 0 | 0 |
| 816 | symmetry                        | $\frac{\sqrt{3}(x-y)(x+y)}{2}$         |                       |                        |                         |                       |                       |                        |                           |                          |                          |                           |   |                       |   |   |

*continued ...*



Table 9

| No. | multipole                         | matrix                    |                           |                          |                          |                           |                          |                           |                           |                           |                           |                            |                           |                           |                           |
|-----|-----------------------------------|---------------------------|---------------------------|--------------------------|--------------------------|---------------------------|--------------------------|---------------------------|---------------------------|---------------------------|---------------------------|----------------------------|---------------------------|---------------------------|---------------------------|
|     | $\mathbb{M}_{2,1}^{(1,1;a)}(E)$   | 0                         | 0                         | 0                        | $\frac{2\sqrt{6}}{35}$   | 0                         | 0                        | $-\frac{3\sqrt{70}}{280}$ | 0                         | 0                         | 0                         | $-\frac{3\sqrt{2}}{280}$   | 0                         | 0                         | 0                         |
|     |                                   | $-\frac{4\sqrt{5}}{35}$   | 0                         | 0                        | 0                        | $\frac{8}{35}$            | 0                        | 0                         | $-\frac{3\sqrt{30}}{280}$ | 0                         | 0                         | 0                          | $-\frac{3\sqrt{10}}{280}$ | 0                         | 0                         |
|     |                                   | 0                         | $-\frac{8}{35}$           | 0                        | 0                        | 0                         | $\frac{4\sqrt{5}}{35}$   | 0                         | 0                         | $-\frac{3\sqrt{10}}{280}$ | 0                         | 0                          | 0                         | $-\frac{3\sqrt{30}}{280}$ | 0                         |
|     |                                   | 0                         | 0                         | $-\frac{2\sqrt{6}}{35}$  | 0                        | 0                         | 0                        | 0                         | 0                         | $-\frac{3\sqrt{2}}{280}$  | 0                         | 0                          | 0                         | 0                         | $-\frac{3\sqrt{70}}{280}$ |
|     |                                   | 0                         | 0                         | $\frac{3\sqrt{30}}{140}$ | 0                        | 0                         | 0                        | 0                         | 0                         | $-\frac{\sqrt{10}}{105}$  | 0                         | 0                          | 0                         | 0                         | 0                         |
|     |                                   | 0                         | 0                         | 0                        | $\frac{9\sqrt{6}}{140}$  | 0                         | 0                        | $\frac{\sqrt{70}}{105}$   | 0                         | 0                         | 0                         | $-\frac{4\sqrt{2}}{105}$   | 0                         | 0                         | 0                         |
|     |                                   | $\frac{3\sqrt{30}}{140}$  | 0                         | 0                        | 0                        | $\frac{9\sqrt{6}}{140}$   | 0                        | 0                         | $\frac{4\sqrt{5}}{105}$   | 0                         | 0                         | 0                          | $-\frac{2\sqrt{15}}{105}$ | 0                         | 0                         |
|     |                                   | 0                         | $\frac{9\sqrt{6}}{140}$   | 0                        | 0                        | 0                         | $\frac{3\sqrt{30}}{140}$ | 0                         | 0                         | $\frac{2\sqrt{15}}{105}$  | 0                         | 0                          | 0                         | $-\frac{4\sqrt{5}}{105}$  | 0                         |
|     |                                   | 0                         | 0                         | $\frac{9\sqrt{6}}{140}$  | 0                        | 0                         | 0                        | 0                         | 0                         | $\frac{4\sqrt{2}}{105}$   | 0                         | 0                          | 0                         | 0                         | $-\frac{\sqrt{70}}{105}$  |
|     |                                   | 0                         | 0                         | 0                        | $\frac{3\sqrt{30}}{140}$ | 0                         | 0                        | 0                         | 0                         | 0                         | $\frac{\sqrt{10}}{105}$   | 0                          | 0                         | 0                         | 0                         |
| 817 | symmetry                          | $\sqrt{3}yz$              |                           |                          |                          |                           |                          |                           |                           |                           |                           |                            |                           |                           |                           |
|     | $\mathbb{M}_{2,0}^{(1,1;a)}(T_2)$ | $-\frac{2\sqrt{15}i}{35}$ | 0                         | $-\frac{3\sqrt{6}i}{35}$ | 0                        | 0                         | 0                        | 0                         | $\frac{3\sqrt{10}i}{140}$ | 0                         | $\frac{3\sqrt{2}i}{140}$  | 0                          | 0                         | 0                         | 0                         |
|     |                                   | 0                         | $\frac{2i}{35}$           | 0                        | $-\frac{\sqrt{2}i}{7}$   | 0                         | 0                        | 0                         | 0                         | $\frac{3\sqrt{10}i}{140}$ | 0                         | $\frac{3\sqrt{6}i}{140}$   | 0                         | 0                         | 0                         |
|     |                                   | 0                         | 0                         | $\frac{\sqrt{2}i}{7}$    | 0                        | $-\frac{2i}{35}$          | 0                        | 0                         | 0                         | 0                         | $\frac{3\sqrt{6}i}{140}$  | 0                          | $\frac{3\sqrt{10}i}{140}$ | 0                         | 0                         |
|     |                                   | 0                         | 0                         | 0                        | $\frac{3\sqrt{6}i}{35}$  | 0                         | $\frac{2\sqrt{15}i}{35}$ | 0                         | 0                         | 0                         | 0                         | $\frac{3\sqrt{2}i}{140}$   | 0                         | $\frac{3\sqrt{10}i}{140}$ | 0                         |
|     |                                   | 0                         | $-\frac{3\sqrt{15}i}{70}$ | 0                        | 0                        | 0                         | 0                        | $\frac{\sqrt{14}i}{42}$   | 0                         | $\frac{\sqrt{6}i}{42}$    | 0                         | 0                          | 0                         | 0                         | 0                         |
|     |                                   | $\frac{3\sqrt{15}i}{70}$  | 0                         | $-\frac{3\sqrt{6}i}{70}$ | 0                        | 0                         | 0                        | 0                         | $\frac{\sqrt{10}i}{210}$  | 0                         | $\frac{11\sqrt{2}i}{210}$ | 0                          | 0                         | 0                         | 0                         |
|     |                                   | 0                         | $\frac{3\sqrt{6}i}{70}$   | 0                        | 0                        | 0                         | 0                        | 0                         | 0                         | $-\frac{\sqrt{15}i}{105}$ | 0                         | $\frac{i}{15}$             | 0                         | 0                         | 0                         |
|     |                                   | 0                         | 0                         | 0                        | 0                        | $\frac{3\sqrt{6}i}{70}$   | 0                        | 0                         | 0                         | 0                         | $-\frac{i}{15}$           | 0                          | $\frac{\sqrt{15}i}{105}$  | 0                         | 0                         |
|     |                                   | 0                         | 0                         | 0                        | $-\frac{3\sqrt{6}i}{70}$ | 0                         | $\frac{3\sqrt{15}i}{70}$ | 0                         | 0                         | 0                         | 0                         | $-\frac{11\sqrt{2}i}{210}$ | 0                         | $-\frac{\sqrt{10}i}{210}$ | 0                         |
|     |                                   | 0                         | 0                         | 0                        | 0                        | $-\frac{3\sqrt{15}i}{70}$ | 0                        | 0                         | 0                         | 0                         | 0                         | 0                          | $-\frac{\sqrt{6}i}{42}$   | 0                         | $-\frac{\sqrt{14}i}{42}$  |
| 818 | symmetry                          | $\sqrt{3}xz$              |                           |                          |                          |                           |                          |                           |                           |                           |                           |                            |                           |                           |                           |

continued ...

Table 9

| No. | multipole                         | matrix   |                          |                            |                           |                           |                            |                            |                            |                            |                           |                           |                           |                           |                           |
|-----|-----------------------------------|--|--------------------------|----------------------------|---------------------------|---------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
|     | $\mathbb{M}_{2,1}^{(1,1;a)}(T_2)$ | $-\frac{2\sqrt{15}}{35}$                                   | 0                        | $\frac{3\sqrt{6}}{35}$     | 0                         | 0                         | 0                          | 0                          | $\frac{3\sqrt{10}}{140}$   | 0                          | $-\frac{3\sqrt{2}}{140}$  | 0                         | 0                         | 0                         | 0                         |
|     |                                   | 0  | $\frac{2}{35}$           | 0                          | $\frac{\sqrt{2}}{7}$      | 0                         | 0                          | 0                          | 0                          | $\frac{3\sqrt{10}}{140}$   | 0                         | $-\frac{3\sqrt{6}}{140}$  | 0                         | 0                         | 0                         |
|     |                                   | 0  | 0                        | $\frac{\sqrt{2}}{7}$       | 0                         | $\frac{2}{35}$            | 0                          | 0                          | 0                          | 0                          | $\frac{3\sqrt{6}}{140}$   | 0                         | $-\frac{3\sqrt{10}}{140}$ | 0                         | 0                         |
|     |                                   | 0  | 0                        | 0                          | $\frac{3\sqrt{6}}{35}$    | 0                         | $-\frac{2\sqrt{15}}{35}$   | 0                          | 0                          | 0                          | 0                         | $\frac{3\sqrt{2}}{140}$   | 0                         | $-\frac{3\sqrt{10}}{140}$ | 0                         |
|     |                                   | 0  | $\frac{3\sqrt{15}}{70}$  | 0                          | 0                         | 0                         | 0                          | $\frac{\sqrt{14}}{42}$     | 0                          | $-\frac{\sqrt{6}}{42}$     | 0                         | 0                         | 0                         | 0                         | 0                         |
|     |                                   | $\frac{3\sqrt{15}}{70}$                                    | 0                        | $\frac{3\sqrt{6}}{70}$     | 0                         | 0                         | 0                          | 0                          | $\frac{\sqrt{10}}{210}$    | 0                          | $-\frac{11\sqrt{2}}{210}$ | 0                         | 0                         | 0                         | 0                         |
|     |                                   | 0  | $\frac{3\sqrt{6}}{70}$   | 0                          | 0                         | 0                         | 0                          | 0                          | 0                          | $-\frac{\sqrt{15}}{105}$   | 0                         | $-\frac{1}{15}$           | 0                         | 0                         | 0                         |
|     |                                   | 0  | 0                        | 0                          | 0                         | $-\frac{3\sqrt{6}}{70}$   | 0                          | 0                          | 0                          | 0                          | $-\frac{1}{15}$           | 0                         | $-\frac{\sqrt{15}}{105}$  | 0                         | 0                         |
|     |                                   | 0  | 0                        | 0                          | $-\frac{3\sqrt{6}}{70}$   | 0                         | $-\frac{3\sqrt{15}}{70}$   | 0                          | 0                          | 0                          | 0                         | $-\frac{11\sqrt{2}}{210}$ | 0                         | $\frac{\sqrt{10}}{210}$   | 0                         |
|     |                                   | 0  | 0                        | 0                          | 0                         | $-\frac{3\sqrt{15}}{70}$  | 0                          | 0                          | 0                          | 0                          | 0                         | 0                         | $-\frac{\sqrt{6}}{42}$    | 0                         | $\frac{\sqrt{14}}{42}$    |
| 819 | symmetry                          | $\sqrt{3}xy$   |                          |                            |                           |                           |                            |                            |                            |                            |                           |                           |                           |                           |                           |
|     | $\mathbb{M}_{2,2}^{(1,1;a)}(T_2)$ | 0  | 0                        | 0                          | $-\frac{2\sqrt{6}i}{35}$  | 0                         | 0                          | $-\frac{3\sqrt{70}i}{280}$ | 0                          | 0                          | 0                         | $\frac{3\sqrt{2}i}{280}$  | 0                         | 0                         | 0                         |
|     |                                   | $-\frac{4\sqrt{5}i}{35}$                                   | 0                        | 0                          | 0                         | $-\frac{8i}{35}$          | 0                          | 0                          | $-\frac{3\sqrt{30}i}{280}$ | 0                          | 0                         | 0                         | $\frac{3\sqrt{10}i}{280}$ | 0                         | 0                         |
|     |                                   | 0  | $-\frac{8i}{35}$         | 0                          | 0                         | 0                         | $-\frac{4\sqrt{5}i}{35}$   | 0                          | 0                          | $-\frac{3\sqrt{10}i}{280}$ | 0                         | 0                         | 0                         | $\frac{3\sqrt{30}i}{280}$ | 0                         |
|     |                                   | 0  | 0                        | $-\frac{2\sqrt{6}i}{35}$   | 0                         | 0                         | 0                          | 0                          | 0                          | 0                          | $-\frac{3\sqrt{2}i}{280}$ | 0                         | 0                         | 0                         | $\frac{3\sqrt{70}i}{280}$ |
|     |                                   | 0  | 0                        | $-\frac{3\sqrt{30}i}{140}$ | 0                         | 0                         | 0                          | 0                          | 0                          | 0                          | $\frac{\sqrt{10}i}{105}$  | 0                         | 0                         | 0                         | 0                         |
|     |                                   | 0  | 0                        | 0                          | $-\frac{9\sqrt{6}i}{140}$ | 0                         | 0                          | $\frac{\sqrt{70}i}{105}$   | 0                          | 0                          | 0                         | $\frac{4\sqrt{2}i}{105}$  | 0                         | 0                         | 0                         |
|     |                                   | $\frac{3\sqrt{30}i}{140}$                                  | 0                        | 0                          | 0                         | $-\frac{9\sqrt{6}i}{140}$ | 0                          | 0                          | $\frac{4\sqrt{5}i}{105}$   | 0                          | 0                         | 0                         | $\frac{2\sqrt{15}i}{105}$ | 0                         | 0                         |
|     |                                   | 0  | $\frac{9\sqrt{6}i}{140}$ | 0                          | 0                         | 0                         | $-\frac{3\sqrt{30}i}{140}$ | 0                          | 0                          | $\frac{2\sqrt{15}i}{105}$  | 0                         | 0                         | 0                         | $\frac{4\sqrt{5}i}{105}$  | 0                         |
|     |                                   | 0  | 0                        | $\frac{9\sqrt{6}i}{140}$   | 0                         | 0                         | 0                          | 0                          | 0                          | 0                          | $\frac{4\sqrt{2}i}{105}$  | 0                         | 0                         | 0                         | $\frac{\sqrt{70}i}{105}$  |
|     |                                   | 0  | 0                        | 0                          | $\frac{3\sqrt{30}i}{140}$ | 0                         | 0                          | 0                          | 0                          | 0                          | 0                         | $\frac{\sqrt{10}i}{105}$  | 0                         | 0                         | 0                         |
| 820 | symmetry                          | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$ |                          |                            |                           |                           |                            |                            |                            |                            |                           |                           |                           |                           |                           |

continued ...

Table 9

| No. | multipole                       | matrix   |                           |                           |                            |                           |                           |                            |                             |                            |                             |                            |                           |                             |                         |
|-----|---------------------------------|--|---------------------------|---------------------------|----------------------------|---------------------------|---------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|----------------------------|---------------------------|-----------------------------|-------------------------|
|     | $\mathbb{M}_4^{(1,1;a)}(A_1)$   | 0  | $-\frac{\sqrt{770}}{210}$ | 0                         | 0                          | 0                         | $-\frac{\sqrt{154}}{42}$  | 0                          | 0                           | $\frac{\sqrt{77}}{140}$    | 0                           | 0                          | 0                         | $\frac{\sqrt{231}}{420}$    | 0                       |
|     |                                 | 0  | 0                         | $\frac{\sqrt{1155}}{105}$ | 0                          | 0                         | 0                         | 0                          | 0                           | 0                          | $-\frac{\sqrt{385}}{420}$   | 0                          | 0                         | 0                           | $\frac{\sqrt{11}}{60}$  |
|     |                                 | 0  | 0                         | 0                         | $-\frac{\sqrt{1155}}{105}$ | 0                         | 0                         | $\frac{\sqrt{11}}{60}$     | 0                           | 0                          | 0                           | $-\frac{\sqrt{385}}{420}$  | 0                         | 0                           | 0                       |
|     |                                 | $\frac{\sqrt{154}}{42}$  | 0                         | 0                         | 0                          | $\frac{\sqrt{770}}{210}$  | 0                         | 0                          | $\frac{\sqrt{231}}{420}$    | 0                          | 0                           | 0                          | $\frac{\sqrt{77}}{140}$   | 0                           | 0                       |
|     |                                 | $-\frac{\sqrt{770}}{840}$                                      | 0                         | 0                         | 0                          | $-\frac{\sqrt{154}}{168}$ | 0                         | 0                          | $\frac{\sqrt{1155}}{1155}$  | 0                          | 0                           | 0                          | $\frac{\sqrt{385}}{1155}$ | 0                           | 0                       |
|     |                                 | 0  | $\frac{\sqrt{770}}{280}$  | 0                         | 0                          | 0                         | $-\frac{\sqrt{154}}{168}$ | 0                          | 0                           | $-\frac{4\sqrt{77}}{1155}$ | 0                           | 0                          | 0                         | $\frac{2\sqrt{231}}{1155}$  | 0                       |
|     |                                 | 0  | 0                         | $-\frac{\sqrt{770}}{420}$ | 0                          | 0                         | 0                         | 0                          | 0                           | 0                          | $-\frac{\sqrt{2310}}{2310}$ | 0                          | 0                         | 0                           | $\frac{\sqrt{66}}{330}$ |
|     |                                 | 0  | 0                         | 0                         | $-\frac{\sqrt{770}}{420}$  | 0                         | 0                         | $-\frac{\sqrt{66}}{330}$   | 0                           | 0                          | 0                           | $\frac{\sqrt{2310}}{2310}$ | 0                         | 0                           | 0                       |
|     |                                 | $-\frac{\sqrt{154}}{168}$                                      | 0                         | 0                         | 0                          | $\frac{\sqrt{770}}{280}$  | 0                         | 0                          | $-\frac{2\sqrt{231}}{1155}$ | 0                          | 0                           | 0                          | $\frac{4\sqrt{77}}{1155}$ | 0                           | 0                       |
|     |                                 | 0  | $-\frac{\sqrt{154}}{168}$ | 0                         | 0                          | 0                         | $-\frac{\sqrt{770}}{840}$ | 0                          | 0                           | $-\frac{\sqrt{385}}{1155}$ | 0                           | 0                          | 0                         | $-\frac{\sqrt{1155}}{1155}$ | 0                       |
| 821 | symmetry                        | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ |                           |                           |                            |                           |                           |                            |                             |                            |                             |                            |                           |                             |                         |
|     | $\mathbb{M}_{4,0}^{(1,1;a)}(E)$ | 0  | $-\frac{\sqrt{22}}{42}$   | 0                         | 0                          | 0                         | $\frac{\sqrt{110}}{30}$   | 0                          | 0                           | $\frac{\sqrt{55}}{140}$    | 0                           | 0                          | 0                         | $-\frac{\sqrt{165}}{300}$   | 0                       |
|     |                                 | 0  | 0                         | $\frac{\sqrt{33}}{21}$    | 0                          | 0                         | 0                         | 0                          | 0                           | $-\frac{\sqrt{11}}{84}$    | 0                           | 0                          | 0                         | $-\frac{\sqrt{385}}{300}$   | 0                       |
|     |                                 | 0  | 0                         | 0                         | $-\frac{\sqrt{33}}{21}$    | 0                         | 0                         | $-\frac{\sqrt{385}}{300}$  | 0                           | 0                          | 0                           | $-\frac{\sqrt{11}}{84}$    | 0                         | 0                           | 0                       |
|     |                                 | $-\frac{\sqrt{110}}{30}$                                       | 0                         | 0                         | 0                          | $\frac{\sqrt{22}}{42}$    | 0                         | 0                          | $-\frac{\sqrt{165}}{300}$   | 0                          | 0                           | 0                          | $\frac{\sqrt{55}}{140}$   | 0                           | 0                       |
|     |                                 | $-\frac{\sqrt{22}}{168}$                                       | 0                         | 0                         | 0                          | $\frac{\sqrt{110}}{120}$  | 0                         | 0                          | $\frac{\sqrt{33}}{231}$     | 0                          | 0                           | 0                          | $-\frac{\sqrt{11}}{165}$  | 0                           | 0                       |
|     |                                 | 0  | $\frac{\sqrt{22}}{56}$    | 0                         | 0                          | 0                         | $\frac{\sqrt{110}}{120}$  | 0                          | 0                           | $-\frac{4\sqrt{55}}{1155}$ | 0                           | 0                          | 0                         | $-\frac{2\sqrt{165}}{825}$  | 0                       |
|     |                                 | 0  | 0                         | $-\frac{\sqrt{22}}{84}$   | 0                          | 0                         | 0                         | 0                          | 0                           | $-\frac{\sqrt{66}}{462}$   | 0                           | 0                          | 0                         | $-\frac{\sqrt{2310}}{1650}$ | 0                       |
|     |                                 | 0  | 0                         | 0                         | $-\frac{\sqrt{22}}{84}$    | 0                         | 0                         | $\frac{\sqrt{2310}}{1650}$ | 0                           | 0                          | 0                           | $\frac{\sqrt{66}}{462}$    | 0                         | 0                           | 0                       |
|     |                                 | $\frac{\sqrt{110}}{120}$                                       | 0                         | 0                         | 0                          | $\frac{\sqrt{22}}{56}$    | 0                         | 0                          | $\frac{2\sqrt{165}}{825}$   | 0                          | 0                           | 0                          | $\frac{4\sqrt{55}}{1155}$ | 0                           | 0                       |
|     |                                 | 0  | $\frac{\sqrt{110}}{120}$  | 0                         | 0                          | 0                         | $-\frac{\sqrt{22}}{168}$  | 0                          | 0                           | $\frac{\sqrt{11}}{165}$    | 0                           | 0                          | 0                         | $-\frac{\sqrt{33}}{231}$    | 0                       |
| 822 | symmetry                        | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$                   |                           |                           |                            |                           |                           |                            |                             |                            |                             |                            |                           |                             |                         |

continued ...

Table 9

| No. | multipole                         | matrix                             |                             |                             |                             |                             |                            |                             |                               |                               |                            |                            |                               |                              |                              |
|-----|-----------------------------------|------------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|----------------------------|-----------------------------|-------------------------------|-------------------------------|----------------------------|----------------------------|-------------------------------|------------------------------|------------------------------|
|     | $\mathbb{M}_{4,1}^{(1,1;a)}(E)$   | 0                                  | 0                           | 0                           | $\frac{\sqrt{33}}{21}$      | 0                           | 0                          | $-\frac{\sqrt{385}}{700}$   | 0                             | 0                             | 0                          | $-\frac{3\sqrt{11}}{140}$  | 0                             | 0                            | 0                            |
|     |                                   | $-\frac{\sqrt{110}}{70}$           | 0                           | 0                           | 0                           | $-\frac{\sqrt{22}}{14}$     | 0                          | 0                           | $\frac{11\sqrt{165}}{2100}$   | 0                             | 0                          | 0                          | $-\frac{\sqrt{55}}{700}$      | 0                            | 0                            |
|     |                                   | 0                                  | $\frac{\sqrt{22}}{14}$      | 0                           | 0                           | 0                           | $\frac{\sqrt{110}}{70}$    | 0                           | 0                             | $-\frac{\sqrt{55}}{700}$      | 0                          | 0                          | 0                             | $\frac{11\sqrt{165}}{2100}$  | 0                            |
|     |                                   | 0                                  | 0                           | $-\frac{\sqrt{33}}{21}$     | 0                           | 0                           | 0                          | 0                           | 0                             | $-\frac{3\sqrt{11}}{140}$     | 0                          | 0                          | 0                             | 0                            | $-\frac{\sqrt{385}}{700}$    |
|     |                                   | 0                                  | 0                           | $\frac{\sqrt{165}}{140}$    | 0                           | 0                           | 0                          | 0                           | 0                             | $-\frac{2\sqrt{55}}{385}$     | 0                          | 0                          | 0                             | 0                            | 0                            |
|     |                                   | 0                                  | 0                           | 0                           | $-\frac{\sqrt{33}}{84}$     | 0                           | 0                          | $\frac{3\sqrt{385}}{1925}$  | 0                             | 0                             | 0                          | $-\frac{\sqrt{11}}{385}$   | 0                             | 0                            | 0                            |
|     |                                   | $\frac{\sqrt{165}}{140}$           | 0                           | 0                           | 0                           | $-\frac{\sqrt{33}}{84}$     | 0                          | 0                           | $-\frac{9\sqrt{110}}{3850}$   | 0                             | 0                          | 0                          | $\frac{17\sqrt{330}}{11550}$  | 0                            | 0                            |
|     |                                   | 0                                  | $-\frac{\sqrt{33}}{84}$     | 0                           | 0                           | 0                           | $\frac{\sqrt{165}}{140}$   | 0                           | 0                             | $-\frac{17\sqrt{330}}{11550}$ | 0                          | 0                          | 0                             | $\frac{9\sqrt{110}}{3850}$   | 0                            |
|     |                                   | 0                                  | 0                           | $-\frac{\sqrt{33}}{84}$     | 0                           | 0                           | 0                          | 0                           | 0                             | 0                             | $\frac{\sqrt{11}}{385}$    | 0                          | 0                             | 0                            | $-\frac{3\sqrt{385}}{1925}$  |
|     |                                   | 0                                  | 0                           | 0                           | $\frac{\sqrt{165}}{140}$    | 0                           | 0                          | 0                           | 0                             | 0                             | $\frac{2\sqrt{55}}{385}$   | 0                          | 0                             | 0                            | 0                            |
| 823 | symmetry                          | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$  |                             |                             |                             |                             |                            |                             |                               |                               |                            |                            |                               |                              |                              |
|     | $\mathbb{M}_{4,0}^{(1,1;a)}(T_1)$ | $-\frac{\sqrt{2310}i}{840}$        | 0                           | $-\frac{\sqrt{231}i}{84}$   | 0                           | $-\frac{\sqrt{462}i}{168}$  | 0                          | 0                           | $\frac{3\sqrt{385}i}{1400}$   | 0                             | $\frac{\sqrt{77}i}{140}$   | 0                          | $\frac{\sqrt{1155}i}{1400}$   | 0                            | 0                            |
|     |                                   | 0                                  | $\frac{\sqrt{154}i}{56}$    | 0                           | $\frac{\sqrt{77}i}{28}$     | 0                           | $\frac{\sqrt{770}i}{280}$  | $-\frac{\sqrt{165}i}{600}$  | 0                             | $-\frac{\sqrt{385}i}{350}$    | 0                          | $-\frac{\sqrt{231}i}{840}$ | 0                             | $\frac{\sqrt{1155}i}{2100}$  | 0                            |
|     |                                   | $-\frac{\sqrt{770}i}{280}$         | 0                           | $-\frac{\sqrt{77}i}{28}$    | 0                           | $-\frac{\sqrt{154}i}{56}$   | 0                          | 0                           | $\frac{\sqrt{1155}i}{2100}$   | 0                             | $-\frac{\sqrt{231}i}{840}$ | 0                          | $-\frac{\sqrt{385}i}{350}$    | 0                            | $-\frac{\sqrt{165}i}{600}$   |
|     |                                   | 0                                  | $\frac{\sqrt{462}i}{168}$   | 0                           | $\frac{\sqrt{231}i}{84}$    | 0                           | $\frac{\sqrt{2310}i}{840}$ | 0                           | 0                             | $\frac{\sqrt{1155}i}{1400}$   | 0                          | $\frac{\sqrt{77}i}{140}$   | 0                             | $\frac{3\sqrt{385}i}{1400}$  | 0                            |
|     |                                   | 0                                  | $-\frac{\sqrt{2310}i}{840}$ | 0                           | $-\frac{\sqrt{1155}i}{840}$ | 0                           | 0                          | $\frac{\sqrt{11}i}{220}$    | 0                             | $\frac{\sqrt{231}i}{462}$     | 0                          | $\frac{\sqrt{385}i}{1540}$ | 0                             | 0                            | 0                            |
|     |                                   | $\frac{\sqrt{2310}i}{840}$         | 0                           | $\frac{\sqrt{231}i}{168}$   | 0                           | 0                           | 0                          | 0                           | $-\frac{13\sqrt{385}i}{7700}$ | 0                             | $-\frac{\sqrt{77}i}{770}$  | 0                          | $\frac{\sqrt{1155}i}{3300}$   | 0                            | 0                            |
|     |                                   | 0                                  | $-\frac{\sqrt{231}i}{168}$  | 0                           | 0                           | 0                           | $\frac{\sqrt{1155}i}{840}$ | $\frac{3\sqrt{110}i}{2200}$ | 0                             | $\frac{\sqrt{2310}i}{46200}$  | 0                          | $-\frac{\sqrt{154}i}{440}$ | 0                             | $-\frac{\sqrt{770}i}{15400}$ | 0                            |
|     |                                   | $\frac{\sqrt{1155}i}{840}$         | 0                           | 0                           | 0                           | $-\frac{\sqrt{231}i}{168}$  | 0                          | 0                           | $\frac{\sqrt{770}i}{15400}$   | 0                             | $\frac{\sqrt{154}i}{440}$  | 0                          | $-\frac{\sqrt{2310}i}{46200}$ | 0                            | $-\frac{3\sqrt{110}i}{2200}$ |
|     |                                   | 0                                  | 0                           | 0                           | $\frac{\sqrt{231}i}{168}$   | 0                           | $\frac{\sqrt{2310}i}{840}$ | 0                           | 0                             | $-\frac{\sqrt{1155}i}{3300}$  | 0                          | $\frac{\sqrt{77}i}{770}$   | 0                             | $\frac{13\sqrt{385}i}{7700}$ | 0                            |
|     |                                   | 0                                  | 0                           | $-\frac{\sqrt{1155}i}{840}$ | 0                           | $-\frac{\sqrt{2310}i}{840}$ | 0                          | 0                           | 0                             | $-\frac{\sqrt{385}i}{1540}$   | 0                          | $-\frac{\sqrt{231}i}{462}$ | 0                             | $-\frac{\sqrt{11}i}{220}$    | 0                            |
| 824 | symmetry                          | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ |                             |                             |                             |                             |                            |                             |                               |                               |                            |                            |                               |                              |                              |

continued ...

Table 9

| No. | multipole                         | matrix                               |                             |                            |                           |                            |                            |                            |                              |                              |                           |                              |                              |                             |                            |
|-----|-----------------------------------|--------------------------------------|-----------------------------|----------------------------|---------------------------|----------------------------|----------------------------|----------------------------|------------------------------|------------------------------|---------------------------|------------------------------|------------------------------|-----------------------------|----------------------------|
|     | $\mathbb{M}_{4,1}^{(1,1;a)}(T_1)$ | $\frac{\sqrt{2310}}{840}$            | 0                           | $-\frac{\sqrt{231}}{84}$   | 0                         | $\frac{\sqrt{462}}{168}$   | 0                          | 0                          | $-\frac{3\sqrt{385}}{1400}$  | 0                            | $\frac{\sqrt{77}}{140}$   | 0                            | $-\frac{\sqrt{1155}}{1400}$  | 0                           | 0                          |
|     |                                   | 0                                    | $-\frac{\sqrt{154}}{56}$    | 0                          | $\frac{\sqrt{77}}{28}$    | 0                          | $-\frac{\sqrt{770}}{280}$  | $-\frac{\sqrt{165}}{600}$  | 0                            | $\frac{\sqrt{385}}{350}$     | 0                         | $-\frac{\sqrt{231}}{840}$    | 0                            | $-\frac{\sqrt{1155}}{2100}$ | 0                          |
|     |                                   | $-\frac{\sqrt{770}}{280}$            | 0                           | $\frac{\sqrt{77}}{28}$     | 0                         | $-\frac{\sqrt{154}}{56}$   | 0                          | 0                          | $\frac{\sqrt{1155}}{2100}$   | 0                            | $\frac{\sqrt{231}}{840}$  | 0                            | $-\frac{\sqrt{385}}{350}$    | 0                           | $\frac{\sqrt{165}}{600}$   |
|     |                                   | 0                                    | $\frac{\sqrt{462}}{168}$    | 0                          | $-\frac{\sqrt{231}}{84}$  | 0                          | $\frac{\sqrt{2310}}{840}$  | 0                          | 0                            | $\frac{\sqrt{1155}}{1400}$   | 0                         | $-\frac{\sqrt{77}}{140}$     | 0                            | $\frac{3\sqrt{385}}{1400}$  | 0                          |
|     |                                   | 0                                    | $-\frac{\sqrt{2310}}{840}$  | 0                          | $\frac{\sqrt{1155}}{840}$ | 0                          | 0                          | $-\frac{\sqrt{11}}{220}$   | 0                            | $\frac{\sqrt{231}}{462}$     | 0                         | $-\frac{\sqrt{385}}{1540}$   | 0                            | 0                           | 0                          |
|     |                                   | $-\frac{\sqrt{2310}}{840}$           | 0                           | $\frac{\sqrt{231}}{168}$   | 0                         | 0                          | 0                          | 0                          | $\frac{13\sqrt{385}}{7700}$  | 0                            | $-\frac{\sqrt{77}}{770}$  | 0                            | $-\frac{\sqrt{1155}}{3300}$  | 0                           | 0                          |
|     |                                   | 0                                    | $\frac{\sqrt{231}}{168}$    | 0                          | 0                         | 0                          | $-\frac{\sqrt{1155}}{840}$ | $\frac{3\sqrt{110}}{2200}$ | 0                            | $-\frac{\sqrt{2310}}{46200}$ | 0                         | $-\frac{\sqrt{154}}{440}$    | 0                            | $\frac{\sqrt{770}}{15400}$  | 0                          |
|     |                                   | $\frac{\sqrt{1155}}{840}$            | 0                           | 0                          | 0                         | $-\frac{\sqrt{231}}{168}$  | 0                          | 0                          | $\frac{\sqrt{770}}{15400}$   | 0                            | $-\frac{\sqrt{154}}{440}$ | 0                            | $-\frac{\sqrt{2310}}{46200}$ | 0                           | $\frac{3\sqrt{110}}{2200}$ |
|     |                                   | 0                                    | 0                           | 0                          | $-\frac{\sqrt{231}}{168}$ | 0                          | $\frac{\sqrt{2310}}{840}$  | 0                          | 0                            | $-\frac{\sqrt{1155}}{3300}$  | 0                         | $-\frac{\sqrt{77}}{770}$     | 0                            | $\frac{13\sqrt{385}}{7700}$ | 0                          |
|     |                                   | 0                                    | 0                           | $-\frac{\sqrt{1155}}{840}$ | 0                         | $\frac{\sqrt{2310}}{840}$  | 0                          | 0                          | 0                            | $-\frac{\sqrt{385}}{1540}$   | 0                         | $\frac{\sqrt{231}}{462}$     | 0                            | $-\frac{\sqrt{11}}{220}$    |                            |
| 825 | symmetry                          | $\frac{\sqrt{35xy(x-y)(x+y)}}{2}$    |                             |                            |                           |                            |                            |                            |                              |                              |                           |                              |                              |                             |                            |
|     | $\mathbb{M}_{4,2}^{(1,1;a)}(T_1)$ | 0                                    | 0                           | 0                          | 0                         | 0                          | $\frac{\sqrt{2310}i}{105}$ | 0                          | 0                            | 0                            | 0                         | 0                            | $-\frac{\sqrt{385}i}{350}$   | 0                           |                            |
|     |                                   | 0                                    | 0                           | 0                          | 0                         | 0                          | 0                          | 0                          | 0                            | 0                            | 0                         | 0                            | 0                            | $-\frac{\sqrt{165}i}{150}$  |                            |
|     |                                   | 0                                    | 0                           | 0                          | 0                         | 0                          | 0                          | $\frac{\sqrt{165}i}{150}$  | 0                            | 0                            | 0                         | 0                            | 0                            | 0                           |                            |
|     |                                   | $\frac{\sqrt{2310}i}{105}$           | 0                           | 0                          | 0                         | 0                          | 0                          | 0                          | $\frac{\sqrt{385}i}{350}$    | 0                            | 0                         | 0                            | 0                            | 0                           |                            |
|     |                                   | 0                                    | 0                           | 0                          | 0                         | $\frac{\sqrt{2310}i}{420}$ | 0                          | 0                          | 0                            | 0                            | 0                         | $-\frac{2\sqrt{231}i}{1155}$ | 0                            | 0                           |                            |
|     |                                   | 0                                    | 0                           | 0                          | 0                         | 0                          | $\frac{\sqrt{2310}i}{420}$ | 0                          | 0                            | 0                            | 0                         | 0                            | $-\frac{4\sqrt{385}i}{1925}$ | 0                           |                            |
|     |                                   | 0                                    | 0                           | 0                          | 0                         | 0                          | 0                          | 0                          | 0                            | 0                            | 0                         | 0                            | 0                            | $-\frac{\sqrt{110}i}{275}$  |                            |
|     |                                   | 0                                    | 0                           | 0                          | 0                         | 0                          | 0                          | $-\frac{\sqrt{110}i}{275}$ | 0                            | 0                            | 0                         | 0                            | 0                            | 0                           |                            |
|     |                                   | $-\frac{\sqrt{2310}i}{420}$          | 0                           | 0                          | 0                         | 0                          | 0                          | 0                          | $-\frac{4\sqrt{385}i}{1925}$ | 0                            | 0                         | 0                            | 0                            | 0                           |                            |
|     |                                   | 0                                    | $-\frac{\sqrt{2310}i}{420}$ | 0                          | 0                         | 0                          | 0                          | 0                          | 0                            | $-\frac{2\sqrt{231}i}{1155}$ | 0                         | 0                            | 0                            | 0                           |                            |
| 826 | symmetry                          | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$ |                             |                            |                           |                            |                            |                            |                              |                              |                           |                              |                              |                             |                            |

continued ...

Table 9

| No. | multipole                         | matrix                                |                            |                           |                           |                            |                            |                              |                              |                             |                           |                           |                              |                             |                             |
|-----|-----------------------------------|---------------------------------------|----------------------------|---------------------------|---------------------------|----------------------------|----------------------------|------------------------------|------------------------------|-----------------------------|---------------------------|---------------------------|------------------------------|-----------------------------|-----------------------------|
|     | $\mathbb{M}_{4,0}^{(1,1;a)}(T_2)$ | $-\frac{\sqrt{330i}}{840}$            | 0                          | $-\frac{\sqrt{33i}}{84}$  | 0                         | $\frac{\sqrt{66i}}{24}$    | 0                          | 0                            | $\frac{3\sqrt{55i}}{1400}$   | 0                           | $\frac{\sqrt{11i}}{140}$  | 0                         | $-\frac{\sqrt{165i}}{200}$   | 0                           | 0                           |
|     |                                   | 0                                     | $\frac{\sqrt{22i}}{56}$    | 0                         | $\frac{\sqrt{11i}}{28}$   | 0                          | $-\frac{\sqrt{110i}}{40}$  | $\frac{\sqrt{1155i}}{600}$   | 0                            | $-\frac{\sqrt{55i}}{350}$   | 0                         | $-\frac{\sqrt{33i}}{840}$ | 0                            | $-\frac{\sqrt{165i}}{300}$  | 0                           |
|     |                                   | $\frac{\sqrt{110i}}{40}$              | 0                          | $-\frac{\sqrt{11i}}{28}$  | 0                         | $-\frac{\sqrt{22i}}{56}$   | 0                          | 0                            | $-\frac{\sqrt{165i}}{300}$   | 0                           | $-\frac{\sqrt{33i}}{840}$ | 0                         | $-\frac{\sqrt{55i}}{350}$    | 0                           | $\frac{\sqrt{1155i}}{600}$  |
|     |                                   | 0                                     | $-\frac{\sqrt{66i}}{24}$   | 0                         | $\frac{\sqrt{33i}}{84}$   | 0                          | $\frac{\sqrt{330i}}{840}$  | 0                            | 0                            | $-\frac{\sqrt{165i}}{200}$  | 0                         | $\frac{\sqrt{11i}}{140}$  | 0                            | $\frac{3\sqrt{55i}}{1400}$  | 0                           |
|     |                                   | 0                                     | $-\frac{\sqrt{330i}}{840}$ | 0                         | $\frac{\sqrt{165i}}{120}$ | 0                          | 0                          | $\frac{\sqrt{77i}}{1540}$    | 0                            | $\frac{\sqrt{33i}}{462}$    | 0                         | $-\frac{\sqrt{55i}}{220}$ | 0                            | 0                           | 0                           |
|     |                                   | $\frac{\sqrt{330i}}{840}$             | 0                          | $\frac{\sqrt{33i}}{168}$  | 0                         | 0                          | 0                          | 0                            | $-\frac{13\sqrt{55i}}{7700}$ | 0                           | $-\frac{\sqrt{11i}}{770}$ | 0                         | $-\frac{7\sqrt{165i}}{3300}$ | 0                           | 0                           |
|     |                                   | 0                                     | $-\frac{\sqrt{33i}}{168}$  | 0                         | 0                         | 0                          | $-\frac{\sqrt{165i}}{120}$ | $-\frac{3\sqrt{770i}}{2200}$ | 0                            | $\frac{\sqrt{330i}}{46200}$ | 0                         | $-\frac{\sqrt{22i}}{440}$ | 0                            | $\frac{\sqrt{110i}}{2200}$  | 0                           |
|     |                                   | $-\frac{\sqrt{165i}}{120}$            | 0                          | 0                         | 0                         | $-\frac{\sqrt{33i}}{168}$  | 0                          | 0                            | $-\frac{\sqrt{110i}}{2200}$  | 0                           | $\frac{\sqrt{22i}}{440}$  | 0                         | $-\frac{\sqrt{330i}}{46200}$ | 0                           | $\frac{3\sqrt{770i}}{2200}$ |
|     |                                   | 0                                     | 0                          | 0                         | $\frac{\sqrt{33i}}{168}$  | 0                          | $\frac{\sqrt{330i}}{840}$  | 0                            | 0                            | $\frac{7\sqrt{165i}}{3300}$ | 0                         | $\frac{\sqrt{11i}}{770}$  | 0                            | $\frac{13\sqrt{55i}}{7700}$ | 0                           |
|     |                                   | 0                                     | 0                          | $\frac{\sqrt{165i}}{120}$ | 0                         | $-\frac{\sqrt{330i}}{840}$ | 0                          | 0                            | 0                            | 0                           | $\frac{\sqrt{55i}}{220}$  | 0                         | $-\frac{\sqrt{33i}}{462}$    | 0                           | $-\frac{\sqrt{77i}}{1540}$  |
| 827 | symmetry                          | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ |                            |                           |                           |                            |                            |                              |                              |                             |                           |                           |                              |                             |                             |
|     | $\mathbb{M}_{4,1}^{(1,1;a)}(T_2)$ | $-\frac{\sqrt{330}}{840}$             | 0                          | $\frac{\sqrt{33}}{84}$    | 0                         | $\frac{\sqrt{66}}{24}$     | 0                          | 0                            | $\frac{3\sqrt{55}}{1400}$    | 0                           | $-\frac{\sqrt{11}}{140}$  | 0                         | $-\frac{\sqrt{165}}{200}$    | 0                           | 0                           |
|     |                                   | 0                                     | $\frac{\sqrt{22}}{56}$     | 0                         | $-\frac{\sqrt{11}}{28}$   | 0                          | $-\frac{\sqrt{110}}{40}$   | $-\frac{\sqrt{1155}}{600}$   | 0                            | $-\frac{\sqrt{55}}{350}$    | 0                         | $\frac{\sqrt{33}}{840}$   | 0                            | $-\frac{\sqrt{165}}{300}$   | 0                           |
|     |                                   | $-\frac{\sqrt{110}}{40}$              | 0                          | $-\frac{\sqrt{11}}{28}$   | 0                         | $\frac{\sqrt{22}}{56}$     | 0                          | 0                            | $\frac{\sqrt{165}}{300}$     | 0                           | $-\frac{\sqrt{33}}{840}$  | 0                         | $\frac{\sqrt{55}}{350}$      | 0                           | $\frac{\sqrt{1155}}{600}$   |
|     |                                   | 0                                     | $\frac{\sqrt{66}}{24}$     | 0                         | $\frac{\sqrt{33}}{84}$    | 0                          | $-\frac{\sqrt{330}}{840}$  | 0                            | 0                            | $\frac{\sqrt{165}}{200}$    | 0                         | $\frac{\sqrt{11}}{140}$   | 0                            | $-\frac{3\sqrt{55}}{1400}$  | 0                           |
|     |                                   | 0                                     | $\frac{\sqrt{330}}{840}$   | 0                         | $\frac{\sqrt{165}}{120}$  | 0                          | 0                          | $\frac{\sqrt{77}}{1540}$     | 0                            | $-\frac{\sqrt{33}}{462}$    | 0                         | $-\frac{\sqrt{55}}{220}$  | 0                            | 0                           | 0                           |
|     |                                   | $\frac{\sqrt{330}}{840}$              | 0                          | $-\frac{\sqrt{33}}{168}$  | 0                         | 0                          | 0                          | 0                            | $-\frac{13\sqrt{55}}{7700}$  | 0                           | $\frac{\sqrt{11}}{770}$   | 0                         | $-\frac{7\sqrt{165}}{3300}$  | 0                           | 0                           |
|     |                                   | 0                                     | $-\frac{\sqrt{33}}{168}$   | 0                         | 0                         | 0                          | $-\frac{\sqrt{165}}{120}$  | $\frac{3\sqrt{770}}{2200}$   | 0                            | $\frac{\sqrt{330}}{46200}$  | 0                         | $\frac{\sqrt{22}}{440}$   | 0                            | $\frac{\sqrt{110}}{2200}$   | 0                           |
|     |                                   | $\frac{\sqrt{165}}{120}$              | 0                          | 0                         | 0                         | $\frac{\sqrt{33}}{168}$    | 0                          | 0                            | $\frac{\sqrt{110}}{2200}$    | 0                           | $\frac{\sqrt{22}}{440}$   | 0                         | $\frac{\sqrt{330}}{46200}$   | 0                           | $\frac{3\sqrt{770}}{2200}$  |
|     |                                   | 0                                     | 0                          | 0                         | $\frac{\sqrt{33}}{168}$   | 0                          | $-\frac{\sqrt{330}}{840}$  | 0                            | 0                            | $-\frac{7\sqrt{165}}{3300}$ | 0                         | $\frac{\sqrt{11}}{770}$   | 0                            | $-\frac{13\sqrt{55}}{7700}$ | 0                           |
|     |                                   | 0                                     | 0                          | $-\frac{\sqrt{165}}{120}$ | 0                         | $-\frac{\sqrt{330}}{840}$  | 0                          | 0                            | 0                            | 0                           | $-\frac{\sqrt{55}}{220}$  | 0                         | $-\frac{\sqrt{33}}{462}$     | 0                           | $\frac{\sqrt{77}}{1540}$    |
| 828 | symmetry                          | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ |                            |                           |                           |                            |                            |                              |                              |                             |                           |                           |                              |                             |                             |

continued ...

Table 9

| No.                               | multipole                  | matrix                   |                           |                            |                          |                           |                              |                               |                               |                            |                            |                               |                              |   |  |
|-----------------------------------|----------------------------|--------------------------|---------------------------|----------------------------|--------------------------|---------------------------|------------------------------|-------------------------------|-------------------------------|----------------------------|----------------------------|-------------------------------|------------------------------|---|--|
| $\mathbb{M}_{4,2}^{(1,1;a)}(T_2)$ | 0                          | 0                        | 0                         | $\frac{\sqrt{33}i}{21}$    | 0                        | 0                         | $\frac{\sqrt{385}i}{700}$    | 0                             | 0                             | 0                          | $-\frac{3\sqrt{11}i}{140}$ | 0                             | 0                            | 0 |  |
|                                   | $\frac{\sqrt{110}i}{70}$   | 0                        | 0                         | 0                          | $-\frac{\sqrt{22}i}{14}$ | 0                         | 0                            | $-\frac{11\sqrt{165}i}{2100}$ | 0                             | 0                          | 0                          | $-\frac{\sqrt{55}i}{700}$     | 0                            | 0 |  |
|                                   | 0                          | $-\frac{\sqrt{22}i}{14}$ | 0                         | 0                          | 0                        | $\frac{\sqrt{110}i}{70}$  | 0                            | 0                             | $\frac{\sqrt{55}i}{700}$      | 0                          | 0                          | 0                             | $\frac{11\sqrt{165}i}{2100}$ | 0 |  |
|                                   | 0                          | 0                        | $\frac{\sqrt{33}i}{21}$   | 0                          | 0                        | 0                         | 0                            | 0                             | $\frac{3\sqrt{11}i}{140}$     | 0                          | 0                          | 0                             | $-\frac{\sqrt{385}i}{700}$   |   |  |
|                                   | 0                          | 0                        | $\frac{\sqrt{165}i}{140}$ | 0                          | 0                        | 0                         | 0                            | 0                             | $-\frac{2\sqrt{55}i}{385}$    | 0                          | 0                          | 0                             | 0                            |   |  |
|                                   | 0                          | 0                        | 0                         | $-\frac{\sqrt{33}i}{84}$   | 0                        | 0                         | $-\frac{3\sqrt{385}i}{1925}$ | 0                             | 0                             | $-\frac{\sqrt{11}i}{385}$  | 0                          | 0                             | 0                            |   |  |
|                                   | $-\frac{\sqrt{165}i}{140}$ | 0                        | 0                         | 0                          | $-\frac{\sqrt{33}i}{84}$ | 0                         | 0                            | $\frac{9\sqrt{110}i}{3850}$   | 0                             | 0                          | 0                          | $\frac{17\sqrt{330}i}{11550}$ | 0                            | 0 |  |
|                                   | 0                          | $\frac{\sqrt{33}i}{84}$  | 0                         | 0                          | 0                        | $\frac{\sqrt{165}i}{140}$ | 0                            | 0                             | $\frac{17\sqrt{330}i}{11550}$ | 0                          | 0                          | 0                             | $\frac{9\sqrt{110}i}{3850}$  | 0 |  |
|                                   | 0                          | 0                        | $\frac{\sqrt{33}i}{84}$   | 0                          | 0                        | 0                         | 0                            | 0                             | $-\frac{\sqrt{11}i}{385}$     | 0                          | 0                          | 0                             | $-\frac{3\sqrt{385}i}{1925}$ |   |  |
|                                   | 0                          | 0                        | 0                         | $-\frac{\sqrt{165}i}{140}$ | 0                        | 0                         | 0                            | 0                             | 0                             | $-\frac{2\sqrt{55}i}{385}$ | 0                          | 0                             | 0                            |   |  |

$$\begin{aligned} \text{bra:} &= \langle \frac{5}{2}, \frac{5}{2}; f |, \langle \frac{5}{2}, \frac{3}{2}; f |, \langle \frac{5}{2}, \frac{1}{2}; f |, \langle \frac{5}{2}, -\frac{1}{2}; f |, \langle \frac{5}{2}, -\frac{3}{2}; f |, \langle \frac{5}{2}, -\frac{5}{2}; f |, \langle \frac{7}{2}, \frac{7}{2}; f |, \langle \frac{7}{2}, \frac{5}{2}; f |, \langle \frac{7}{2}, \frac{3}{2}; f |, \langle \frac{7}{2}, \frac{1}{2}; f |, \langle \frac{7}{2}, -\frac{1}{2}; f |, \langle \frac{7}{2}, -\frac{3}{2}; f |, \langle \frac{7}{2}, -\frac{5}{2}; f |, \langle \frac{7}{2}, -\frac{7}{2}; f | \\ \text{ket:} &= | \frac{5}{2}, \frac{5}{2}; f \rangle, | \frac{5}{2}, \frac{3}{2}; f \rangle, | \frac{5}{2}, \frac{1}{2}; f \rangle, | \frac{5}{2}, -\frac{1}{2}; f \rangle, | \frac{5}{2}, -\frac{3}{2}; f \rangle, | \frac{5}{2}, -\frac{5}{2}; f \rangle, | \frac{7}{2}, \frac{7}{2}; f \rangle, | \frac{7}{2}, \frac{5}{2}; f \rangle, | \frac{7}{2}, \frac{3}{2}; f \rangle, | \frac{7}{2}, \frac{1}{2}; f \rangle, | \frac{7}{2}, -\frac{1}{2}; f \rangle, | \frac{7}{2}, -\frac{3}{2}; f \rangle, | \frac{7}{2}, -\frac{5}{2}; f \rangle, | \frac{7}{2}, -\frac{7}{2}; f \rangle \end{aligned}$$

Table 10: (f,f) block.

| No. | multipole | matrix |
|-----|-----------|--------|
| 829 | symmetry  | 1      |

*continued ...*

Table 10

| No.                       | multipole | matrix                                 |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |
|---------------------------|-----------|--|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| $\mathbb{Q}_0^{(a)}(A_1)$ |           | $\frac{\sqrt{14}}{14}$                 | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      |
|                           |           | 0                                      | $\frac{\sqrt{14}}{14}$ | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      |
|                           |           | 0                                      | 0                      | $\frac{\sqrt{14}}{14}$ | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      |
|                           |           | 0                                      | 0                      | 0                      | $\frac{\sqrt{14}}{14}$ | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      |
|                           |           | 0                                      | 0                      | 0                      | 0                      | $\frac{\sqrt{14}}{14}$ | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      |
|                           |           | 0                                      | 0                      | 0                      | 0                      | 0                      | $\frac{\sqrt{14}}{14}$ | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      |
|                           |           | 0                                      | 0                      | 0                      | 0                      | 0                      | 0                      | $\frac{\sqrt{14}}{14}$ | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      |
|                           |           | 0                                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | $\frac{\sqrt{14}}{14}$ | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      |
|                           |           | 0                                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | $\frac{\sqrt{14}}{14}$ | 0                      | 0                      | 0                      | 0                      | 0                      |
|                           |           | 0                                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | $\frac{\sqrt{14}}{14}$ | 0                      | 0                      | 0                      | 0                      |
|                           |           | 0                                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | $\frac{\sqrt{14}}{14}$ | 0                      | 0                      | 0                      |
|                           |           | 0                                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | $\frac{\sqrt{14}}{14}$ | 0                      | 0                      |
|                           |           | 0                                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | $\frac{\sqrt{14}}{14}$ | 0                      |
|                           |           | 0                                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | $\frac{\sqrt{14}}{14}$ |
| 830                       | symmetry  | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |

*continued ...*



Table 10

| No.                         | multipole | matrix                         |                          |                         |                         |                         |                          |                          |                           |                          |                           |                           |                          |                           |                          |
|-----------------------------|-----------|--------------------------------|--------------------------|-------------------------|-------------------------|-------------------------|--------------------------|--------------------------|---------------------------|--------------------------|---------------------------|---------------------------|--------------------------|---------------------------|--------------------------|
| $\mathbb{Q}_{2,0}^{(a)}(E)$ |           | $-\frac{5\sqrt{42}}{98}$       | 0                        | 0                       | 0                       | 0                       | 0                        | 0                        | $-\frac{5\sqrt{7}}{98}$   | 0                        | 0                         | 0                         | 0                        | 0                         | 0                        |
|                             |           | 0                              | $\frac{\sqrt{42}}{98}$   | 0                       | 0                       | 0                       | 0                        | 0                        | 0                         | $-\frac{\sqrt{105}}{98}$ | 0                         | 0                         | 0                        | 0                         | 0                        |
|                             |           | 0                              | 0                        | $\frac{2\sqrt{42}}{49}$ | 0                       | 0                       | 0                        | 0                        | 0                         | 0                        | $-\frac{\sqrt{14}}{98}$   | 0                         | 0                        | 0                         | 0                        |
|                             |           | 0                              | 0                        | 0                       | $\frac{2\sqrt{42}}{49}$ | 0                       | 0                        | 0                        | 0                         | 0                        | 0                         | $\frac{\sqrt{14}}{98}$    | 0                        | 0                         | 0                        |
|                             |           | 0                              | 0                        | 0                       | 0                       | $\frac{\sqrt{42}}{98}$  | 0                        | 0                        | 0                         | 0                        | 0                         | 0                         | $\frac{\sqrt{105}}{98}$  | 0                         | 0                        |
|                             |           | 0                              | 0                        | 0                       | 0                       | 0                       | $-\frac{5\sqrt{42}}{98}$ | 0                        | 0                         | 0                        | 0                         | 0                         | 0                        | $\frac{5\sqrt{7}}{98}$    | 0                        |
|                             |           | 0                              | 0                        | 0                       | 0                       | 0                       | 0                        | $-\frac{5\sqrt{42}}{84}$ | 0                         | 0                        | 0                         | 0                         | 0                        | 0                         | 0                        |
|                             |           | $-\frac{5\sqrt{7}}{98}$        | 0                        | 0                       | 0                       | 0                       | 0                        | 0                        | $-\frac{5\sqrt{42}}{588}$ | 0                        | 0                         | 0                         | 0                        | 0                         | 0                        |
|                             |           | 0                              | $-\frac{\sqrt{105}}{98}$ | 0                       | 0                       | 0                       | 0                        | 0                        | 0                         | $\frac{5\sqrt{42}}{196}$ | 0                         | 0                         | 0                        | 0                         | 0                        |
|                             |           | 0                              | 0                        | $-\frac{\sqrt{14}}{98}$ | 0                       | 0                       | 0                        | 0                        | 0                         | 0                        | $\frac{25\sqrt{42}}{588}$ | 0                         | 0                        | 0                         | 0                        |
|                             |           | 0                              | 0                        | 0                       | $\frac{\sqrt{14}}{98}$  | 0                       | 0                        | 0                        | 0                         | 0                        | 0                         | $\frac{25\sqrt{42}}{588}$ | 0                        | 0                         | 0                        |
|                             |           | 0                              | 0                        | 0                       | 0                       | $\frac{\sqrt{105}}{98}$ | 0                        | 0                        | 0                         | 0                        | 0                         | 0                         | $\frac{5\sqrt{42}}{196}$ | 0                         | 0                        |
|                             |           | 0                              | 0                        | 0                       | 0                       | 0                       | $\frac{5\sqrt{7}}{98}$   | 0                        | 0                         | 0                        | 0                         | 0                         | 0                        | $-\frac{5\sqrt{42}}{588}$ | 0                        |
|                             |           | 0                              | 0                        | 0                       | 0                       | 0                       | 0                        | 0                        | 0                         | 0                        | 0                         | 0                         | 0                        | 0                         | $-\frac{5\sqrt{42}}{84}$ |
| 831                         | symmetry  | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ |                          |                         |                         |                         |                          |                          |                           |                          |                           |                           |                          |                           |                          |

*continued ...*

Table 10

| No.                         | multipole | matrix                    |                           |                          |                           |                          |                          |                         |                           |                            |                            |                            |                           |                         |
|-----------------------------|-----------|---------------------------|---------------------------|--------------------------|---------------------------|--------------------------|--------------------------|-------------------------|---------------------------|----------------------------|----------------------------|----------------------------|---------------------------|-------------------------|
| $\mathbb{Q}_{2,1}^{(a)}(E)$ |           | 0                         | 0                         | $-\frac{3\sqrt{35}}{98}$ | 0                         | 0                        | 0                        | 0                       | 0                         | $-\frac{\sqrt{105}}{294}$  | 0                          | 0                          | 0                         | 0                       |
|                             |           | 0                         | 0                         | 0                        | $-\frac{9\sqrt{7}}{98}$   | 0                        | 0                        | $\frac{\sqrt{15}}{42}$  | 0                         | 0                          | $-\frac{2\sqrt{21}}{147}$  | 0                          | 0                         | 0                       |
|                             |           | $-\frac{3\sqrt{35}}{98}$  | 0                         | 0                        | 0                         | $-\frac{9\sqrt{7}}{98}$  | 0                        | 0                       | $\frac{\sqrt{210}}{147}$  | 0                          | 0                          | $-\frac{\sqrt{70}}{98}$    | 0                         | 0                       |
|                             |           | 0                         | $-\frac{9\sqrt{7}}{98}$   | 0                        | 0                         | 0                        | $-\frac{3\sqrt{35}}{98}$ | 0                       | 0                         | $\frac{\sqrt{70}}{98}$     | 0                          | 0                          | $-\frac{\sqrt{210}}{147}$ | 0                       |
|                             |           | 0                         | 0                         | $-\frac{9\sqrt{7}}{98}$  | 0                         | 0                        | 0                        | 0                       | 0                         | $\frac{2\sqrt{21}}{147}$   | 0                          | 0                          | 0                         | $-\frac{\sqrt{15}}{42}$ |
|                             |           | 0                         | 0                         | 0                        | $-\frac{3\sqrt{35}}{98}$  | 0                        | 0                        | 0                       | 0                         | 0                          | $\frac{\sqrt{105}}{294}$   | 0                          | 0                         | 0                       |
|                             |           | 0                         | $\frac{\sqrt{15}}{42}$    | 0                        | 0                         | 0                        | 0                        | 0                       | 0                         | $-\frac{5\sqrt{6}}{84}$    | 0                          | 0                          | 0                         | 0                       |
|                             |           | 0                         | 0                         | $\frac{\sqrt{210}}{147}$ | 0                         | 0                        | 0                        | 0                       | 0                         | $-\frac{5\sqrt{70}}{196}$  | 0                          | 0                          | 0                         | 0                       |
|                             |           | 0                         | 0                         | 0                        | $\frac{\sqrt{70}}{98}$    | 0                        | 0                        | $-\frac{5\sqrt{6}}{84}$ | 0                         | 0                          | $-\frac{5\sqrt{210}}{294}$ | 0                          | 0                         | 0                       |
|                             |           | $-\frac{\sqrt{105}}{294}$ | 0                         | 0                        | 0                         | $\frac{2\sqrt{21}}{147}$ | 0                        | 0                       | $-\frac{5\sqrt{70}}{196}$ | 0                          | 0                          | $-\frac{5\sqrt{210}}{294}$ | 0                         | 0                       |
|                             |           | 0                         | $-\frac{2\sqrt{21}}{147}$ | 0                        | 0                         | 0                        | $\frac{\sqrt{105}}{294}$ | 0                       | 0                         | $-\frac{5\sqrt{210}}{294}$ | 0                          | 0                          | $-\frac{5\sqrt{70}}{196}$ | 0                       |
|                             |           | 0                         | 0                         | $-\frac{\sqrt{70}}{98}$  | 0                         | 0                        | 0                        | 0                       | 0                         | $-\frac{5\sqrt{210}}{294}$ | 0                          | 0                          | 0                         | $-\frac{5\sqrt{6}}{84}$ |
|                             |           | 0                         | 0                         | 0                        | $-\frac{\sqrt{210}}{147}$ | 0                        | 0                        | 0                       | 0                         | 0                          | $-\frac{5\sqrt{70}}{196}$  | 0                          | 0                         | 0                       |
|                             |           | 0                         | 0                         | 0                        | 0                         | $-\frac{\sqrt{15}}{42}$  | 0                        | 0                       | 0                         | 0                          | 0                          | $-\frac{5\sqrt{6}}{84}$    | 0                         | 0                       |
| 832                         | symmetry  | $\sqrt{3}yz$              |                           |                          |                           |                          |                          |                         |                           |                            |                            |                            |                           |                         |

*continued ...*

Table 10

| No.                           | multipole | matrix                    |                             |                          |                           |                            |                           |                          |                            |                             |                            |                             |                           |                            |                          |
|-------------------------------|-----------|---------------------------|-----------------------------|--------------------------|---------------------------|----------------------------|---------------------------|--------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|---------------------------|----------------------------|--------------------------|
| $\mathbb{Q}_{2,0}^{(a)}(T_2)$ |           | 0                         | $\frac{3\sqrt{70}i}{98}$    | 0                        | 0                         | 0                          | 0                         | $\frac{5\sqrt{3}i}{84}$  | 0                          | $\frac{5\sqrt{7}i}{196}$    | 0                          | 0                           | 0                         | 0                          | 0                        |
|                               |           | $-\frac{3\sqrt{70}i}{98}$ | 0                           | $\frac{3\sqrt{7}i}{49}$  | 0                         | 0                          | 0                         | 0                        | $\frac{\sqrt{105}i}{588}$  | 0                           | $\frac{11\sqrt{21}i}{588}$ | 0                           | 0                         | 0                          | 0                        |
|                               |           | 0                         | $-\frac{3\sqrt{7}i}{49}$    | 0                        | 0                         | 0                          | 0                         | 0                        | 0                          | $-\frac{\sqrt{70}i}{196}$   | 0                          | $\frac{\sqrt{42}i}{84}$     | 0                         | 0                          | 0                        |
|                               |           | 0                         | 0                           | 0                        | 0                         | $-\frac{3\sqrt{7}i}{49}$   | 0                         | 0                        | 0                          | 0                           | $-\frac{\sqrt{42}i}{84}$   | 0                           | $\frac{\sqrt{70}i}{196}$  | 0                          | 0                        |
|                               |           | 0                         | 0                           | 0                        | $\frac{3\sqrt{7}i}{49}$   | 0                          | $-\frac{3\sqrt{70}i}{98}$ | 0                        | 0                          | 0                           | 0                          | $-\frac{11\sqrt{21}i}{588}$ | 0                         | $-\frac{\sqrt{105}i}{588}$ | 0                        |
|                               |           | 0                         | 0                           | 0                        | 0                         | $\frac{3\sqrt{70}i}{98}$   | 0                         | 0                        | 0                          | 0                           | 0                          | 0                           | $-\frac{5\sqrt{7}i}{196}$ | 0                          | $-\frac{5\sqrt{3}i}{84}$ |
|                               |           | $-\frac{5\sqrt{3}i}{84}$  | 0                           | 0                        | 0                         | 0                          | 0                         | 0                        | $\frac{5\sqrt{2}i}{28}$    | 0                           | 0                          | 0                           | 0                         | 0                          | 0                        |
|                               |           | 0                         | $-\frac{\sqrt{105}i}{588}$  | 0                        | 0                         | 0                          | 0                         | $-\frac{5\sqrt{2}i}{28}$ | 0                          | $\frac{5\sqrt{42}i}{147}$   | 0                          | 0                           | 0                         | 0                          | 0                        |
|                               |           | $-\frac{5\sqrt{7}i}{196}$ | 0                           | $\frac{\sqrt{70}i}{196}$ | 0                         | 0                          | 0                         | 0                        | $-\frac{5\sqrt{42}i}{147}$ | 0                           | $\frac{5\sqrt{210}i}{588}$ | 0                           | 0                         | 0                          | 0                        |
|                               |           | 0                         | $-\frac{11\sqrt{21}i}{588}$ | 0                        | $\frac{\sqrt{42}i}{84}$   | 0                          | 0                         | 0                        | 0                          | $-\frac{5\sqrt{210}i}{588}$ | 0                          | 0                           | 0                         | 0                          | 0                        |
|                               |           | 0                         | 0                           | $-\frac{\sqrt{42}i}{84}$ | 0                         | $\frac{11\sqrt{21}i}{588}$ | 0                         | 0                        | 0                          | 0                           | 0                          | $-\frac{5\sqrt{210}i}{588}$ | 0                         | 0                          | 0                        |
|                               |           | 0                         | 0                           | 0                        | $-\frac{\sqrt{70}i}{196}$ | 0                          | $\frac{5\sqrt{7}i}{196}$  | 0                        | 0                          | 0                           | 0                          | $\frac{5\sqrt{210}i}{588}$  | 0                         | $-\frac{5\sqrt{42}i}{147}$ | 0                        |
|                               |           | 0                         | 0                           | 0                        | 0                         | $\frac{\sqrt{105}i}{588}$  | 0                         | 0                        | 0                          | 0                           | 0                          | 0                           | $\frac{5\sqrt{42}i}{147}$ | 0                          | $-\frac{5\sqrt{2}i}{28}$ |
|                               |           | 0                         | 0                           | 0                        | 0                         | 0                          | $\frac{5\sqrt{3}i}{84}$   | 0                        | 0                          | 0                           | 0                          | 0                           | 0                         | $\frac{5\sqrt{2}i}{28}$    | 0                        |
| 833                           | symmetry  | $\sqrt{3}xz$              |                             |                          |                           |                            |                           |                          |                            |                             |                            |                             |                           |                            |                          |

*continued ...*

Table 10

| No.                           | multipole | matrix                   |                            |                          |                          |                            |                          |                         |                           |                            |                            |                            |                          |                          |                        |
|-------------------------------|-----------|--------------------------|----------------------------|--------------------------|--------------------------|----------------------------|--------------------------|-------------------------|---------------------------|----------------------------|----------------------------|----------------------------|--------------------------|--------------------------|------------------------|
| $\mathbb{Q}_{2,1}^{(a)}(T_2)$ |           | 0                        | $-\frac{3\sqrt{70}}{98}$   | 0                        | 0                        | 0                          | 0                        | $\frac{5\sqrt{3}}{84}$  | 0                         | $-\frac{5\sqrt{7}}{196}$   | 0                          | 0                          | 0                        | 0                        | 0                      |
|                               |           | $-\frac{3\sqrt{70}}{98}$ | 0                          | $-\frac{3\sqrt{7}}{49}$  | 0                        | 0                          | 0                        | 0                       | $\frac{\sqrt{105}}{588}$  | 0                          | $-\frac{11\sqrt{21}}{588}$ | 0                          | 0                        | 0                        | 0                      |
|                               |           | 0                        | $-\frac{3\sqrt{7}}{49}$    | 0                        | 0                        | 0                          | 0                        | 0                       | 0                         | $-\frac{\sqrt{70}}{196}$   | 0                          | $-\frac{\sqrt{42}}{84}$    | 0                        | 0                        | 0                      |
|                               |           | 0                        | 0                          | 0                        | 0                        | $\frac{3\sqrt{7}}{49}$     | 0                        | 0                       | 0                         | 0                          | $-\frac{\sqrt{42}}{84}$    | 0                          | $-\frac{\sqrt{70}}{196}$ | 0                        | 0                      |
|                               |           | 0                        | 0                          | 0                        | $\frac{3\sqrt{7}}{49}$   | 0                          | $\frac{3\sqrt{70}}{98}$  | 0                       | 0                         | 0                          | 0                          | $-\frac{11\sqrt{21}}{588}$ | 0                        | $\frac{\sqrt{105}}{588}$ | 0                      |
|                               |           | 0                        | 0                          | 0                        | 0                        | $\frac{3\sqrt{70}}{98}$    | 0                        | 0                       | 0                         | 0                          | 0                          | 0                          | $-\frac{5\sqrt{7}}{196}$ | 0                        | $\frac{5\sqrt{3}}{84}$ |
|                               |           | $\frac{5\sqrt{3}}{84}$   | 0                          | 0                        | 0                        | 0                          | 0                        | 0                       | $-\frac{5\sqrt{2}}{28}$   | 0                          | 0                          | 0                          | 0                        | 0                        | 0                      |
|                               |           | 0                        | $\frac{\sqrt{105}}{588}$   | 0                        | 0                        | 0                          | 0                        | $-\frac{5\sqrt{2}}{28}$ | 0                         | $-\frac{5\sqrt{42}}{147}$  | 0                          | 0                          | 0                        | 0                        | 0                      |
|                               |           | $-\frac{5\sqrt{7}}{196}$ | 0                          | $-\frac{\sqrt{70}}{196}$ | 0                        | 0                          | 0                        | 0                       | $-\frac{5\sqrt{42}}{147}$ | 0                          | $-\frac{5\sqrt{210}}{588}$ | 0                          | 0                        | 0                        | 0                      |
|                               |           | 0                        | $-\frac{11\sqrt{21}}{588}$ | 0                        | $-\frac{\sqrt{42}}{84}$  | 0                          | 0                        | 0                       | 0                         | $-\frac{5\sqrt{210}}{588}$ | 0                          | 0                          | 0                        | 0                        | 0                      |
|                               |           | 0                        | 0                          | $-\frac{\sqrt{42}}{84}$  | 0                        | $-\frac{11\sqrt{21}}{588}$ | 0                        | 0                       | 0                         | 0                          | 0                          | $\frac{5\sqrt{210}}{588}$  | 0                        | 0                        | 0                      |
|                               |           | 0                        | 0                          | 0                        | $-\frac{\sqrt{70}}{196}$ | 0                          | $-\frac{5\sqrt{7}}{196}$ | 0                       | 0                         | 0                          | 0                          | $\frac{5\sqrt{210}}{588}$  | 0                        | $\frac{5\sqrt{42}}{147}$ | 0                      |
|                               |           | 0                        | 0                          | 0                        | 0                        | $\frac{\sqrt{105}}{588}$   | 0                        | 0                       | 0                         | 0                          | 0                          | 0                          | $\frac{5\sqrt{42}}{147}$ | 0                        | $\frac{5\sqrt{2}}{28}$ |
|                               |           | 0                        | 0                          | 0                        | 0                        | 0                          | $\frac{5\sqrt{3}}{84}$   | 0                       | 0                         | 0                          | 0                          | 0                          | 0                        | $\frac{5\sqrt{2}}{28}$   | 0                      |
| 834                           | symmetry  | $\sqrt{3}xy$             |                            |                          |                          |                            |                          |                         |                           |                            |                            |                            |                          |                          |                        |

*continued ...*

Table 10

| No.                           | multipole                  | matrix                     |  |                            |                            |                            |                          |                            |                             |                             |                            |                            |                           |                         |  |
|-------------------------------|----------------------------|----------------------------|--|----------------------------|----------------------------|----------------------------|--------------------------|----------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|---------------------------|-------------------------|--|
| $\mathbb{Q}_{2,2}^{(a)}(T_2)$ | 0                          | 0                          | $\frac{3\sqrt{35}i}{98}$                                   | 0                          | 0                          | 0                          | 0                        | 0                          | 0                           | $\frac{\sqrt{105}i}{294}$   | 0                          | 0                          | 0                         | 0                       |  |
|                               | 0                          | 0                          | 0  | $\frac{9\sqrt{7}i}{98}$    | 0                          | 0                          | $\frac{\sqrt{15}i}{42}$  | 0                          | 0                           | 0                           | $\frac{2\sqrt{21}i}{147}$  | 0                          | 0                         | 0                       |  |
|                               | $-\frac{3\sqrt{35}i}{98}$  | 0                          | 0  | 0                          | $\frac{9\sqrt{7}i}{98}$    | 0                          | 0                        | $\frac{\sqrt{210}i}{147}$  | 0                           | 0                           | 0                          | $\frac{\sqrt{70}i}{98}$    | 0                         | 0                       |  |
|                               | 0                          | $-\frac{9\sqrt{7}i}{98}$   | 0  | 0                          | 0                          | $\frac{3\sqrt{35}i}{98}$   | 0                        | 0                          | $\frac{\sqrt{70}i}{98}$     | 0                           | 0                          | 0                          | $\frac{\sqrt{210}i}{147}$ | 0                       |  |
|                               | 0                          | 0                          | $-\frac{9\sqrt{7}i}{98}$                                   | 0                          | 0                          | 0                          | 0                        | 0                          | 0                           | $\frac{2\sqrt{21}i}{147}$   | 0                          | 0                          | 0                         | $\frac{\sqrt{15}i}{42}$ |  |
|                               | 0                          | 0                          | 0  | $-\frac{3\sqrt{35}i}{98}$  | 0                          | 0                          | 0                        | 0                          | 0                           | 0                           | $\frac{\sqrt{105}i}{294}$  | 0                          | 0                         | 0                       |  |
|                               | 0                          | $-\frac{\sqrt{15}i}{42}$   | 0  | 0                          | 0                          | 0                          | 0                        | 0                          | $\frac{5\sqrt{6}i}{84}$     | 0                           | 0                          | 0                          | 0                         | 0                       |  |
|                               | 0                          | 0                          | $-\frac{\sqrt{210}i}{147}$                                 | 0                          | 0                          | 0                          | 0                        | 0                          | 0                           | $\frac{5\sqrt{70}i}{196}$   | 0                          | 0                          | 0                         | 0                       |  |
|                               | 0                          | 0                          | 0  | $-\frac{\sqrt{70}i}{98}$   | 0                          | 0                          | $-\frac{5\sqrt{6}i}{84}$ | 0                          | 0                           | 0                           | $\frac{5\sqrt{210}i}{294}$ | 0                          | 0                         | 0                       |  |
|                               | $-\frac{\sqrt{105}i}{294}$ | 0                          | 0  | 0                          | $-\frac{2\sqrt{21}i}{147}$ | 0                          | 0                        | $-\frac{5\sqrt{70}i}{196}$ | 0                           | 0                           | 0                          | $\frac{5\sqrt{210}i}{294}$ | 0                         | 0                       |  |
|                               | 0                          | $-\frac{2\sqrt{21}i}{147}$ | 0  | 0                          | 0                          | $-\frac{\sqrt{105}i}{294}$ | 0                        | 0                          | $-\frac{5\sqrt{210}i}{294}$ | 0                           | 0                          | 0                          | $\frac{5\sqrt{70}i}{196}$ | 0                       |  |
|                               | 0                          | 0                          | $-\frac{\sqrt{70}i}{98}$                                   | 0                          | 0                          | 0                          | 0                        | 0                          | 0                           | $-\frac{5\sqrt{210}i}{294}$ | 0                          | 0                          | 0                         | $\frac{5\sqrt{6}i}{84}$ |  |
|                               | 0                          | 0                          | 0  | $-\frac{\sqrt{210}i}{147}$ | 0                          | 0                          | 0                        | 0                          | 0                           | 0                           | $-\frac{5\sqrt{70}i}{196}$ | 0                          | 0                         | 0                       |  |
|                               | 0                          | 0                          | 0  | 0                          | $-\frac{\sqrt{15}i}{42}$   | 0                          | 0                        | 0                          | 0                           | 0                           | 0                          | $-\frac{5\sqrt{6}i}{84}$   | 0                         | 0                       |  |
|                               | 835                        | symmetry                   | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$ |                            |                            |                            |                          |                            |                             |                             |                            |                            |                           |                         |  |

continued ...

Table 10

| No.                       | multipole | matrix   |                            |                           |                           |                           |                           |                           |                            |                            |   |                           |                           |                            |                           |
|---------------------------|-----------|--|----------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|----------------------------|----------------------------|---|---------------------------|---------------------------|----------------------------|---------------------------|
| $\mathbb{Q}_4^{(a)}(A_1)$ |           | $\frac{\sqrt{33}}{84}$   | 0                          | 0                         | 0                         | $\frac{\sqrt{165}}{84}$   | 0                         | 0                         | $\frac{5\sqrt{22}}{154}$   | 0                          | 0 | 0                         | $\frac{5\sqrt{66}}{462}$  | 0                          | 0                         |
|                           |           | 0  | $-\frac{\sqrt{33}}{28}$    | 0                         | 0                         | 0                         | $\frac{\sqrt{165}}{84}$   | 0                         | 0                          | $-\frac{2\sqrt{330}}{231}$ | 0 | 0                         | 0                         | $\frac{\sqrt{110}}{77}$    | 0                         |
|                           |           | 0  | 0                          | $\frac{\sqrt{33}}{42}$    | 0                         | 0                         | 0                         | 0                         | 0                          | $-\frac{5\sqrt{11}}{154}$  | 0 | 0                         | 0                         | 0                          | $\frac{\sqrt{385}}{154}$  |
|                           |           | 0  | 0                          | 0                         | $\frac{\sqrt{33}}{42}$    | 0                         | 0                         | $-\frac{\sqrt{385}}{154}$ | 0                          | 0                          | 0 | $\frac{5\sqrt{11}}{154}$  | 0                         | 0                          | 0                         |
|                           |           | $\frac{\sqrt{165}}{84}$  | 0                          | 0                         | 0                         | $-\frac{\sqrt{33}}{28}$   | 0                         | 0                         | $-\frac{\sqrt{110}}{77}$   | 0                          | 0 | 0                         | $\frac{2\sqrt{330}}{231}$ | 0                          | 0                         |
|                           |           | 0  | $\frac{\sqrt{165}}{84}$    | 0                         | 0                         | 0                         | $\frac{\sqrt{33}}{84}$    | 0                         | 0                          | $-\frac{5\sqrt{66}}{462}$  | 0 | 0                         | 0                         | $-\frac{5\sqrt{22}}{154}$  | 0                         |
|                           |           | 0  | 0                          | 0                         | $-\frac{\sqrt{385}}{154}$ | 0                         | 0                         | $\frac{\sqrt{33}}{44}$    | 0                          | 0                          | 0 | $\frac{\sqrt{1155}}{308}$ | 0                         | 0                          | 0                         |
|                           |           | $\frac{5\sqrt{22}}{154}$                                       | 0                          | 0                         | 0                         | $-\frac{\sqrt{110}}{77}$  | 0                         | 0                         | $-\frac{13\sqrt{33}}{308}$ | 0                          | 0 | 0                         | $\frac{15\sqrt{11}}{308}$ | 0                          | 0                         |
|                           |           | 0  | $-\frac{2\sqrt{330}}{231}$ | 0                         | 0                         | 0                         | $-\frac{5\sqrt{66}}{462}$ | 0                         | 0                          | $-\frac{3\sqrt{33}}{308}$  | 0 | 0                         | 0                         | $\frac{15\sqrt{11}}{308}$  | 0                         |
|                           |           | 0  | 0                          | $-\frac{5\sqrt{11}}{154}$ | 0                         | 0                         | 0                         | 0                         | 0                          | $\frac{9\sqrt{33}}{308}$   | 0 | 0                         | 0                         | 0                          | $\frac{\sqrt{1155}}{308}$ |
|                           |           | 0  | 0                          | 0                         | $\frac{5\sqrt{11}}{154}$  | 0                         | 0                         | $\frac{\sqrt{1155}}{308}$ | 0                          | 0                          | 0 | $\frac{9\sqrt{33}}{308}$  | 0                         | 0                          | 0                         |
|                           |           | $\frac{5\sqrt{66}}{462}$                                       | 0                          | 0                         | 0                         | $\frac{2\sqrt{330}}{231}$ | 0                         | 0                         | $\frac{15\sqrt{11}}{308}$  | 0                          | 0 | 0                         | $-\frac{3\sqrt{33}}{308}$ | 0                          | 0                         |
|                           |           | 0  | $\frac{\sqrt{110}}{77}$    | 0                         | 0                         | 0                         | $-\frac{5\sqrt{22}}{154}$ | 0                         | 0                          | $\frac{15\sqrt{11}}{308}$  | 0 | 0                         | 0                         | $-\frac{13\sqrt{33}}{308}$ | 0                         |
|                           |           | 0  | 0                          | $\frac{\sqrt{385}}{154}$  | 0                         | 0                         | 0                         | 0                         | 0                          | $\frac{\sqrt{1155}}{308}$  | 0 | 0                         | 0                         | 0                          | $\frac{\sqrt{33}}{44}$    |
| 836                       | symmetry  | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ |                            |                           |                           |                           |                           |                           |                            |                            |   |                           |                           |                            |                           |

*continued ...*

Table 10

| No.                         | multipole | matrix                                       |                              |                             |                            |                             |                             |                           |                               |                              |                             |                             |                              |                               |                           |
|-----------------------------|-----------|--|------------------------------|-----------------------------|----------------------------|-----------------------------|-----------------------------|---------------------------|-------------------------------|------------------------------|-----------------------------|-----------------------------|------------------------------|-------------------------------|---------------------------|
| $\mathbb{Q}_{4,0}^{(a)}(E)$ |           | $\frac{\sqrt{1155}}{588}$                    | 0                            | 0                           | 0                          | $-\frac{\sqrt{231}}{84}$    | 0                           | 0                         | $\frac{5\sqrt{770}}{1078}$    | 0                            | 0                           | 0                           | $-\frac{\sqrt{2310}}{462}$   | 0                             | 0                         |
|                             |           | 0  | $-\frac{\sqrt{1155}}{196}$   | 0                           | 0                          | 0                           | $-\frac{\sqrt{231}}{84}$    | 0                         | 0                             | $-\frac{10\sqrt{462}}{1617}$ | 0                           | 0                           | 0                            | $-\frac{\sqrt{154}}{77}$      | 0                         |
|                             |           | 0  | 0                            | $\frac{\sqrt{1155}}{294}$   | 0                          | 0                           | 0                           | 0                         | 0                             | 0                            | $-\frac{5\sqrt{385}}{1078}$ | 0                           | 0                            | 0                             | $-\frac{\sqrt{11}}{22}$   |
|                             |           | 0  | 0                            | 0                           | $\frac{\sqrt{1155}}{294}$  | 0                           | 0                           | $\frac{\sqrt{11}}{22}$    | 0                             | 0                            | 0                           | $\frac{5\sqrt{385}}{1078}$  | 0                            | 0                             | 0                         |
|                             |           | $-\frac{\sqrt{231}}{84}$                     | 0                            | 0                           | 0                          | $-\frac{\sqrt{1155}}{196}$  | 0                           | 0                         | $\frac{\sqrt{154}}{77}$       | 0                            | 0                           | 0                           | $\frac{10\sqrt{462}}{1617}$  | 0                             | 0                         |
|                             |           | 0  | $-\frac{\sqrt{231}}{84}$     | 0                           | 0                          | 0                           | $\frac{\sqrt{1155}}{588}$   | 0                         | 0                             | $\frac{\sqrt{2310}}{462}$    | 0                           | 0                           | 0                            | $-\frac{5\sqrt{770}}{1078}$   | 0                         |
|                             |           | 0  | 0                            | 0                           | $\frac{\sqrt{11}}{22}$     | 0                           | 0                           | $\frac{\sqrt{1155}}{308}$ | 0                             | 0                            | 0                           | $-\frac{\sqrt{33}}{44}$     | 0                            | 0                             | 0                         |
|                             |           | $\frac{5\sqrt{770}}{1078}$                   | 0                            | 0                           | 0                          | $\frac{\sqrt{154}}{77}$     | 0                           | 0                         | $-\frac{13\sqrt{1155}}{2156}$ | 0                            | 0                           | 0                           | $-\frac{3\sqrt{385}}{308}$   | 0                             | 0                         |
|                             |           | 0  | $-\frac{10\sqrt{462}}{1617}$ | 0                           | 0                          | 0                           | $\frac{\sqrt{2310}}{462}$   | 0                         | 0                             | $-\frac{3\sqrt{1155}}{2156}$ | 0                           | 0                           | 0                            | $-\frac{3\sqrt{385}}{308}$    | 0                         |
|                             |           | 0  | 0                            | $-\frac{5\sqrt{385}}{1078}$ | 0                          | 0                           | 0                           | 0                         | 0                             | 0                            | $\frac{9\sqrt{1155}}{2156}$ | 0                           | 0                            | 0                             | $-\frac{\sqrt{33}}{44}$   |
|                             |           | 0  | 0                            | 0                           | $\frac{5\sqrt{385}}{1078}$ | 0                           | 0                           | $-\frac{\sqrt{33}}{44}$   | 0                             | 0                            | 0                           | $\frac{9\sqrt{1155}}{2156}$ | 0                            | 0                             | 0                         |
|                             |           | $-\frac{\sqrt{2310}}{462}$                   | 0                            | 0                           | 0                          | $\frac{10\sqrt{462}}{1617}$ | 0                           | 0                         | $-\frac{3\sqrt{385}}{308}$    | 0                            | 0                           | 0                           | $-\frac{3\sqrt{1155}}{2156}$ | 0                             | 0                         |
|                             |           | 0  | $-\frac{\sqrt{154}}{77}$     | 0                           | 0                          | 0                           | $-\frac{5\sqrt{770}}{1078}$ | 0                         | 0                             | $-\frac{3\sqrt{385}}{308}$   | 0                           | 0                           | 0                            | $-\frac{13\sqrt{1155}}{2156}$ | 0                         |
|                             |           | 0  | 0                            | $-\frac{\sqrt{11}}{22}$     | 0                          | 0                           | 0                           | 0                         | 0                             | 0                            | $-\frac{\sqrt{33}}{44}$     | 0                           | 0                            | 0                             | $\frac{\sqrt{1155}}{308}$ |
| 837                         | symmetry  | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ |                              |                             |                            |                             |                             |                           |                               |                              |                             |                             |                              |                               |                           |

*continued ...*

Table 10

| No.                         | multipole                  | matrix                            |                             |                             |                            |                            |                            |                             |                             |                            |                             |                            |                            |                            |  |
|-----------------------------|----------------------------|-----------------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|----------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|--|
| $\mathbb{Q}_{4,1}^{(a)}(E)$ | 0                          | 0                                 | $-\frac{3\sqrt{154}}{196}$  | 0                           | 0                          | 0                          | 0                          | 0                           | 0                           | $-\frac{5\sqrt{462}}{539}$ | 0                           | 0                          | 0                          | 0                          |  |
|                             | 0                          | 0                                 | 0                           | $\frac{\sqrt{770}}{196}$    | 0                          | 0                          | $\frac{3\sqrt{66}}{154}$   | 0                           | 0                           | 0                          | $-\frac{\sqrt{2310}}{1078}$ | 0                          | 0                          | 0                          |  |
|                             | $-\frac{3\sqrt{154}}{196}$ | 0                                 | 0                           | 0                           | $\frac{\sqrt{770}}{196}$   | 0                          | 0                          | $-\frac{9\sqrt{231}}{1078}$ | 0                           | 0                          | 0                           | $\frac{17\sqrt{77}}{1078}$ | 0                          | 0                          |  |
|                             | 0                          | $\frac{\sqrt{770}}{196}$          | 0                           | 0                           | 0                          | $-\frac{3\sqrt{154}}{196}$ | 0                          | 0                           | $-\frac{17\sqrt{77}}{1078}$ | 0                          | 0                           | 0                          | $\frac{9\sqrt{231}}{1078}$ | 0                          |  |
|                             | 0                          | 0                                 | $\frac{\sqrt{770}}{196}$    | 0                           | 0                          | 0                          | 0                          | 0                           | 0                           | $\frac{\sqrt{2310}}{1078}$ | 0                           | 0                          | 0                          | $-\frac{3\sqrt{66}}{154}$  |  |
|                             | 0                          | 0                                 | 0                           | $-\frac{3\sqrt{154}}{196}$  | 0                          | 0                          | 0                          | 0                           | 0                           | 0                          | $\frac{5\sqrt{462}}{539}$   | 0                          | 0                          | 0                          |  |
|                             | 0                          | $\frac{3\sqrt{66}}{154}$          | 0                           | 0                           | 0                          | 0                          | 0                          | 0                           | $-\frac{3\sqrt{165}}{154}$  | 0                          | 0                           | 0                          | 0                          | 0                          |  |
|                             | 0                          | 0                                 | $-\frac{9\sqrt{231}}{1078}$ | 0                           | 0                          | 0                          | 0                          | 0                           | 0                           | $-\frac{3\sqrt{77}}{1078}$ | 0                           | 0                          | 0                          | 0                          |  |
|                             | 0                          | 0                                 | 0                           | $-\frac{17\sqrt{77}}{1078}$ | 0                          | 0                          | $-\frac{3\sqrt{165}}{154}$ | 0                           | 0                           | 0                          | $\frac{6\sqrt{231}}{539}$   | 0                          | 0                          | 0                          |  |
|                             | $-\frac{5\sqrt{462}}{539}$ | 0                                 | 0                           | 0                           | $\frac{\sqrt{2310}}{1078}$ | 0                          | 0                          | $-\frac{3\sqrt{77}}{1078}$  | 0                           | 0                          | 0                           | $\frac{6\sqrt{231}}{539}$  | 0                          | 0                          |  |
|                             | 0                          | $-\frac{\sqrt{2310}}{1078}$       | 0                           | 0                           | 0                          | $\frac{5\sqrt{462}}{539}$  | 0                          | 0                           | $\frac{6\sqrt{231}}{539}$   | 0                          | 0                           | 0                          | $-\frac{3\sqrt{77}}{1078}$ | 0                          |  |
|                             | 0                          | 0                                 | $\frac{17\sqrt{77}}{1078}$  | 0                           | 0                          | 0                          | 0                          | 0                           | 0                           | $\frac{6\sqrt{231}}{539}$  | 0                           | 0                          | 0                          | $-\frac{3\sqrt{165}}{154}$ |  |
|                             | 0                          | 0                                 | 0                           | $\frac{9\sqrt{231}}{1078}$  | 0                          | 0                          | 0                          | 0                           | 0                           | 0                          | $-\frac{3\sqrt{77}}{1078}$  | 0                          | 0                          | 0                          |  |
|                             | 0                          | 0                                 | 0                           | 0                           | $-\frac{3\sqrt{66}}{154}$  | 0                          | 0                          | 0                           | 0                           | 0                          | 0                           | $-\frac{3\sqrt{165}}{154}$ | 0                          | 0                          |  |
| 838                         | symmetry                   | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$ |                             |                             |                            |                            |                            |                             |                             |                            |                             |                            |                            |                            |  |

*continued ...*



Table 10

| No.                           | multipole | matrix                             |                            |                             |                            |                             |                            |                             |                             |                             |                            |                            |                             |                            |                             |
|-------------------------------|-----------|------------------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|
| $\mathbb{Q}_{4,0}^{(a)}(T_1)$ |           | 0                                  | $\frac{\sqrt{11}i}{28}$    | 0                           | $\frac{\sqrt{22}i}{56}$    | 0                           | 0                          | $\frac{\sqrt{2310}i}{616}$  | 0                           | $\frac{5\sqrt{110}i}{308}$  | 0                          | $\frac{5\sqrt{66}i}{616}$  | 0                           | 0                          | 0                           |
|                               |           | $-\frac{\sqrt{11}i}{28}$           | 0                          | $-\frac{\sqrt{110}i}{56}$   | 0                          | 0                           | 0                          | 0                           | $-\frac{13\sqrt{66}i}{616}$ | 0                           | $-\frac{\sqrt{330}i}{308}$ | 0                          | $\frac{\sqrt{22}i}{88}$     | 0                          | 0                           |
|                               |           | 0                                  | $\frac{\sqrt{110}i}{56}$   | 0                           | 0                          | 0                           | $-\frac{\sqrt{22}i}{56}$   | $\frac{3\sqrt{231}i}{616}$  | 0                           | $\frac{\sqrt{11}i}{616}$    | 0                          | $-\frac{\sqrt{165}i}{88}$  | 0                           | $-\frac{\sqrt{33}i}{616}$  | 0                           |
|                               |           | $-\frac{\sqrt{22}i}{56}$           | 0                          | 0                           | 0                          | $\frac{\sqrt{110}i}{56}$    | 0                          | 0                           | $\frac{\sqrt{33}i}{616}$    | 0                           | $\frac{\sqrt{165}i}{88}$   | 0                          | $-\frac{\sqrt{11}i}{616}$   | 0                          | $-\frac{3\sqrt{231}i}{616}$ |
|                               |           | 0                                  | 0                          | 0                           | $-\frac{\sqrt{110}i}{56}$  | 0                           | $-\frac{\sqrt{11}i}{28}$   | 0                           | 0                           | $-\frac{\sqrt{22}i}{88}$    | 0                          | $\frac{\sqrt{330}i}{308}$  | 0                           | $\frac{13\sqrt{66}i}{616}$ | 0                           |
|                               |           | 0                                  | 0                          | $\frac{\sqrt{22}i}{56}$     | 0                          | $\frac{\sqrt{11}i}{28}$     | 0                          | 0                           | 0                           | 0                           | $-\frac{5\sqrt{66}i}{616}$ | 0                          | $-\frac{5\sqrt{110}i}{308}$ | 0                          | $-\frac{\sqrt{2310}i}{616}$ |
|                               |           | $-\frac{\sqrt{2310}i}{616}$        | 0                          | $-\frac{3\sqrt{231}i}{616}$ | 0                          | 0                           | 0                          | 0                           | $\frac{3\sqrt{385}i}{308}$  | 0                           | $\frac{3\sqrt{77}i}{308}$  | 0                          | 0                           | 0                          | 0                           |
|                               |           | 0                                  | $\frac{13\sqrt{66}i}{616}$ | 0                           | $-\frac{\sqrt{33}i}{616}$  | 0                           | 0                          | $-\frac{3\sqrt{385}i}{308}$ | 0                           | $-\frac{3\sqrt{165}i}{308}$ | 0                          | $\frac{3\sqrt{11}i}{154}$  | 0                           | 0                          | 0                           |
|                               |           | $-\frac{5\sqrt{110}i}{308}$        | 0                          | $-\frac{\sqrt{11}i}{616}$   | 0                          | $\frac{\sqrt{22}i}{88}$     | 0                          | 0                           | $\frac{3\sqrt{165}i}{308}$  | 0                           | $-\frac{9\sqrt{33}i}{308}$ | 0                          | 0                           | 0                          | 0                           |
|                               |           | 0                                  | $\frac{\sqrt{330}i}{308}$  | 0                           | $-\frac{\sqrt{165}i}{88}$  | 0                           | $\frac{5\sqrt{66}i}{616}$  | $-\frac{3\sqrt{77}i}{308}$  | 0                           | $\frac{9\sqrt{33}i}{308}$   | 0                          | 0                          | 0                           | $-\frac{3\sqrt{11}i}{154}$ | 0                           |
|                               |           | $-\frac{5\sqrt{66}i}{616}$         | 0                          | $\frac{\sqrt{165}i}{88}$    | 0                          | $-\frac{\sqrt{330}i}{308}$  | 0                          | 0                           | $-\frac{3\sqrt{11}i}{154}$  | 0                           | 0                          | 0                          | $\frac{9\sqrt{33}i}{308}$   | 0                          | $-\frac{3\sqrt{77}i}{308}$  |
|                               |           | 0                                  | $-\frac{\sqrt{22}i}{88}$   | 0                           | $\frac{\sqrt{11}i}{616}$   | 0                           | $\frac{5\sqrt{110}i}{308}$ | 0                           | 0                           | 0                           | 0                          | $-\frac{9\sqrt{33}i}{308}$ | 0                           | $\frac{3\sqrt{165}i}{308}$ | 0                           |
|                               |           | 0                                  | 0                          | $\frac{\sqrt{33}i}{616}$    | 0                          | $-\frac{13\sqrt{66}i}{616}$ | 0                          | 0                           | 0                           | 0                           | $\frac{3\sqrt{11}i}{154}$  | 0                          | $-\frac{3\sqrt{165}i}{308}$ | 0                          | $-\frac{3\sqrt{385}i}{308}$ |
|                               |           | 0                                  | 0                          | 0                           | $\frac{3\sqrt{231}i}{616}$ | 0                           | $\frac{\sqrt{2310}i}{616}$ | 0                           | 0                           | 0                           | 0                          | $\frac{3\sqrt{77}i}{308}$  | 0                           | $\frac{3\sqrt{385}i}{308}$ | 0                           |
| 839                           | symmetry  | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ |                            |                             |                            |                             |                            |                             |                             |                             |                            |                            |                             |                            |                             |

continued ...

Table 10

| No.                           | multipole | matrix                            |                           |                           |                           |                           |                            |                            |                            |                            |                           |                           |                           |                            |                            |
|-------------------------------|-----------|-----------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|---------------------------|---------------------------|----------------------------|----------------------------|
| $\mathbb{Q}_{4,1}^{(a)}(T_1)$ |           | 0                                 | $\frac{\sqrt{11}}{28}$    | 0                         | $-\frac{\sqrt{22}}{56}$   | 0                         | 0                          | $-\frac{\sqrt{2310}}{616}$ | 0                          | $\frac{5\sqrt{110}}{308}$  | 0                         | $-\frac{5\sqrt{66}}{616}$ | 0                         | 0                          | 0                          |
|                               |           | $\frac{\sqrt{11}}{28}$            | 0                         | $-\frac{\sqrt{110}}{56}$  | 0                         | 0                         | 0                          | 0                          | $\frac{13\sqrt{66}}{616}$  | 0                          | $-\frac{\sqrt{330}}{308}$ | 0                         | $-\frac{\sqrt{22}}{88}$   | 0                          | 0                          |
|                               |           | 0                                 | $-\frac{\sqrt{110}}{56}$  | 0                         | 0                         | 0                         | $\frac{\sqrt{22}}{56}$     | $\frac{3\sqrt{231}}{616}$  | 0                          | $-\frac{\sqrt{11}}{616}$   | 0                         | $-\frac{\sqrt{165}}{88}$  | 0                         | $\frac{\sqrt{33}}{616}$    | 0                          |
|                               |           | $-\frac{\sqrt{22}}{56}$           | 0                         | 0                         | 0                         | $\frac{\sqrt{110}}{56}$   | 0                          | 0                          | $\frac{\sqrt{33}}{616}$    | 0                          | $-\frac{\sqrt{165}}{88}$  | 0                         | $-\frac{\sqrt{11}}{616}$  | 0                          | $\frac{3\sqrt{231}}{616}$  |
|                               |           | 0                                 | 0                         | 0                         | $\frac{\sqrt{110}}{56}$   | 0                         | $-\frac{\sqrt{11}}{28}$    | 0                          | 0                          | $-\frac{\sqrt{22}}{88}$    | 0                         | $-\frac{\sqrt{330}}{308}$ | 0                         | $\frac{13\sqrt{66}}{616}$  | 0                          |
|                               |           | 0                                 | 0                         | $\frac{\sqrt{22}}{56}$    | 0                         | $-\frac{\sqrt{11}}{28}$   | 0                          | 0                          | 0                          | 0                          | $-\frac{5\sqrt{66}}{616}$ | 0                         | $\frac{5\sqrt{110}}{308}$ | 0                          | $-\frac{\sqrt{2310}}{616}$ |
|                               |           | $-\frac{\sqrt{2310}}{616}$        | 0                         | $\frac{3\sqrt{231}}{616}$ | 0                         | 0                         | 0                          | 0                          | $\frac{3\sqrt{385}}{308}$  | 0                          | $-\frac{3\sqrt{77}}{308}$ | 0                         | 0                         | 0                          | 0                          |
|                               |           | 0                                 | $\frac{13\sqrt{66}}{616}$ | 0                         | $\frac{\sqrt{33}}{616}$   | 0                         | 0                          | $\frac{3\sqrt{385}}{308}$  | 0                          | $-\frac{3\sqrt{165}}{308}$ | 0                         | $-\frac{3\sqrt{11}}{154}$ | 0                         | 0                          | 0                          |
|                               |           | $\frac{5\sqrt{110}}{308}$         | 0                         | $-\frac{\sqrt{11}}{616}$  | 0                         | $-\frac{\sqrt{22}}{88}$   | 0                          | 0                          | $-\frac{3\sqrt{165}}{308}$ | 0                          | $-\frac{9\sqrt{33}}{308}$ | 0                         | 0                         | 0                          | 0                          |
|                               |           | 0                                 | $-\frac{\sqrt{330}}{308}$ | 0                         | $-\frac{\sqrt{165}}{88}$  | 0                         | $-\frac{5\sqrt{66}}{616}$  | $-\frac{3\sqrt{77}}{308}$  | 0                          | $-\frac{9\sqrt{33}}{308}$  | 0                         | 0                         | 0                         | $\frac{3\sqrt{11}}{154}$   | 0                          |
|                               |           | $-\frac{5\sqrt{66}}{616}$         | 0                         | $-\frac{\sqrt{165}}{88}$  | 0                         | $-\frac{\sqrt{330}}{308}$ | 0                          | 0                          | $-\frac{3\sqrt{11}}{154}$  | 0                          | 0                         | 0                         | $\frac{9\sqrt{33}}{308}$  | 0                          | $\frac{3\sqrt{77}}{308}$   |
|                               |           | 0                                 | $-\frac{\sqrt{22}}{88}$   | 0                         | $-\frac{\sqrt{11}}{616}$  | 0                         | $\frac{5\sqrt{110}}{308}$  | 0                          | 0                          | 0                          | 0                         | $\frac{9\sqrt{33}}{308}$  | 0                         | $\frac{3\sqrt{165}}{308}$  | 0                          |
|                               |           | 0                                 | 0                         | $\frac{\sqrt{33}}{616}$   | 0                         | $\frac{13\sqrt{66}}{616}$ | 0                          | 0                          | 0                          | 0                          | $\frac{3\sqrt{11}}{154}$  | 0                         | $\frac{3\sqrt{165}}{308}$ | 0                          | $-\frac{3\sqrt{385}}{308}$ |
|                               |           | 0                                 | 0                         | 0                         | $\frac{3\sqrt{231}}{616}$ | 0                         | $-\frac{\sqrt{2310}}{616}$ | 0                          | 0                          | 0                          | 0                         | $\frac{3\sqrt{77}}{308}$  | 0                         | $-\frac{3\sqrt{385}}{308}$ | 0                          |
| 840                           | symmetry  | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$ |                           |                           |                           |                           |                            |                            |                            |                            |                           |                           |                           |                            |                            |

*continued ...*

Table 10

| No.                           | multipole | matrix                               |                          |                          |                          |                          |                          |                           |                            |                            |                            |                             |                             |                            |  |
|-------------------------------|-----------|--------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|----------------------------|--|
| $\mathbb{Q}_{4,2}^{(a)}(T_1)$ |           | 0                                    | 0                        | 0                        | 0                        | $-\frac{\sqrt{11}i}{14}$ | 0                        | 0                         | 0                          | 0                          | 0                          | $-\frac{\sqrt{110}i}{77}$   | 0                           | 0                          |  |
|                               |           | 0                                    | 0                        | 0                        | 0                        | 0                        | $-\frac{\sqrt{11}i}{14}$ | 0                         | 0                          | 0                          | 0                          | 0                           | $-\frac{2\sqrt{66}i}{77}$   | 0                          |  |
|                               |           | 0                                    | 0                        | 0                        | 0                        | 0                        | 0                        | 0                         | 0                          | 0                          | 0                          | 0                           | 0                           | $-\frac{\sqrt{231}i}{77}$  |  |
|                               |           | 0                                    | 0                        | 0                        | 0                        | 0                        | 0                        | $-\frac{\sqrt{231}i}{77}$ | 0                          | 0                          | 0                          | 0                           | 0                           | 0                          |  |
|                               |           | $\frac{\sqrt{11}i}{14}$              | 0                        | 0                        | 0                        | 0                        | 0                        | 0                         | $-\frac{2\sqrt{66}i}{77}$  | 0                          | 0                          | 0                           | 0                           | 0                          |  |
|                               |           | 0                                    | $\frac{\sqrt{11}i}{14}$  | 0                        | 0                        | 0                        | 0                        | 0                         | 0                          | $-\frac{\sqrt{110}i}{77}$  | 0                          | 0                           | 0                           | 0                          |  |
|                               |           | 0                                    | 0                        | 0                        | $\frac{\sqrt{231}i}{77}$ | 0                        | 0                        | 0                         | 0                          | 0                          | $-\frac{3\sqrt{77}i}{154}$ | 0                           | 0                           | 0                          |  |
|                               |           | 0                                    | 0                        | 0                        | 0                        | $\frac{2\sqrt{66}i}{77}$ | 0                        | 0                         | 0                          | 0                          | 0                          | $-\frac{3\sqrt{165}i}{154}$ | 0                           | 0                          |  |
|                               |           | 0                                    | 0                        | 0                        | 0                        | 0                        | $\frac{\sqrt{110}i}{77}$ | 0                         | 0                          | 0                          | 0                          | 0                           | $-\frac{3\sqrt{165}i}{154}$ | 0                          |  |
|                               |           | 0                                    | 0                        | 0                        | 0                        | 0                        | 0                        | 0                         | 0                          | 0                          | 0                          | 0                           | 0                           | $-\frac{3\sqrt{77}i}{154}$ |  |
|                               |           | 0                                    | 0                        | 0                        | 0                        | 0                        | 0                        | $\frac{3\sqrt{77}i}{154}$ | 0                          | 0                          | 0                          | 0                           | 0                           | 0                          |  |
|                               |           | $\frac{\sqrt{110}i}{77}$             | 0                        | 0                        | 0                        | 0                        | 0                        | 0                         | $\frac{3\sqrt{165}i}{154}$ | 0                          | 0                          | 0                           | 0                           | 0                          |  |
|                               |           | 0                                    | $\frac{2\sqrt{66}i}{77}$ | 0                        | 0                        | 0                        | 0                        | 0                         | 0                          | $\frac{3\sqrt{165}i}{154}$ | 0                          | 0                           | 0                           | 0                          |  |
|                               |           | 0                                    | 0                        | $\frac{\sqrt{231}i}{77}$ | 0                        | 0                        | 0                        | 0                         | 0                          | 0                          | $\frac{3\sqrt{77}i}{154}$  | 0                           | 0                           | 0                          |  |
| 841                           | symmetry  | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$ |                          |                          |                          |                          |                          |                           |                            |                            |                            |                             |                             |                            |  |

*continued ...*

Table 10

| No.                           | multipole | matrix                                |                              |                            |                             |                               |                             |                            |                               |                               |                              |                              |                               |                              |                            |
|-------------------------------|-----------|---------------------------------------|------------------------------|----------------------------|-----------------------------|-------------------------------|-----------------------------|----------------------------|-------------------------------|-------------------------------|------------------------------|------------------------------|-------------------------------|------------------------------|----------------------------|
| $\mathbb{Q}_{4,0}^{(a)}(T_2)$ |           | 0                                     | $\frac{\sqrt{77}i}{196}$     | 0                          | $-\frac{\sqrt{154}i}{56}$   | 0                             | 0                           | $\frac{\sqrt{330}i}{616}$  | 0                             | $\frac{5\sqrt{770}i}{2156}$   | 0                            | $-\frac{5\sqrt{462}i}{616}$  | 0                             | 0                            | 0                          |
|                               |           | $-\frac{\sqrt{77}i}{196}$             | 0                            | $-\frac{\sqrt{770}i}{392}$ | 0                           | 0                             | 0                           | 0                          | $-\frac{13\sqrt{462}i}{4312}$ | 0                             | $-\frac{\sqrt{2310}i}{2156}$ | 0                            | $-\frac{\sqrt{154}i}{88}$     | 0                            | 0                          |
|                               |           | 0                                     | $\frac{\sqrt{770}i}{392}$    | 0                          | 0                           | 0                             | $\frac{\sqrt{154}i}{56}$    | $-\frac{3\sqrt{33}i}{88}$  | 0                             | $\frac{\sqrt{77}i}{4312}$     | 0                            | $-\frac{\sqrt{1155}i}{616}$  | 0                             | $\frac{\sqrt{231}i}{616}$    | 0                          |
|                               |           | $\frac{\sqrt{154}i}{56}$              | 0                            | 0                          | 0                           | $\frac{\sqrt{770}i}{392}$     | 0                           | 0                          | $-\frac{\sqrt{231}i}{616}$    | 0                             | $\frac{\sqrt{1155}i}{616}$   | 0                            | $-\frac{\sqrt{77}i}{4312}$    | 0                            | $\frac{3\sqrt{33}i}{88}$   |
|                               |           | 0                                     | 0                            | 0                          | $-\frac{\sqrt{770}i}{392}$  | 0                             | $-\frac{\sqrt{77}i}{196}$   | 0                          | 0                             | $\frac{\sqrt{154}i}{88}$      | 0                            | $\frac{\sqrt{2310}i}{2156}$  | 0                             | $\frac{13\sqrt{462}i}{4312}$ | 0                          |
|                               |           | 0                                     | 0                            | $-\frac{\sqrt{154}i}{56}$  | 0                           | $\frac{\sqrt{77}i}{196}$      | 0                           | 0                          | 0                             | 0                             | $\frac{5\sqrt{462}i}{616}$   | 0                            | $-\frac{5\sqrt{770}i}{2156}$  | 0                            | $-\frac{\sqrt{330}i}{616}$ |
|                               |           | $-\frac{\sqrt{330}i}{616}$            | 0                            | $\frac{3\sqrt{33}i}{88}$   | 0                           | 0                             | 0                           | 0                          | $\frac{3\sqrt{55}i}{308}$     | 0                             | $-\frac{3\sqrt{11}i}{44}$    | 0                            | 0                             | 0                            | 0                          |
|                               |           | 0                                     | $\frac{13\sqrt{462}i}{4312}$ | 0                          | $\frac{\sqrt{231}i}{616}$   | 0                             | 0                           | $-\frac{3\sqrt{55}i}{308}$ | 0                             | $-\frac{3\sqrt{1155}i}{2156}$ | 0                            | $-\frac{3\sqrt{77}i}{154}$   | 0                             | 0                            | 0                          |
|                               |           | $-\frac{5\sqrt{770}i}{2156}$          | 0                            | $-\frac{\sqrt{77}i}{4312}$ | 0                           | $-\frac{\sqrt{154}i}{88}$     | 0                           | 0                          | $\frac{3\sqrt{1155}i}{2156}$  | 0                             | $-\frac{9\sqrt{231}i}{2156}$ | 0                            | 0                             | 0                            | 0                          |
|                               |           | 0                                     | $\frac{\sqrt{2310}i}{2156}$  | 0                          | $-\frac{\sqrt{1155}i}{616}$ | 0                             | $-\frac{5\sqrt{462}i}{616}$ | $\frac{3\sqrt{11}i}{44}$   | 0                             | $\frac{9\sqrt{231}i}{2156}$   | 0                            | 0                            | 0                             | $\frac{3\sqrt{77}i}{154}$    | 0                          |
|                               |           | $\frac{5\sqrt{462}i}{616}$            | 0                            | $\frac{\sqrt{1155}i}{616}$ | 0                           | $-\frac{\sqrt{2310}i}{2156}$  | 0                           | 0                          | $\frac{3\sqrt{77}i}{154}$     | 0                             | 0                            | 0                            | $\frac{9\sqrt{231}i}{2156}$   | 0                            | $\frac{3\sqrt{11}i}{44}$   |
|                               |           | 0                                     | $\frac{\sqrt{154}i}{88}$     | 0                          | $\frac{\sqrt{77}i}{4312}$   | 0                             | $\frac{5\sqrt{770}i}{2156}$ | 0                          | 0                             | 0                             | 0                            | $-\frac{9\sqrt{231}i}{2156}$ | 0                             | $\frac{3\sqrt{1155}i}{2156}$ | 0                          |
|                               |           | 0                                     | 0                            | $-\frac{\sqrt{231}i}{616}$ | 0                           | $-\frac{13\sqrt{462}i}{4312}$ | 0                           | 0                          | 0                             | 0                             | $-\frac{3\sqrt{77}i}{154}$   | 0                            | $-\frac{3\sqrt{1155}i}{2156}$ | 0                            | $-\frac{3\sqrt{55}i}{308}$ |
|                               |           | 0                                     | 0                            | 0                          | $-\frac{3\sqrt{33}i}{88}$   | 0                             | $\frac{\sqrt{330}i}{616}$   | 0                          | 0                             | 0                             | 0                            | $-\frac{3\sqrt{11}i}{44}$    | 0                             | $\frac{3\sqrt{55}i}{308}$    | 0                          |
| 842                           | symmetry  | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ |                              |                            |                             |                               |                             |                            |                               |                               |                              |                              |                               |                              |                            |

continued ...

Table 10

| No.                           | multipole | matrix                                |                              |                           |                           |                              |                             |                           |                              |                             |                            |                             |                              |                              |                          |   |
|-------------------------------|-----------|---------------------------------------|------------------------------|---------------------------|---------------------------|------------------------------|-----------------------------|---------------------------|------------------------------|-----------------------------|----------------------------|-----------------------------|------------------------------|------------------------------|--------------------------|---|
| $\mathbb{Q}_{4,1}^{(a)}(T_2)$ |           | 0                                     | $-\frac{\sqrt{77}}{196}$     | 0                         | $-\frac{\sqrt{154}}{56}$  | 0                            | 0                           | $\frac{\sqrt{330}}{616}$  | 0                            | $-\frac{5\sqrt{770}}{2156}$ | 0                          | $-\frac{5\sqrt{462}}{616}$  | 0                            | 0                            | 0                        |   |
|                               |           | $-\frac{\sqrt{77}}{196}$              | 0                            | $\frac{\sqrt{770}}{392}$  | 0                         | 0                            | 0                           | 0                         | $-\frac{13\sqrt{462}}{4312}$ | 0                           | $\frac{\sqrt{2310}}{2156}$ | 0                           | $-\frac{\sqrt{154}}{88}$     | 0                            | 0                        |   |
|                               |           | 0                                     | $\frac{\sqrt{770}}{392}$     | 0                         | 0                         | 0                            | $\frac{\sqrt{154}}{56}$     | $\frac{3\sqrt{33}}{88}$   | 0                            | $\frac{\sqrt{77}}{4312}$    | 0                          | $\frac{\sqrt{1155}}{616}$   | 0                            | $\frac{\sqrt{231}}{616}$     | 0                        |   |
|                               |           | $-\frac{\sqrt{154}}{56}$              | 0                            | 0                         | 0                         | $-\frac{\sqrt{770}}{392}$    | 0                           | 0                         | $\frac{\sqrt{231}}{616}$     | 0                           | $\frac{\sqrt{1155}}{616}$  | 0                           | $\frac{\sqrt{77}}{4312}$     | 0                            | $\frac{3\sqrt{33}}{88}$  |   |
|                               |           | 0                                     | 0                            | 0                         | $-\frac{\sqrt{770}}{392}$ | 0                            | $\frac{\sqrt{77}}{196}$     | 0                         | 0                            | $-\frac{\sqrt{154}}{88}$    | 0                          | $\frac{\sqrt{2310}}{2156}$  | 0                            | $-\frac{13\sqrt{462}}{4312}$ | 0                        |   |
|                               |           | 0                                     | 0                            | $\frac{\sqrt{154}}{56}$   | 0                         | $\frac{\sqrt{77}}{196}$      | 0                           | 0                         | 0                            | 0                           | $-\frac{5\sqrt{462}}{616}$ | 0                           | $-\frac{5\sqrt{770}}{2156}$  | 0                            | $\frac{\sqrt{330}}{616}$ |   |
|                               |           | $\frac{\sqrt{330}}{616}$              | 0                            | $\frac{3\sqrt{33}}{88}$   | 0                         | 0                            | 0                           | 0                         | $-\frac{3\sqrt{55}}{308}$    | 0                           | $-\frac{3\sqrt{11}}{44}$   | 0                           | 0                            | 0                            | 0                        |   |
|                               |           | 0                                     | $-\frac{13\sqrt{462}}{4312}$ | 0                         | $\frac{\sqrt{231}}{616}$  | 0                            | 0                           | $-\frac{3\sqrt{55}}{308}$ | 0                            | $\frac{3\sqrt{1155}}{2156}$ | 0                          | $-\frac{3\sqrt{77}}{154}$   | 0                            | 0                            | 0                        |   |
|                               |           | $-\frac{5\sqrt{770}}{2156}$           | 0                            | $\frac{\sqrt{77}}{4312}$  | 0                         | $-\frac{\sqrt{154}}{88}$     | 0                           | 0                         | $\frac{3\sqrt{1155}}{2156}$  | 0                           | $\frac{9\sqrt{231}}{2156}$ | 0                           | 0                            | 0                            | 0                        |   |
|                               |           | 0                                     | $\frac{\sqrt{2310}}{2156}$   | 0                         | $\frac{\sqrt{1155}}{616}$ | 0                            | $-\frac{5\sqrt{462}}{616}$  | $-\frac{3\sqrt{11}}{44}$  | 0                            | $\frac{9\sqrt{231}}{2156}$  | 0                          | 0                           | 0                            | 0                            | $\frac{3\sqrt{77}}{154}$ | 0 |
|                               |           | $-\frac{5\sqrt{462}}{616}$            | 0                            | $\frac{\sqrt{1155}}{616}$ | 0                         | $\frac{\sqrt{2310}}{2156}$   | 0                           | 0                         | $-\frac{3\sqrt{77}}{154}$    | 0                           | 0                          | 0                           | $-\frac{9\sqrt{231}}{2156}$  | 0                            | $\frac{3\sqrt{11}}{44}$  |   |
|                               |           | 0                                     | $-\frac{\sqrt{154}}{88}$     | 0                         | $\frac{\sqrt{77}}{4312}$  | 0                            | $-\frac{5\sqrt{770}}{2156}$ | 0                         | 0                            | 0                           | 0                          | $-\frac{9\sqrt{231}}{2156}$ | 0                            | $-\frac{3\sqrt{1155}}{2156}$ | 0                        |   |
|                               |           | 0                                     | 0                            | $\frac{\sqrt{231}}{616}$  | 0                         | $-\frac{13\sqrt{462}}{4312}$ | 0                           | 0                         | 0                            | 0                           | $\frac{3\sqrt{77}}{154}$   | 0                           | $-\frac{3\sqrt{1155}}{2156}$ | 0                            | $\frac{3\sqrt{55}}{308}$ |   |
|                               |           | 0                                     | 0                            | 0                         | $\frac{3\sqrt{33}}{88}$   | 0                            | $\frac{\sqrt{330}}{616}$    | 0                         | 0                            | 0                           | 0                          | $\frac{3\sqrt{11}}{44}$     | 0                            | $\frac{3\sqrt{55}}{308}$     | 0                        |   |
| 843                           | symmetry  | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ |                              |                           |                           |                              |                             |                           |                              |                             |                            |                             |                              |                              |                          |   |

*continued ...*

Table 10

| No.                           | multipole | matrix  |                             |                              |                              |                             |                             |                            |                             |                             |                              |                              |                             |                             |                             |
|-------------------------------|-----------|---|-----------------------------|------------------------------|------------------------------|-----------------------------|-----------------------------|----------------------------|-----------------------------|-----------------------------|------------------------------|------------------------------|-----------------------------|-----------------------------|-----------------------------|
| $\mathbb{Q}_{4,2}^{(a)}(T_2)$ |           | 0   | 0                           | $-\frac{3\sqrt{154}i}{196}$  | 0                            | 0                           | 0                           | 0                          | 0                           | 0                           | $-\frac{5\sqrt{462}i}{539}$  | 0                            | 0                           | 0                           | 0                           |
|                               |           | 0   | 0                           | 0                            | $\frac{\sqrt{770}i}{196}$    | 0                           | 0                           | $-\frac{3\sqrt{66}i}{154}$ | 0                           | 0                           | 0                            | $-\frac{\sqrt{2310}i}{1078}$ | 0                           | 0                           | 0                           |
|                               |           | $\frac{3\sqrt{154}i}{196}$  | 0                           | 0                            | 0                            | $\frac{\sqrt{770}i}{196}$   | 0                           | 0                          | $\frac{9\sqrt{231}i}{1078}$ | 0                           | 0                            | 0                            | $\frac{17\sqrt{77}i}{1078}$ | 0                           | 0                           |
|                               |           | 0   | $-\frac{\sqrt{770}i}{196}$  | 0                            | 0                            | 0                           | $-\frac{3\sqrt{154}i}{196}$ | 0                          | 0                           | $\frac{17\sqrt{77}i}{1078}$ | 0                            | 0                            | 0                           | $\frac{9\sqrt{231}i}{1078}$ | 0                           |
|                               |           | 0   | 0                           | $-\frac{\sqrt{770}i}{196}$   | 0                            | 0                           | 0                           | 0                          | 0                           | 0                           | $-\frac{\sqrt{2310}i}{1078}$ | 0                            | 0                           | 0                           | $-\frac{3\sqrt{66}i}{154}$  |
|                               |           | 0   | 0                           | 0                            | $\frac{3\sqrt{154}i}{196}$   | 0                           | 0                           | 0                          | 0                           | 0                           | 0                            | $-\frac{5\sqrt{462}i}{539}$  | 0                           | 0                           | 0                           |
|                               |           | 0   | $\frac{3\sqrt{66}i}{154}$   | 0                            | 0                            | 0                           | 0                           | 0                          | 0                           | $-\frac{3\sqrt{165}i}{154}$ | 0                            | 0                            | 0                           | 0                           | 0                           |
|                               |           | 0   | 0                           | $-\frac{9\sqrt{231}i}{1078}$ | 0                            | 0                           | 0                           | 0                          | 0                           | 0                           | $-\frac{3\sqrt{77}i}{1078}$  | 0                            | 0                           | 0                           | 0                           |
|                               |           | 0   | 0                           | 0                            | $-\frac{17\sqrt{77}i}{1078}$ | 0                           | 0                           | $\frac{3\sqrt{165}i}{154}$ | 0                           | 0                           | 0                            | $\frac{6\sqrt{231}i}{539}$   | 0                           | 0                           | 0                           |
|                               |           | $\frac{5\sqrt{462}i}{539}$  | 0                           | 0                            | 0                            | $\frac{\sqrt{2310}i}{1078}$ | 0                           | 0                          | $\frac{3\sqrt{77}i}{1078}$  | 0                           | 0                            | 0                            | $\frac{6\sqrt{231}i}{539}$  | 0                           | 0                           |
|                               |           | 0   | $\frac{\sqrt{2310}i}{1078}$ | 0                            | 0                            | 0                           | $\frac{5\sqrt{462}i}{539}$  | 0                          | 0                           | $-\frac{6\sqrt{231}i}{539}$ | 0                            | 0                            | 0                           | $-\frac{3\sqrt{77}i}{1078}$ | 0                           |
|                               |           | 0   | 0                           | $-\frac{17\sqrt{77}i}{1078}$ | 0                            | 0                           | 0                           | 0                          | 0                           | 0                           | $-\frac{6\sqrt{231}i}{539}$  | 0                            | 0                           | 0                           | $-\frac{3\sqrt{165}i}{154}$ |
|                               |           | 0   | 0                           | 0                            | $-\frac{9\sqrt{231}i}{1078}$ | 0                           | 0                           | 0                          | 0                           | 0                           | 0                            | $\frac{3\sqrt{77}i}{1078}$   | 0                           | 0                           | 0                           |
|                               |           | 0   | 0                           | 0                            | 0                            | $\frac{3\sqrt{66}i}{154}$   | 0                           | 0                          | 0                           | 0                           | 0                            | 0                            | $\frac{3\sqrt{165}i}{154}$  | 0                           | 0                           |
| 844                           | symmetry  | $\frac{\sqrt{2}(2x^6-15x^4y^2-15x^4z^2-15x^2y^4+180x^2y^2z^2-15x^2z^4+2y^6-15y^4z^2-15y^2z^4+2z^6)}{8}$ |                             |                              |                              |                             |                             |                            |                             |                             |                              |                              |                             |                             |                             |

continued ...

Table 10

| No.                       | multipole | matrix   |                           |                           |                          |                            |                          |                            |                            |                            |                            |                            |                            |                            |                            |
|---------------------------|-----------|--|---------------------------|---------------------------|--------------------------|----------------------------|--------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| $\mathbb{Q}_6^{(a)}(A_1)$ |           | 0  | 0                         | 0                         | 0                        | 0                          | 0                        | 0                          | $-\frac{\sqrt{154}}{616}$  | 0                          | 0                          | 0                          | $\frac{\sqrt{462}}{88}$    | 0                          | 0                          |
|                           |           | 0  | 0                         | 0                         | 0                        | 0                          | 0                        | 0                          | 0                          | $\frac{\sqrt{2310}}{616}$  | 0                          | 0                          | 0                          | $-\frac{\sqrt{770}}{88}$   | 0                          |
|                           |           | 0  | 0                         | 0                         | 0                        | 0                          | 0                        | 0                          | 0                          | 0                          | $-\frac{5\sqrt{77}}{308}$  | 0                          | 0                          | 0                          | $\frac{\sqrt{55}}{44}$     |
|                           |           | 0  | 0                         | 0                         | 0                        | 0                          | 0                        | $-\frac{\sqrt{55}}{44}$    | 0                          | 0                          | 0                          | $\frac{5\sqrt{77}}{308}$   | 0                          | 0                          | 0                          |
|                           |           | 0  | 0                         | 0                         | 0                        | 0                          | 0                        | 0                          | $\frac{\sqrt{770}}{88}$    | 0                          | 0                          | 0                          | $-\frac{\sqrt{2310}}{616}$ | 0                          | 0                          |
|                           |           | 0  | 0                         | 0                         | 0                        | 0                          | 0                        | 0                          | 0                          | $-\frac{\sqrt{462}}{88}$   | 0                          | 0                          | 0                          | $\frac{\sqrt{154}}{616}$   | 0                          |
|                           |           | 0  | 0                         | 0                         | $-\frac{\sqrt{55}}{44}$  | 0                          | 0                        | $-\frac{\sqrt{231}}{1848}$ | 0                          | 0                          | 0                          | $\frac{\sqrt{165}}{88}$    | 0                          | 0                          | 0                          |
|                           |           | $-\frac{\sqrt{154}}{616}$                              | 0                         | 0                         | 0                        | $\frac{\sqrt{770}}{88}$    | 0                        | 0                          | $\frac{5\sqrt{231}}{1848}$ | 0                          | 0                          | 0                          | $-\frac{\sqrt{77}}{88}$    | 0                          | 0                          |
|                           |           | 0  | $\frac{\sqrt{2310}}{616}$ | 0                         | 0                        | 0                          | $-\frac{\sqrt{462}}{88}$ | 0                          | 0                          | $-\frac{3\sqrt{231}}{616}$ | 0                          | 0                          | 0                          | $-\frac{\sqrt{77}}{88}$    | 0                          |
|                           |           | 0  | 0                         | $-\frac{5\sqrt{77}}{308}$ | 0                        | 0                          | 0                        | 0                          | 0                          | 0                          | $\frac{5\sqrt{231}}{1848}$ | 0                          | 0                          | 0                          | $\frac{\sqrt{165}}{88}$    |
|                           |           | 0  | 0                         | 0                         | $\frac{5\sqrt{77}}{308}$ | 0                          | 0                        | $\frac{\sqrt{165}}{88}$    | 0                          | 0                          | 0                          | $\frac{5\sqrt{231}}{1848}$ | 0                          | 0                          | 0                          |
|                           |           | $\frac{\sqrt{462}}{88}$                                | 0                         | 0                         | 0                        | $-\frac{\sqrt{2310}}{616}$ | 0                        | 0                          | $-\frac{\sqrt{77}}{88}$    | 0                          | 0                          | 0                          | $-\frac{3\sqrt{231}}{616}$ | 0                          | 0                          |
|                           |           | 0  | $-\frac{\sqrt{770}}{88}$  | 0                         | 0                        | 0                          | $\frac{\sqrt{154}}{616}$ | 0                          | 0                          | $-\frac{\sqrt{77}}{88}$    | 0                          | 0                          | 0                          | $\frac{5\sqrt{231}}{1848}$ | 0                          |
|                           |           | 0  | 0                         | $\frac{\sqrt{55}}{44}$    | 0                        | 0                          | 0                        | 0                          | 0                          | 0                          | $\frac{\sqrt{165}}{88}$    | 0                          | 0                          | 0                          | $-\frac{\sqrt{231}}{1848}$ |
| 845                       | symmetry  | $-\frac{\sqrt{2310}(x-y)(x+y)(x-z)(x+z)(y-z)(y+z)}{8}$ |                           |                           |                          |                            |                          |                            |                            |                            |                            |                            |                            |                            |                            |

*continued ...*

Table 10

| No.                       | multipole | matrix                   |  |                       |                        |                         |                         |                          |                         |                          |                        |                         |                          |                         |                          |  |
|---------------------------|-----------|--------------------------|--|-----------------------|------------------------|-------------------------|-------------------------|--------------------------|-------------------------|--------------------------|------------------------|-------------------------|--------------------------|-------------------------|--------------------------|--|
| $\mathbb{Q}_6^{(a)}(A_2)$ |           | 0                        | 0  | 0                     | 0                      | 0                       | 0                       | 0                        | 0                       | 0                        | $\frac{\sqrt{6}}{24}$  | 0                       | 0                        | 0                       | $-\frac{\sqrt{210}}{56}$ |  |
|                           |           | 0                        | 0  | 0                     | 0                      | 0                       | 0                       | $-\frac{\sqrt{42}}{168}$ | 0                       | 0                        | 0                      | $-\frac{\sqrt{30}}{24}$ | 0                        | 0                       | 0                        |  |
|                           |           | 0                        | 0  | 0                     | 0                      | 0                       | 0                       | 0                        | $\frac{\sqrt{3}}{12}$   | 0                        | 0                      | 0                       | $\frac{1}{4}$            | 0                       | 0                        |  |
|                           |           | 0                        | 0  | 0                     | 0                      | 0                       | 0                       | 0                        | 0                       | $-\frac{1}{4}$           | 0                      | 0                       | 0                        | $-\frac{\sqrt{3}}{12}$  | 0                        |  |
|                           |           | 0                        | 0  | 0                     | 0                      | 0                       | 0                       | 0                        | 0                       | 0                        | $\frac{\sqrt{30}}{24}$ | 0                       | 0                        | 0                       | $\frac{\sqrt{42}}{168}$  |  |
|                           |           | 0                        | 0  | 0                     | 0                      | 0                       | 0                       | $\frac{\sqrt{210}}{56}$  | 0                       | 0                        | 0                      | $-\frac{\sqrt{6}}{24}$  | 0                        | 0                       | 0                        |  |
|                           |           | 0                        | $-\frac{\sqrt{42}}{168}$   | 0                     | 0                      | 0                       | $\frac{\sqrt{210}}{56}$ | 0                        | 0                       | $\frac{\sqrt{105}}{168}$ | 0                      | 0                       | 0                        | $-\frac{\sqrt{35}}{56}$ | 0                        |  |
|                           |           | 0                        | 0  | $\frac{\sqrt{3}}{12}$ | 0                      | 0                       | 0                       | 0                        | 0                       | 0                        | $-\frac{1}{8}$         | 0                       | 0                        | 0                       | $-\frac{\sqrt{35}}{56}$  |  |
|                           |           | 0                        | 0  | 0                     | $-\frac{1}{4}$         | 0                       | 0                       | $\frac{\sqrt{105}}{168}$ | 0                       | 0                        | 0                      | $\frac{\sqrt{3}}{24}$   | 0                        | 0                       | 0                        |  |
|                           |           | $\frac{\sqrt{6}}{24}$    | 0  | 0                     | 0                      | $\frac{\sqrt{30}}{24}$  | 0                       | 0                        | $-\frac{1}{8}$          | 0                        | 0                      | 0                       | $\frac{\sqrt{3}}{24}$    | 0                       | 0                        |  |
|                           |           | 0                        | $-\frac{\sqrt{30}}{24}$  | 0                     | 0                      | 0                       | $-\frac{\sqrt{6}}{24}$  | 0                        | 0                       | $\frac{\sqrt{3}}{24}$    | 0                      | 0                       | 0                        | $-\frac{1}{8}$          | 0                        |  |
|                           |           | 0                        | 0  | $\frac{1}{4}$         | 0                      | 0                       | 0                       | 0                        | 0                       | 0                        | $\frac{\sqrt{3}}{24}$  | 0                       | 0                        | 0                       | $\frac{\sqrt{105}}{168}$ |  |
|                           |           | 0                        | 0  | 0                     | $-\frac{\sqrt{3}}{12}$ | 0                       | 0                       | $-\frac{\sqrt{35}}{56}$  | 0                       | 0                        | 0                      | $-\frac{1}{8}$          | 0                        | 0                       | 0                        |  |
|                           |           | $-\frac{\sqrt{210}}{56}$ | 0  | 0                     | 0                      | $\frac{\sqrt{42}}{168}$ | 0                       | 0                        | $-\frac{\sqrt{35}}{56}$ | 0                        | 0                      | 0                       | $\frac{\sqrt{105}}{168}$ | 0                       | 0                        |  |
|                           | 846       | symmetry                 | $-\frac{\sqrt{14}(x^6-15x^4z^2+15x^2z^4+y^6-15y^4z^2+15y^2z^4-2z^6)}{8}$ |                       |                        |                         |                         |                          |                         |                          |                        |                         |                          |                         |                          |  |

*continued ...*



Table 10

| No. | multipole                   | matrix  |                         |                           |                          |                          |                        |                            |                          |                          |                            |                            |                          |                          |                            |
|-----|-----------------------------|---|-------------------------|---------------------------|--------------------------|--------------------------|------------------------|----------------------------|--------------------------|--------------------------|----------------------------|----------------------------|--------------------------|--------------------------|----------------------------|
| 847 | $\mathbb{Q}_{6,0}^{(a)}(E)$ | 0   | 0                       | 0                         | 0                        | 0                        | 0                      | 0                          | $-\frac{\sqrt{22}}{88}$  | 0                        | 0                          | 0                          | $-\frac{\sqrt{66}}{88}$  | 0                        | 0                          |
|     |                             | 0   | 0                       | 0                         | 0                        | 0                        | 0                      | 0                          | 0                        | $\frac{\sqrt{330}}{88}$  | 0                          | 0                          | 0                        | $\frac{\sqrt{110}}{88}$  | 0                          |
|     |                             | 0   | 0                       | 0                         | 0                        | 0                        | 0                      | 0                          | 0                        | 0                        | $-\frac{5\sqrt{11}}{44}$   | 0                          | 0                        | 0                        | $-\frac{\sqrt{385}}{308}$  |
|     |                             | 0   | 0                       | 0                         | 0                        | 0                        | 0                      | $\frac{\sqrt{385}}{308}$   | 0                        | 0                        | 0                          | $\frac{5\sqrt{11}}{44}$    | 0                        | 0                        | 0                          |
|     |                             | 0   | 0                       | 0                         | 0                        | 0                        | 0                      | 0                          | $-\frac{\sqrt{110}}{88}$ | 0                        | 0                          | 0                          | $-\frac{\sqrt{330}}{88}$ | 0                        | 0                          |
|     |                             | 0   | 0                       | 0                         | 0                        | 0                        | 0                      | 0                          | 0                        | $\frac{\sqrt{66}}{88}$   | 0                          | 0                          | 0                        | $\frac{\sqrt{22}}{88}$   | 0                          |
|     |                             | 0   | 0                       | 0                         | $\frac{\sqrt{385}}{308}$ | 0                        | 0                      | $-\frac{\sqrt{33}}{264}$   | 0                        | 0                        | 0                          | $-\frac{\sqrt{1155}}{616}$ | 0                        | 0                        | 0                          |
|     |                             | $-\frac{\sqrt{22}}{88}$   | 0                       | 0                         | 0                        | $-\frac{\sqrt{110}}{88}$ | 0                      | 0                          | $\frac{5\sqrt{33}}{264}$ | 0                        | 0                          | 0                          | $\frac{\sqrt{11}}{88}$   | 0                        | 0                          |
|     |                             | 0   | $\frac{\sqrt{330}}{88}$ | 0                         | 0                        | 0                        | $\frac{\sqrt{66}}{88}$ | 0                          | 0                        | $-\frac{3\sqrt{33}}{88}$ | 0                          | 0                          | 0                        | $\frac{\sqrt{11}}{88}$   | 0                          |
|     |                             | 0   | 0                       | $-\frac{5\sqrt{11}}{44}$  | 0                        | 0                        | 0                      | 0                          | 0                        | 0                        | $\frac{5\sqrt{33}}{264}$   | 0                          | 0                        | 0                        | $-\frac{\sqrt{1155}}{616}$ |
|     |                             | 0   | 0                       | 0                         | $\frac{5\sqrt{11}}{44}$  | 0                        | 0                      | $-\frac{\sqrt{1155}}{616}$ | 0                        | 0                        | 0                          | $\frac{5\sqrt{33}}{264}$   | 0                        | 0                        | 0                          |
|     |                             | $-\frac{\sqrt{66}}{88}$   | 0                       | 0                         | 0                        | $-\frac{\sqrt{330}}{88}$ | 0                      | 0                          | $\frac{\sqrt{11}}{88}$   | 0                        | 0                          | 0                          | $-\frac{3\sqrt{33}}{88}$ | 0                        | 0                          |
|     |                             | 0   | $\frac{\sqrt{110}}{88}$ | 0                         | 0                        | 0                        | $\frac{\sqrt{22}}{88}$ | 0                          | 0                        | $\frac{\sqrt{11}}{88}$   | 0                          | 0                          | 0                        | $\frac{5\sqrt{33}}{264}$ | 0                          |
|     |                             | 0   | 0                       | $-\frac{\sqrt{385}}{308}$ | 0                        | 0                        | 0                      | 0                          | 0                        | 0                        | $-\frac{\sqrt{1155}}{616}$ | 0                          | 0                        | 0                        | $-\frac{\sqrt{33}}{264}$   |
|     |                             | $\frac{\sqrt{42}(x-y)(x+y)(x^4-9x^2y^2-5x^2z^2+y^4-5y^2z^2+5z^4)}{8}$ |                         |                           |                          |                          |                        |                            |                          |                          |                            |                            |                          |                          |                            |

continued ...

Table 10

| No.                         | multipole | matrix   |                            |                           |                          |                             |                          |                             |                           |                             |                           |                           |                             |                          |                             |
|-----------------------------|-----------|--|----------------------------|---------------------------|--------------------------|-----------------------------|--------------------------|-----------------------------|---------------------------|-----------------------------|---------------------------|---------------------------|-----------------------------|--------------------------|-----------------------------|
| $\mathbb{Q}_{6,1}^{(a)}(E)$ |           | 0  | 0                          | 0                         | 0                        | 0                           | 0                        | 0                           | 0                         | 0                           | $-\frac{\sqrt{330}}{264}$ | 0                         | 0                           | 0                        | $-\frac{\sqrt{462}}{56}$    |
|                             |           | 0  | 0                          | 0                         | 0                        | 0                           | 0                        | $\frac{\sqrt{2310}}{1848}$  | 0                         | 0                           | 0                         | $\frac{5\sqrt{66}}{264}$  | 0                           | 0                        | 0                           |
|                             |           | 0  | 0                          | 0                         | 0                        | 0                           | 0                        | 0                           | $-\frac{\sqrt{165}}{132}$ | 0                           | 0                         | 0                         | $-\frac{\sqrt{55}}{44}$     | 0                        | 0                           |
|                             |           | 0  | 0                          | 0                         | 0                        | 0                           | 0                        | 0                           | 0                         | $\frac{\sqrt{55}}{44}$      | 0                         | 0                         | 0                           | $\frac{\sqrt{165}}{132}$ | 0                           |
|                             |           | 0  | 0                          | 0                         | 0                        | 0                           | 0                        | 0                           | 0                         | 0                           | $-\frac{5\sqrt{66}}{264}$ | 0                         | 0                           | 0                        | $-\frac{\sqrt{2310}}{1848}$ |
|                             |           | 0  | 0                          | 0                         | 0                        | 0                           | 0                        | $\frac{\sqrt{462}}{56}$     | 0                         | 0                           | 0                         | $\frac{\sqrt{330}}{264}$  | 0                           | 0                        | 0                           |
|                             |           | 0  | $\frac{\sqrt{2310}}{1848}$ | 0                         | 0                        | 0                           | $\frac{\sqrt{462}}{56}$  | 0                           | 0                         | $-\frac{5\sqrt{231}}{1848}$ | 0                         | 0                         | 0                           | $-\frac{\sqrt{77}}{56}$  | 0                           |
|                             |           | 0  | 0                          | $-\frac{\sqrt{165}}{132}$ | 0                        | 0                           | 0                        | 0                           | 0                         | 0                           | $\frac{\sqrt{55}}{88}$    | 0                         | 0                           | 0                        | $-\frac{\sqrt{77}}{56}$     |
|                             |           | 0  | 0                          | 0                         | $\frac{\sqrt{55}}{44}$   | 0                           | 0                        | $-\frac{5\sqrt{231}}{1848}$ | 0                         | 0                           | 0                         | $-\frac{\sqrt{165}}{264}$ | 0                           | 0                        | 0                           |
|                             |           | $-\frac{\sqrt{330}}{264}$                        | 0                          | 0                         | 0                        | $-\frac{5\sqrt{66}}{264}$   | 0                        | 0                           | $\frac{\sqrt{55}}{88}$    | 0                           | 0                         | 0                         | $-\frac{\sqrt{165}}{264}$   | 0                        | 0                           |
|                             |           | 0  | $\frac{5\sqrt{66}}{264}$   | 0                         | 0                        | 0                           | $\frac{\sqrt{330}}{264}$ | 0                           | 0                         | $-\frac{\sqrt{165}}{264}$   | 0                         | 0                         | 0                           | $\frac{\sqrt{55}}{88}$   | 0                           |
|                             |           | 0  | 0                          | $-\frac{\sqrt{55}}{44}$   | 0                        | 0                           | 0                        | 0                           | 0                         | 0                           | $-\frac{\sqrt{165}}{264}$ | 0                         | 0                           | 0                        | $-\frac{5\sqrt{231}}{1848}$ |
|                             |           | 0  | 0                          | 0                         | $\frac{\sqrt{165}}{132}$ | 0                           | 0                        | $-\frac{\sqrt{77}}{56}$     | 0                         | 0                           | 0                         | $\frac{\sqrt{55}}{88}$    | 0                           | 0                        | 0                           |
|                             |           | $-\frac{\sqrt{462}}{56}$                         | 0                          | 0                         | 0                        | $-\frac{\sqrt{2310}}{1848}$ | 0                        | 0                           | $-\frac{\sqrt{77}}{56}$   | 0                           | 0                         | 0                         | $-\frac{5\sqrt{231}}{1848}$ | 0                        | 0                           |
| 848                         | symmetry  | $\frac{3\sqrt{7}yz(y-z)(y+z)(10x^2-y^2-z^2)}{4}$ |                            |                           |                          |                             |                          |                             |                           |                             |                           |                           |                             |                          |                             |

*continued ...*

Table 10

| No.                           | multipole | matrix   |                             |                             |                              |                            |                            |                              |                            |                             |                             |                             |                            |                             |                            |
|-------------------------------|-----------|--|-----------------------------|-----------------------------|------------------------------|----------------------------|----------------------------|------------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|----------------------------|-----------------------------|----------------------------|
| $\mathbb{Q}_{6,0}^{(a)}(T_1)$ |           | 0  | 0                           | 0                           | 0                            | 0                          | 0                          | $\frac{\sqrt{77}i}{1232}$    | 0                          | $\frac{\sqrt{33}i}{176}$    | 0                           | $-\frac{3\sqrt{55}i}{176}$  | 0                          | $-\frac{\sqrt{11}i}{16}$    | 0                          |
|                               |           | 0  | 0                           | 0                           | 0                            | 0                          | 0                          | $-\frac{\sqrt{55}i}{176}$    | 0                          | $-\frac{5\sqrt{11}i}{176}$  | 0                           | $\frac{3\sqrt{165}i}{176}$  | 0                          | $\frac{\sqrt{385}i}{112}$   |                            |
|                               |           | 0  | 0                           | 0                           | 0                            | 0                          | 0                          | $-\frac{3\sqrt{770}i}{1232}$ | 0                          | $\frac{\sqrt{330}i}{176}$   | 0                           | $\frac{5\sqrt{22}i}{176}$   | 0                          | $-\frac{3\sqrt{110}i}{176}$ | 0                          |
|                               |           | 0  | 0                           | 0                           | 0                            | 0                          | 0                          | $\frac{3\sqrt{110}i}{176}$   | 0                          | $-\frac{5\sqrt{22}i}{176}$  | 0                           | $-\frac{\sqrt{330}i}{176}$  | 0                          | $\frac{3\sqrt{770}i}{1232}$ |                            |
|                               |           | 0  | 0                           | 0                           | 0                            | 0                          | 0                          | $-\frac{\sqrt{385}i}{112}$   | 0                          | $-\frac{3\sqrt{165}i}{176}$ | 0                           | $\frac{5\sqrt{11}i}{176}$   | 0                          | $\frac{\sqrt{55}i}{176}$    | 0                          |
|                               |           | 0  | 0                           | 0                           | 0                            | 0                          | 0                          | $\frac{\sqrt{11}i}{16}$      | 0                          | $\frac{3\sqrt{55}i}{176}$   | 0                           | $-\frac{\sqrt{33}i}{176}$   | 0                          | $-\frac{\sqrt{77}i}{1232}$  |                            |
|                               |           | $-\frac{\sqrt{77}i}{1232}$                       | 0                           | $\frac{3\sqrt{770}i}{1232}$ | 0                            | $\frac{\sqrt{385}i}{112}$  | 0                          | 0                            | $\frac{\sqrt{462}i}{1232}$ | 0                           | $-\frac{\sqrt{2310}i}{616}$ | 0                           | $-\frac{\sqrt{154}i}{112}$ | 0                           | 0                          |
|                               |           | 0  | $\frac{\sqrt{55}i}{176}$    | 0                           | $-\frac{3\sqrt{110}i}{176}$  | 0                          | $-\frac{\sqrt{11}i}{16}$   | $-\frac{\sqrt{462}i}{1232}$  | 0                          | $-\frac{\sqrt{22}i}{88}$    | 0                           | $\frac{\sqrt{330}i}{176}$   | 0                          | 0                           | 0                          |
|                               |           | $-\frac{\sqrt{33}i}{176}$                        | 0                           | $-\frac{\sqrt{330}i}{176}$  | 0                            | $\frac{3\sqrt{165}i}{176}$ | 0                          | 0                            | $\frac{\sqrt{22}i}{88}$    | 0                           | $\frac{\sqrt{110}i}{176}$   | 0                           | 0                          | 0                           | $\frac{\sqrt{154}i}{112}$  |
|                               |           | 0  | $\frac{5\sqrt{11}i}{176}$   | 0                           | $\frac{5\sqrt{22}i}{176}$    | 0                          | $-\frac{3\sqrt{55}i}{176}$ | $\frac{\sqrt{2310}i}{616}$   | 0                          | $-\frac{\sqrt{110}i}{176}$  | 0                           | 0                           | 0                          | $-\frac{\sqrt{330}i}{176}$  | 0                          |
|                               |           | $\frac{3\sqrt{55}i}{176}$                        | 0                           | $-\frac{5\sqrt{22}i}{176}$  | 0                            | $-\frac{5\sqrt{11}i}{176}$ | 0                          | 0                            | $-\frac{\sqrt{330}i}{176}$ | 0                           | 0                           | 0                           | $-\frac{\sqrt{110}i}{176}$ | 0                           | $\frac{\sqrt{2310}i}{616}$ |
|                               |           | 0  | $-\frac{3\sqrt{165}i}{176}$ | 0                           | $\frac{\sqrt{330}i}{176}$    | 0                          | $\frac{\sqrt{33}i}{176}$   | $\frac{\sqrt{154}i}{112}$    | 0                          | 0                           | 0                           | $\frac{\sqrt{110}i}{176}$   | 0                          | $\frac{\sqrt{22}i}{88}$     | 0                          |
|                               |           | $\frac{\sqrt{11}i}{16}$                          | 0                           | $\frac{3\sqrt{110}i}{176}$  | 0                            | $-\frac{\sqrt{55}i}{176}$  | 0                          | 0                            | 0                          | $\frac{\sqrt{330}i}{176}$   | 0                           | $-\frac{\sqrt{22}i}{88}$    | 0                          | $-\frac{\sqrt{462}i}{1232}$ |                            |
|                               |           | 0  | $-\frac{\sqrt{385}i}{112}$  | 0                           | $-\frac{3\sqrt{770}i}{1232}$ | 0                          | $\frac{\sqrt{77}i}{1232}$  | 0                            | 0                          | $-\frac{\sqrt{154}i}{112}$  | 0                           | $-\frac{\sqrt{2310}i}{616}$ | 0                          | $\frac{\sqrt{462}i}{1232}$  | 0                          |
| 849                           | symmetry  | $\frac{3\sqrt{7}xz(x-z)(x+z)(x^2-10y^2+z^2)}{4}$ |                             |                             |                              |                            |                            |                              |                            |                             |                             |                             |                            |                             |                            |

continued ...

Table 10

| No.                           | multipole | matrix  |                            |                             |                             |                            |                           |                             |   |                            |   |                            |   |                             |                          |
|-------------------------------|-----------|---|----------------------------|-----------------------------|-----------------------------|----------------------------|---------------------------|-----------------------------|---|----------------------------|---|----------------------------|---|-----------------------------|--------------------------|
| $\mathbb{Q}_{6,1}^{(a)}(T_1)$ |           | 0   | 0                          | 0                           | 0                           | 0                          | 0                         | $-\frac{\sqrt{77}}{1232}$   | 0 | $\frac{\sqrt{33}}{176}$    | 0 | $\frac{3\sqrt{55}}{176}$   | 0 | $-\frac{\sqrt{11}}{16}$     | 0                        |
|                               |           | 0   | 0                          | 0                           | 0                           | 0                          | 0                         | $\frac{\sqrt{55}}{176}$     | 0 | $-\frac{5\sqrt{11}}{176}$  | 0 | $-\frac{3\sqrt{165}}{176}$ | 0 | $\frac{\sqrt{385}}{112}$    | 0                        |
|                               |           | 0   | 0                          | 0                           | 0                           | 0                          | 0                         | $-\frac{3\sqrt{770}}{1232}$ | 0 | $-\frac{\sqrt{330}}{176}$  | 0 | $\frac{5\sqrt{22}}{176}$   | 0 | $\frac{3\sqrt{110}}{176}$   | 0                        |
|                               |           | 0   | 0                          | 0                           | 0                           | 0                          | 0                         | $\frac{3\sqrt{110}}{176}$   | 0 | $\frac{5\sqrt{22}}{176}$   | 0 | $-\frac{\sqrt{330}}{176}$  | 0 | $-\frac{3\sqrt{770}}{1232}$ | 0                        |
|                               |           | 0   | 0                          | 0                           | 0                           | 0                          | 0                         | $\frac{\sqrt{385}}{112}$    | 0 | $-\frac{3\sqrt{165}}{176}$ | 0 | $-\frac{5\sqrt{11}}{176}$  | 0 | $\frac{\sqrt{55}}{176}$     | 0                        |
|                               |           | 0   | 0                          | 0                           | 0                           | 0                          | 0                         | $-\frac{\sqrt{11}}{16}$     | 0 | $\frac{3\sqrt{55}}{176}$   | 0 | $\frac{\sqrt{33}}{176}$    | 0 | $-\frac{\sqrt{77}}{1232}$   | 0                        |
|                               |           | $-\frac{\sqrt{77}}{1232}$                         | 0                          | $-\frac{3\sqrt{770}}{1232}$ | 0                           | $\frac{\sqrt{385}}{112}$   | 0                         | $\frac{\sqrt{462}}{1232}$   | 0 | $\frac{\sqrt{2310}}{616}$  | 0 | $-\frac{\sqrt{154}}{112}$  | 0 | 0                           | 0                        |
|                               |           | 0   | $\frac{\sqrt{55}}{176}$    | 0                           | $\frac{3\sqrt{110}}{176}$   | 0                          | $-\frac{\sqrt{11}}{16}$   | $\frac{\sqrt{462}}{1232}$   | 0 | $-\frac{\sqrt{22}}{88}$    | 0 | $-\frac{\sqrt{330}}{176}$  | 0 | 0                           | 0                        |
|                               |           | $\frac{\sqrt{33}}{176}$                           | 0                          | $-\frac{\sqrt{330}}{176}$   | 0                           | $-\frac{3\sqrt{165}}{176}$ | 0                         | $-\frac{\sqrt{22}}{88}$     | 0 | $\frac{\sqrt{110}}{176}$   | 0 | 0                          | 0 | 0                           | $\frac{\sqrt{154}}{112}$ |
|                               |           | 0   | $-\frac{5\sqrt{11}}{176}$  | 0                           | $\frac{5\sqrt{22}}{176}$    | 0                          | $\frac{3\sqrt{55}}{176}$  | $\frac{\sqrt{2310}}{616}$   | 0 | $\frac{\sqrt{110}}{176}$   | 0 | 0                          | 0 | $\frac{\sqrt{330}}{176}$    | 0                        |
|                               |           | $\frac{3\sqrt{55}}{176}$                          | 0                          | $\frac{5\sqrt{22}}{176}$    | 0                           | $-\frac{5\sqrt{11}}{176}$  | 0                         | $-\frac{\sqrt{330}}{176}$   | 0 | 0                          | 0 | $-\frac{\sqrt{110}}{176}$  | 0 | $-\frac{\sqrt{2310}}{616}$  | 0                        |
|                               |           | 0   | $-\frac{3\sqrt{165}}{176}$ | 0                           | $-\frac{\sqrt{330}}{176}$   | 0                          | $\frac{\sqrt{33}}{176}$   | $-\frac{\sqrt{154}}{112}$   | 0 | 0                          | 0 | $-\frac{\sqrt{110}}{176}$  | 0 | $\frac{\sqrt{22}}{88}$      | 0                        |
|                               |           | $-\frac{\sqrt{11}}{16}$                           | 0                          | $\frac{3\sqrt{110}}{176}$   | 0                           | $\frac{\sqrt{55}}{176}$    | 0                         | 0                           | 0 | $\frac{\sqrt{330}}{176}$   | 0 | $\frac{\sqrt{22}}{88}$     | 0 | $-\frac{\sqrt{462}}{1232}$  | 0                        |
|                               |           | 0   | $\frac{\sqrt{385}}{112}$   | 0                           | $-\frac{3\sqrt{770}}{1232}$ | 0                          | $-\frac{\sqrt{77}}{1232}$ | 0                           | 0 | $\frac{\sqrt{154}}{112}$   | 0 | $-\frac{\sqrt{2310}}{616}$ | 0 | $-\frac{\sqrt{462}}{1232}$  | 0                        |
| 850                           | symmetry  | $-\frac{3\sqrt{7}xy(x-y)(x+y)(x^2+y^2-10z^2)}{4}$ |                            |                             |                             |                            |                           |                             |   |                            |   |                            |   |                             |                          |

*continued ...*

Table 10

| No.                           | multipole | matrix  |                         |                            |                            |                         |                          |                             |                          |                         |                             |                            |                          |                            |
|-------------------------------|-----------|---|-------------------------|----------------------------|----------------------------|-------------------------|--------------------------|-----------------------------|--------------------------|-------------------------|-----------------------------|----------------------------|--------------------------|----------------------------|
| $\mathbb{Q}_{6,2}^{(a)}(T_1)$ |           | 0   | 0                       | 0                          | 0                          | 0                       | 0                        | 0                           | 0                        | 0                       | 0                           | $\frac{\sqrt{33}i}{22}$    | 0                        | 0                          |
|                               |           | 0   | 0                       | 0                          | 0                          | 0                       | 0                        | 0                           | 0                        | 0                       | 0                           | 0                          | $-\frac{\sqrt{55}i}{22}$ | 0                          |
|                               |           | 0   | 0                       | 0                          | 0                          | 0                       | 0                        | 0                           | 0                        | 0                       | 0                           | 0                          | 0                        | $\frac{\sqrt{770}i}{154}$  |
|                               |           | 0   | 0                       | 0                          | 0                          | 0                       | 0                        | $\frac{\sqrt{770}i}{154}$   | 0                        | 0                       | 0                           | 0                          | 0                        | 0                          |
|                               |           | 0   | 0                       | 0                          | 0                          | 0                       | 0                        | 0                           | $-\frac{\sqrt{55}i}{22}$ | 0                       | 0                           | 0                          | 0                        | 0                          |
|                               |           | 0   | 0                       | 0                          | 0                          | 0                       | 0                        | 0                           | 0                        | $\frac{\sqrt{33}i}{22}$ | 0                           | 0                          | 0                        | 0                          |
|                               |           | 0   | 0                       | 0                          | $-\frac{\sqrt{770}i}{154}$ | 0                       | 0                        | 0                           | 0                        | 0                       | 0                           | $\frac{\sqrt{2310}i}{308}$ | 0                        | 0                          |
|                               |           | 0   | 0                       | 0                          | 0                          | $\frac{\sqrt{55}i}{22}$ | 0                        | 0                           | 0                        | 0                       | 0                           | 0                          | $-\frac{\sqrt{22}i}{44}$ | 0                          |
|                               |           | 0   | 0                       | 0                          | 0                          | 0                       | $-\frac{\sqrt{33}i}{22}$ | 0                           | 0                        | 0                       | 0                           | 0                          | 0                        | $-\frac{\sqrt{22}i}{44}$   |
|                               |           | 0   | 0                       | 0                          | 0                          | 0                       | 0                        | 0                           | 0                        | 0                       | 0                           | 0                          | 0                        | $\frac{\sqrt{2310}i}{308}$ |
|                               |           | 0   | 0                       | 0                          | 0                          | 0                       | 0                        | $-\frac{\sqrt{2310}i}{308}$ | 0                        | 0                       | 0                           | 0                          | 0                        | 0                          |
|                               |           | $-\frac{\sqrt{33}i}{22}$                      | 0                       | 0                          | 0                          | 0                       | 0                        | 0                           | $\frac{\sqrt{22}i}{44}$  | 0                       | 0                           | 0                          | 0                        | 0                          |
|                               |           | 0   | $\frac{\sqrt{55}i}{22}$ | 0                          | 0                          | 0                       | 0                        | 0                           | 0                        | $\frac{\sqrt{22}i}{44}$ | 0                           | 0                          | 0                        | 0                          |
|                               |           | 0   | 0                       | $-\frac{\sqrt{770}i}{154}$ | 0                          | 0                       | 0                        | 0                           | 0                        | 0                       | $-\frac{\sqrt{2310}i}{308}$ | 0                          | 0                        | 0                          |
| 851                           | symmetry  | $\frac{\sqrt{462}yz(y^2-3z^2)(3y^2-z^2)}{16}$ |                         |                            |                            |                         |                          |                             |                          |                         |                             |                            |                          |                            |

*continued ...*

Table 10

| No.                              | multipole | matrix  |                           |                            |                           |                            |                          |                           |                          |                          |                          |                           |                          |                            |                           |
|----------------------------------|-----------|---|---------------------------|----------------------------|---------------------------|----------------------------|--------------------------|---------------------------|--------------------------|--------------------------|--------------------------|---------------------------|--------------------------|----------------------------|---------------------------|
| $\mathbb{Q}_{6,0}^{(a)}(T_2, 1)$ |           | 0   | 0                         | 0                          | 0                         | 0                          | 0                        | $\frac{\sqrt{42}i}{448}$  | 0                        | $\frac{3\sqrt{2}i}{64}$  | 0                        | $\frac{\sqrt{30}i}{64}$   | 0                        | $\frac{\sqrt{6}i}{64}$     | 0                         |
|                                  |           | 0   | 0                         | 0                          | 0                         | 0                          | 0                        | $-\frac{\sqrt{30}i}{64}$  | 0                        | $-\frac{5\sqrt{6}i}{64}$ | 0                        | $-\frac{3\sqrt{10}i}{64}$ | 0                        | $-\frac{\sqrt{210}i}{448}$ |                           |
|                                  |           | 0   | 0                         | 0                          | 0                         | 0                          | 0                        | $\frac{\sqrt{105}i}{224}$ | 0                        | $\frac{3\sqrt{5}i}{32}$  | 0                        | $\frac{5\sqrt{3}i}{32}$   | 0                        | $\frac{\sqrt{15}i}{32}$    | 0                         |
|                                  |           | 0   | 0                         | 0                          | 0                         | 0                          | 0                        | $-\frac{\sqrt{15}i}{32}$  | 0                        | $-\frac{5\sqrt{3}i}{32}$ | 0                        | $-\frac{3\sqrt{5}i}{32}$  | 0                        | $-\frac{\sqrt{105}i}{224}$ |                           |
|                                  |           | 0   | 0                         | 0                          | 0                         | 0                          | 0                        | $\frac{\sqrt{210}i}{448}$ | 0                        | $\frac{3\sqrt{10}i}{64}$ | 0                        | $\frac{5\sqrt{6}i}{64}$   | 0                        | $\frac{\sqrt{30}i}{64}$    | 0                         |
|                                  |           | 0   | 0                         | 0                          | 0                         | 0                          | 0                        | $-\frac{\sqrt{6}i}{64}$   | 0                        | $-\frac{\sqrt{30}i}{64}$ | 0                        | $-\frac{3\sqrt{2}i}{64}$  | 0                        | $-\frac{\sqrt{42}i}{448}$  |                           |
|                                  |           | $-\frac{\sqrt{42}i}{448}$                     | 0                         | $-\frac{\sqrt{105}i}{224}$ | 0                         | $-\frac{\sqrt{210}i}{448}$ | 0                        | 0                         | $\frac{3\sqrt{7}i}{224}$ | 0                        | $\frac{\sqrt{35}i}{112}$ | 0                         | $\frac{\sqrt{21}i}{224}$ | 0                          | 0                         |
|                                  |           | 0   | $\frac{\sqrt{30}i}{64}$   | 0                          | $\frac{\sqrt{15}i}{32}$   | 0                          | $\frac{\sqrt{6}i}{64}$   | $-\frac{3\sqrt{7}i}{224}$ | 0                        | $-\frac{\sqrt{3}i}{16}$  | 0                        | $-\frac{\sqrt{5}i}{32}$   | 0                        | 0                          | 0                         |
|                                  |           | $-\frac{3\sqrt{2}i}{64}$                      | 0                         | $-\frac{3\sqrt{5}i}{32}$   | 0                         | $-\frac{3\sqrt{10}i}{64}$  | 0                        | 0                         | $\frac{\sqrt{3}i}{16}$   | 0                        | $\frac{\sqrt{15}i}{32}$  | 0                         | 0                        | 0                          | $-\frac{\sqrt{21}i}{224}$ |
|                                  |           | 0   | $\frac{5\sqrt{6}i}{64}$   | 0                          | $\frac{5\sqrt{3}i}{32}$   | 0                          | $\frac{\sqrt{30}i}{64}$  | $-\frac{\sqrt{35}i}{112}$ | 0                        | $-\frac{\sqrt{15}i}{32}$ | 0                        | 0                         | 0                        | $\frac{\sqrt{5}i}{32}$     | 0                         |
|                                  |           | $-\frac{\sqrt{30}i}{64}$                      | 0                         | $-\frac{5\sqrt{3}i}{32}$   | 0                         | $-\frac{5\sqrt{6}i}{64}$   | 0                        | 0                         | $\frac{\sqrt{5}i}{32}$   | 0                        | 0                        | 0                         | $-\frac{\sqrt{15}i}{32}$ | 0                          | $-\frac{\sqrt{35}i}{112}$ |
|                                  |           | 0   | $\frac{3\sqrt{10}i}{64}$  | 0                          | $\frac{3\sqrt{5}i}{32}$   | 0                          | $\frac{3\sqrt{2}i}{64}$  | $-\frac{\sqrt{21}i}{224}$ | 0                        | 0                        | 0                        | $\frac{\sqrt{15}i}{32}$   | 0                        | $\frac{\sqrt{3}i}{16}$     | 0                         |
|                                  |           | $-\frac{\sqrt{6}i}{64}$                       | 0                         | $-\frac{\sqrt{15}i}{32}$   | 0                         | $-\frac{\sqrt{30}i}{64}$   | 0                        | 0                         | 0                        | $-\frac{\sqrt{5}i}{32}$  | 0                        | $-\frac{\sqrt{3}i}{16}$   | 0                        | 0                          | $-\frac{3\sqrt{7}i}{224}$ |
|                                  |           | 0   | $\frac{\sqrt{210}i}{448}$ | 0                          | $\frac{\sqrt{105}i}{224}$ | 0                          | $\frac{\sqrt{42}i}{448}$ | 0                         | 0                        | $\frac{\sqrt{21}i}{224}$ | 0                        | $\frac{\sqrt{35}i}{112}$  | 0                        | $\frac{3\sqrt{7}i}{224}$   | 0                         |
| 852                              | symmetry  | $\frac{\sqrt{462}xz(x^2-3z^2)(3x^2-z^2)}{16}$ |                           |                            |                           |                            |                          |                           |                          |                          |                          |                           |                          |                            |                           |

*continued ...*

Table 10

| No.                              | multipole | matrix  |                          |                           |                           |                          |                         |                           |                          |                          |                         |                          |                          |                           |                          |
|----------------------------------|-----------|---|--------------------------|---------------------------|---------------------------|--------------------------|-------------------------|---------------------------|--------------------------|--------------------------|-------------------------|--------------------------|--------------------------|---------------------------|--------------------------|
| $\mathbb{Q}_{6,1}^{(a)}(T_2, 1)$ |           | 0   | 0                        | 0                         | 0                         | 0                        | 0                       | $\frac{\sqrt{42}}{448}$   | 0                        | $-\frac{3\sqrt{2}}{64}$  | 0                       | $\frac{\sqrt{30}}{64}$   | 0                        | $-\frac{\sqrt{6}}{64}$    | 0                        |
|                                  |           | 0   | 0                        | 0                         | 0                         | 0                        | 0                       | $-\frac{\sqrt{30}}{64}$   | 0                        | $\frac{5\sqrt{6}}{64}$   | 0                       | $-\frac{3\sqrt{10}}{64}$ | 0                        | $\frac{\sqrt{210}}{448}$  |                          |
|                                  |           | 0   | 0                        | 0                         | 0                         | 0                        | 0                       | $-\frac{\sqrt{105}}{224}$ | 0                        | $\frac{3\sqrt{5}}{32}$   | 0                       | $-\frac{5\sqrt{3}}{32}$  | 0                        | $\frac{\sqrt{15}}{32}$    | 0                        |
|                                  |           | 0   | 0                        | 0                         | 0                         | 0                        | 0                       | $\frac{\sqrt{15}}{32}$    | 0                        | $-\frac{5\sqrt{3}}{32}$  | 0                       | $\frac{3\sqrt{5}}{32}$   | 0                        | $-\frac{\sqrt{105}}{224}$ |                          |
|                                  |           | 0   | 0                        | 0                         | 0                         | 0                        | 0                       | $\frac{\sqrt{210}}{448}$  | 0                        | $-\frac{3\sqrt{10}}{64}$ | 0                       | $\frac{5\sqrt{6}}{64}$   | 0                        | $-\frac{\sqrt{30}}{64}$   | 0                        |
|                                  |           | 0   | 0                        | 0                         | 0                         | 0                        | 0                       | $-\frac{\sqrt{6}}{64}$    | 0                        | $\frac{\sqrt{30}}{64}$   | 0                       | $-\frac{3\sqrt{2}}{64}$  | 0                        | $\frac{\sqrt{42}}{448}$   |                          |
|                                  |           | $\frac{\sqrt{42}}{448}$                       | 0                        | $-\frac{\sqrt{105}}{224}$ | 0                         | $\frac{\sqrt{210}}{448}$ | 0                       | 0                         | $-\frac{3\sqrt{7}}{224}$ | 0                        | $\frac{\sqrt{35}}{112}$ | 0                        | $-\frac{\sqrt{21}}{224}$ | 0                         | 0                        |
|                                  |           | 0   | $-\frac{\sqrt{30}}{64}$  | 0                         | $\frac{\sqrt{15}}{32}$    | 0                        | $-\frac{\sqrt{6}}{64}$  | $-\frac{3\sqrt{7}}{224}$  | 0                        | $\frac{\sqrt{3}}{16}$    | 0                       | $-\frac{\sqrt{5}}{32}$   | 0                        | 0                         | 0                        |
|                                  |           | $-\frac{3\sqrt{2}}{64}$                       | 0                        | $\frac{3\sqrt{5}}{32}$    | 0                         | $-\frac{3\sqrt{10}}{64}$ | 0                       | 0                         | $\frac{\sqrt{3}}{16}$    | 0                        | $-\frac{\sqrt{15}}{32}$ | 0                        | 0                        | 0                         | $\frac{\sqrt{21}}{224}$  |
|                                  |           | 0   | $\frac{5\sqrt{6}}{64}$   | 0                         | $-\frac{5\sqrt{3}}{32}$   | 0                        | $\frac{\sqrt{30}}{64}$  | $\frac{\sqrt{35}}{112}$   | 0                        | $-\frac{\sqrt{15}}{32}$  | 0                       | 0                        | 0                        | $\frac{\sqrt{5}}{32}$     | 0                        |
|                                  |           | $\frac{\sqrt{30}}{64}$                        | 0                        | $-\frac{5\sqrt{3}}{32}$   | 0                         | $\frac{5\sqrt{6}}{64}$   | 0                       | 0                         | $-\frac{\sqrt{5}}{32}$   | 0                        | 0                       | 0                        | $\frac{\sqrt{15}}{32}$   | 0                         | $-\frac{\sqrt{35}}{112}$ |
|                                  |           | 0   | $-\frac{3\sqrt{10}}{64}$ | 0                         | $\frac{3\sqrt{5}}{32}$    | 0                        | $-\frac{3\sqrt{2}}{64}$ | $-\frac{\sqrt{21}}{224}$  | 0                        | 0                        | 0                       | $\frac{\sqrt{15}}{32}$   | 0                        | $-\frac{\sqrt{3}}{16}$    | 0                        |
|                                  |           | $-\frac{\sqrt{6}}{64}$                        | 0                        | $\frac{\sqrt{15}}{32}$    | 0                         | $-\frac{\sqrt{30}}{64}$  | 0                       | 0                         | 0                        | 0                        | $\frac{\sqrt{5}}{32}$   | 0                        | $-\frac{\sqrt{3}}{16}$   | 0                         | $\frac{3\sqrt{7}}{224}$  |
|                                  |           | 0   | $\frac{\sqrt{210}}{448}$ | 0                         | $-\frac{\sqrt{105}}{224}$ | 0                        | $\frac{\sqrt{42}}{448}$ | 0                         | 0                        | $\frac{\sqrt{21}}{224}$  | 0                       | $-\frac{\sqrt{35}}{112}$ | 0                        | $\frac{3\sqrt{7}}{224}$   | 0                        |
| 853                              | symmetry  | $\frac{\sqrt{462}xy(x^2-3y^2)(3x^2-y^2)}{16}$ |                          |                           |                           |                          |                         |                           |                          |                          |                         |                          |                          |                           |                          |

*continued ...*

Table 10

| No.                              | multipole | matrix   |   |   |   |   |                          |                         |   |   |   |   |                        |                         |  |
|----------------------------------|-----------|--|---|---|---|---|--------------------------|-------------------------|---|---|---|---|------------------------|-------------------------|--|
| $\mathbb{Q}_{6,2}^{(a)}(T_2, 1)$ |           | 0  | 0 | 0 | 0 | 0 | 0                        | 0                       | 0 | 0 | 0 | 0 | 0                      | $\frac{\sqrt{42}i}{14}$ |  |
|                                  |           | 0  | 0 | 0 | 0 | 0 | 0                        | 0                       | 0 | 0 | 0 | 0 | 0                      | 0                       |  |
|                                  |           | 0  | 0 | 0 | 0 | 0 | 0                        | 0                       | 0 | 0 | 0 | 0 | 0                      | 0                       |  |
|                                  |           | 0  | 0 | 0 | 0 | 0 | 0                        | 0                       | 0 | 0 | 0 | 0 | 0                      | 0                       |  |
|                                  |           | 0  | 0 | 0 | 0 | 0 | 0                        | 0                       | 0 | 0 | 0 | 0 | 0                      | 0                       |  |
|                                  |           | 0  | 0 | 0 | 0 | 0 | $\frac{\sqrt{42}i}{14}$  | 0                       | 0 | 0 | 0 | 0 | 0                      | 0                       |  |
|                                  |           | 0  | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{14}$ | 0                       | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{14}$ | 0                       |  |
|                                  |           | 0  | 0 | 0 | 0 | 0 | 0                        | 0                       | 0 | 0 | 0 | 0 | 0                      | $\frac{\sqrt{7}i}{14}$  |  |
|                                  |           | 0  | 0 | 0 | 0 | 0 | 0                        | 0                       | 0 | 0 | 0 | 0 | 0                      | 0                       |  |
|                                  |           | 0  | 0 | 0 | 0 | 0 | 0                        | 0                       | 0 | 0 | 0 | 0 | 0                      | 0                       |  |
|                                  |           | 0  | 0 | 0 | 0 | 0 | 0                        | 0                       | 0 | 0 | 0 | 0 | 0                      | 0                       |  |
|                                  |           | 0  | 0 | 0 | 0 | 0 | 0                        | 0                       | 0 | 0 | 0 | 0 | 0                      | 0                       |  |
|                                  |           | 0  | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{14}$  | 0                       | 0 | 0 | 0 | 0 | 0                      | 0                       |  |
|                                  |           | $-\frac{\sqrt{42}i}{14}$   | 0 | 0 | 0 | 0 | 0                        | $-\frac{\sqrt{7}i}{14}$ | 0 | 0 | 0 | 0 | 0                      | 0                       |  |
| 854                              | symmetry  | $\frac{\sqrt{210}yz(16x^4-16x^2y^2-16x^2z^2+y^4+2y^2z^2+z^4)}{16}$ |   |   |   |   |                          |                         |   |   |   |   |                        |                         |  |

*continued ...*



Table 10

| No.                              | multipole | matrix   |                             |                              |                              |                              |                              |                              |                            |                              |                             |                             |                             |                               |                             |
|----------------------------------|-----------|--|-----------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|----------------------------|------------------------------|-----------------------------|-----------------------------|-----------------------------|-------------------------------|-----------------------------|
| $\mathbb{Q}_{6,0}^{(a)}(T_2, 2)$ |           | 0  | 0                           | 0                            | 0                            | 0                            | 0                            | $\frac{\sqrt{2310i}}{14784}$ | 0                          | $\frac{\sqrt{110i}}{704}$    | 0                           | $-\frac{9\sqrt{66i}}{704}$  | 0                           | $\frac{\sqrt{330i}}{64}$      | 0                           |
|                                  |           | 0  | 0                           | 0                            | 0                            | 0                            | 0                            | $-\frac{5\sqrt{66i}}{2112}$  | 0                          | $-\frac{5\sqrt{330i}}{2112}$ | 0                           | $\frac{27\sqrt{22i}}{704}$  | 0                           | $-\frac{5\sqrt{462i}}{448}$   |                             |
|                                  |           | 0  | 0                           | 0                            | 0                            | 0                            | 0                            | $-\frac{9\sqrt{231i}}{2464}$ | 0                          | $\frac{5\sqrt{11i}}{352}$    | 0                           | $\frac{5\sqrt{165i}}{1056}$ | 0                           | $-\frac{9\sqrt{33i}}{352}$    | 0                           |
|                                  |           | 0  | 0                           | 0                            | 0                            | 0                            | 0                            | $\frac{9\sqrt{33i}}{352}$    | 0                          | $-\frac{5\sqrt{165i}}{1056}$ | 0                           | $-\frac{5\sqrt{11i}}{352}$  | 0                           | $\frac{9\sqrt{231i}}{2464}$   |                             |
|                                  |           | 0  | 0                           | 0                            | 0                            | 0                            | 0                            | $\frac{5\sqrt{462i}}{448}$   | 0                          | $-\frac{27\sqrt{22i}}{704}$  | 0                           | $\frac{5\sqrt{330i}}{2112}$ | 0                           | $\frac{5\sqrt{66i}}{2112}$    | 0                           |
|                                  |           | 0  | 0                           | 0                            | 0                            | 0                            | 0                            | $-\frac{\sqrt{330i}}{64}$    | 0                          | $\frac{9\sqrt{66i}}{704}$    | 0                           | $-\frac{\sqrt{110i}}{704}$  | 0                           | $-\frac{\sqrt{2310i}}{14784}$ |                             |
|                                  |           | $-\frac{\sqrt{2310i}}{14784}$                                      | 0                           | $\frac{9\sqrt{231i}}{2464}$  | 0                            | $-\frac{5\sqrt{462i}}{448}$  | 0                            | 0                            | $\frac{\sqrt{385i}}{2464}$ | 0                            | $-\frac{9\sqrt{77i}}{1232}$ | 0                           | $\frac{\sqrt{1155i}}{224}$  | 0                             | 0                           |
|                                  |           | 0  | $\frac{5\sqrt{66i}}{2112}$  | 0                            | $-\frac{9\sqrt{33i}}{352}$   | 0                            | $\frac{\sqrt{330i}}{64}$     | $-\frac{\sqrt{385i}}{2464}$  | 0                          | $-\frac{\sqrt{165i}}{528}$   | 0                           | $\frac{9\sqrt{11i}}{352}$   | 0                           | 0                             | 0                           |
|                                  |           | $-\frac{\sqrt{110i}}{704}$   | 0                           | $-\frac{5\sqrt{11i}}{352}$   | 0                            | $\frac{27\sqrt{22i}}{704}$   | 0                            | 0                            | $\frac{\sqrt{165i}}{528}$  | 0                            | $\frac{5\sqrt{33i}}{1056}$  | 0                           | 0                           | 0                             | $-\frac{\sqrt{1155i}}{224}$ |
|                                  |           | 0  | $\frac{5\sqrt{330i}}{2112}$ | 0                            | $\frac{5\sqrt{165i}}{1056}$  | 0                            | $-\frac{9\sqrt{66i}}{704}$   | $\frac{9\sqrt{77i}}{1232}$   | 0                          | $-\frac{5\sqrt{33i}}{1056}$  | 0                           | 0                           | 0                           | $-\frac{9\sqrt{11i}}{352}$    | 0                           |
|                                  |           | $\frac{9\sqrt{66i}}{704}$  | 0                           | $-\frac{5\sqrt{165i}}{1056}$ | 0                            | $-\frac{5\sqrt{330i}}{2112}$ | 0                            | 0                            | $-\frac{9\sqrt{11i}}{352}$ | 0                            | 0                           | 0                           | $-\frac{5\sqrt{33i}}{1056}$ | 0                             | $\frac{9\sqrt{77i}}{1232}$  |
|                                  |           | 0  | $-\frac{27\sqrt{22i}}{704}$ | 0                            | $\frac{5\sqrt{11i}}{352}$    | 0                            | $\frac{\sqrt{110i}}{704}$    | $-\frac{\sqrt{1155i}}{224}$  | 0                          | 0                            | 0                           | $\frac{5\sqrt{33i}}{1056}$  | 0                           | $\frac{\sqrt{165i}}{528}$     | 0                           |
|                                  |           | $-\frac{\sqrt{330i}}{64}$  | 0                           | $\frac{9\sqrt{33i}}{352}$    | 0                            | $-\frac{5\sqrt{66i}}{2112}$  | 0                            | 0                            | 0                          | $\frac{9\sqrt{11i}}{352}$    | 0                           | $-\frac{\sqrt{165i}}{528}$  | 0                           | $-\frac{\sqrt{385i}}{2464}$   |                             |
|                                  |           | 0  | $\frac{5\sqrt{462i}}{448}$  | 0                            | $-\frac{9\sqrt{231i}}{2464}$ | 0                            | $\frac{\sqrt{2310i}}{14784}$ | 0                            | 0                          | $\frac{\sqrt{1155i}}{224}$   | 0                           | $-\frac{9\sqrt{77i}}{1232}$ | 0                           | $\frac{\sqrt{385i}}{2464}$    | 0                           |
| 855                              | symmetry  | $\frac{\sqrt{210}xz(x^4-16x^2y^2+2x^2z^2+16y^4-16y^2z^2+z^4)}{16}$ |                             |                              |                              |                              |                              |                              |                            |                              |                             |                             |                             |                               |                             |

continued ...

Table 10

| No.                              | multipole | matrix   |                            |                             |                             |                            |                             |                             |                            |                             |                            |                             |                            |                             |                           |
|----------------------------------|-----------|--|----------------------------|-----------------------------|-----------------------------|----------------------------|-----------------------------|-----------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|---------------------------|
| $\mathbb{Q}_{6,1}^{(a)}(T_2, 2)$ |           | 0  | 0                          | 0                           | 0                           | 0                          | 0                           | $\frac{\sqrt{2310}}{14784}$ | 0                          | $-\frac{\sqrt{110}}{704}$   | 0                          | $-\frac{9\sqrt{66}}{704}$   | 0                          | $-\frac{\sqrt{330}}{64}$    | 0                         |
|                                  |           | 0  | 0                          | 0                           | 0                           | 0                          | 0                           | $-\frac{5\sqrt{66}}{2112}$  | 0                          | $\frac{5\sqrt{330}}{2112}$  | 0                          | $\frac{27\sqrt{22}}{704}$   | 0                          | $\frac{5\sqrt{462}}{448}$   |                           |
|                                  |           | 0  | 0                          | 0                           | 0                           | 0                          | 0                           | $\frac{9\sqrt{231}}{2464}$  | 0                          | $\frac{5\sqrt{11}}{352}$    | 0                          | $-\frac{5\sqrt{165}}{1056}$ | 0                          | $-\frac{9\sqrt{33}}{352}$   | 0                         |
|                                  |           | 0  | 0                          | 0                           | 0                           | 0                          | 0                           | $-\frac{9\sqrt{33}}{352}$   | 0                          | $-\frac{5\sqrt{165}}{1056}$ | 0                          | $\frac{5\sqrt{11}}{352}$    | 0                          | $\frac{9\sqrt{231}}{2464}$  |                           |
|                                  |           | 0  | 0                          | 0                           | 0                           | 0                          | 0                           | $\frac{5\sqrt{462}}{448}$   | 0                          | $\frac{27\sqrt{22}}{704}$   | 0                          | $\frac{5\sqrt{330}}{2112}$  | 0                          | $-\frac{5\sqrt{66}}{2112}$  | 0                         |
|                                  |           | 0  | 0                          | 0                           | 0                           | 0                          | 0                           | $-\frac{\sqrt{330}}{64}$    | 0                          | $-\frac{9\sqrt{66}}{704}$   | 0                          | $-\frac{\sqrt{110}}{704}$   | 0                          | $\frac{\sqrt{2310}}{14784}$ |                           |
|                                  |           | $\frac{\sqrt{2310}}{14784}$  | 0                          | $\frac{9\sqrt{231}}{2464}$  | 0                           | $\frac{5\sqrt{462}}{448}$  | 0                           | 0                           | $-\frac{\sqrt{385}}{2464}$ | 0                           | $-\frac{9\sqrt{77}}{1232}$ | 0                           | $-\frac{\sqrt{1155}}{224}$ | 0                           | 0                         |
|                                  |           | 0  | $-\frac{5\sqrt{66}}{2112}$ | 0                           | $-\frac{9\sqrt{33}}{352}$   | 0                          | $-\frac{\sqrt{330}}{64}$    | $-\frac{\sqrt{385}}{2464}$  | 0                          | $\frac{\sqrt{165}}{528}$    | 0                          | $\frac{9\sqrt{11}}{352}$    | 0                          | 0                           | 0                         |
|                                  |           | $-\frac{\sqrt{110}}{704}$  | 0                          | $\frac{5\sqrt{11}}{352}$    | 0                           | $\frac{27\sqrt{22}}{704}$  | 0                           | 0                           | $\frac{\sqrt{165}}{528}$   | 0                           | $-\frac{5\sqrt{33}}{1056}$ | 0                           | 0                          | 0                           | $\frac{\sqrt{1155}}{224}$ |
|                                  |           | 0  | $\frac{5\sqrt{330}}{2112}$ | 0                           | $-\frac{5\sqrt{165}}{1056}$ | 0                          | $-\frac{9\sqrt{66}}{704}$   | $-\frac{9\sqrt{77}}{1232}$  | 0                          | $-\frac{5\sqrt{33}}{1056}$  | 0                          | 0                           | 0                          | $-\frac{9\sqrt{11}}{352}$   | 0                         |
|                                  |           | $-\frac{9\sqrt{66}}{704}$  | 0                          | $-\frac{5\sqrt{165}}{1056}$ | 0                           | $\frac{5\sqrt{330}}{2112}$ | 0                           | 0                           | $\frac{9\sqrt{11}}{352}$   | 0                           | 0                          | 0                           | $\frac{5\sqrt{33}}{1056}$  | 0                           | $\frac{9\sqrt{77}}{1232}$ |
|                                  |           | 0  | $\frac{27\sqrt{22}}{704}$  | 0                           | $\frac{5\sqrt{11}}{352}$    | 0                          | $-\frac{\sqrt{110}}{704}$   | $-\frac{\sqrt{1155}}{224}$  | 0                          | 0                           | 0                          | $\frac{5\sqrt{33}}{1056}$   | 0                          | $-\frac{\sqrt{165}}{528}$   | 0                         |
|                                  |           | $-\frac{\sqrt{330}}{64}$   | 0                          | $-\frac{9\sqrt{33}}{352}$   | 0                           | $-\frac{5\sqrt{66}}{2112}$ | 0                           | 0                           | 0                          | $-\frac{9\sqrt{11}}{352}$   | 0                          | $-\frac{\sqrt{165}}{528}$   | 0                          | $\frac{\sqrt{385}}{2464}$   |                           |
|                                  |           | 0  | $\frac{5\sqrt{462}}{448}$  | 0                           | $\frac{9\sqrt{231}}{2464}$  | 0                          | $\frac{\sqrt{2310}}{14784}$ | 0                           | 0                          | $\frac{\sqrt{1155}}{224}$   | 0                          | $\frac{9\sqrt{77}}{1232}$   | 0                          | $\frac{\sqrt{385}}{2464}$   | 0                         |
| 856                              | symmetry  | $\frac{\sqrt{210}xy(x^4+2x^2y^2-16x^2z^2+y^4-16y^2z^2+16z^4)}{16}$ |                            |                             |                             |                            |                             |                             |                            |                             |                            |                             |                            |                             |                           |

*continued ...*

Table 10

| No.                              | multipole                | matrix                     |  |                          |                            |                          |                             |                          |                            |                           |                           |                             |                          |                            |  |
|----------------------------------|--------------------------|----------------------------|--|--------------------------|----------------------------|--------------------------|-----------------------------|--------------------------|----------------------------|---------------------------|---------------------------|-----------------------------|--------------------------|----------------------------|--|
| $\mathbb{Q}_{6,2}^{(a)}(T_2, 2)$ | 0                        | 0                          | 0                                      | 0                        | 0                          | 0                        | 0                           | 0                        | 0                          | $\frac{\sqrt{66}i}{66}$   | 0                         | 0                           | 0                        | 0                          |  |
|                                  | 0                        | 0                          | 0                                      | 0                        | 0                          | 0                        | $\frac{\sqrt{462}i}{462}$   | 0                        | 0                          | 0                         | $-\frac{\sqrt{330}i}{66}$ | 0                           | 0                        | 0                          |  |
|                                  | 0                        | 0                          | 0                                      | 0                        | 0                          | 0                        | 0                           | $-\frac{\sqrt{33}i}{33}$ | 0                          | 0                         | 0                         | $\frac{\sqrt{11}i}{11}$     | 0                        | 0                          |  |
|                                  | 0                        | 0                          | 0                                      | 0                        | 0                          | 0                        | 0                           | 0                        | $\frac{\sqrt{11}i}{11}$    | 0                         | 0                         | 0                           | $-\frac{\sqrt{33}i}{33}$ | 0                          |  |
|                                  | 0                        | 0                          | 0                                      | 0                        | 0                          | 0                        | 0                           | 0                        | 0                          | $-\frac{\sqrt{330}i}{66}$ | 0                         | 0                           | 0                        | $\frac{\sqrt{462}i}{462}$  |  |
|                                  | 0                        | 0                          | 0                                      | 0                        | 0                          | 0                        | 0                           | 0                        | 0                          | 0                         | $\frac{\sqrt{66}i}{66}$   | 0                           | 0                        | 0                          |  |
|                                  | 0                        | $-\frac{\sqrt{462}i}{462}$ | 0                                      | 0                        | 0                          | 0                        | 0                           | 0                        | $\frac{\sqrt{1155}i}{462}$ | 0                         | 0                         | 0                           | 0                        | 0                          |  |
|                                  | 0                        | 0                          | $\frac{\sqrt{33}i}{33}$                | 0                        | 0                          | 0                        | 0                           | 0                        | 0                          | $-\frac{\sqrt{11}i}{22}$  | 0                         | 0                           | 0                        | 0                          |  |
|                                  | 0                        | 0                          | 0                                      | $-\frac{\sqrt{11}i}{11}$ | 0                          | 0                        | $-\frac{\sqrt{1155}i}{462}$ | 0                        | 0                          | 0                         | $\frac{\sqrt{33}i}{66}$   | 0                           | 0                        | 0                          |  |
|                                  | $-\frac{\sqrt{66}i}{66}$ | 0                          | 0                                      | 0                        | $\frac{\sqrt{330}i}{66}$   | 0                        | 0                           | $\frac{\sqrt{11}i}{22}$  | 0                          | 0                         | 0                         | $\frac{\sqrt{33}i}{66}$     | 0                        | 0                          |  |
|                                  | 0                        | $\frac{\sqrt{330}i}{66}$   | 0                                      | 0                        | 0                          | $-\frac{\sqrt{66}i}{66}$ | 0                           | 0                        | $-\frac{\sqrt{33}i}{66}$   | 0                         | 0                         | 0                           | $-\frac{\sqrt{11}i}{22}$ | 0                          |  |
|                                  | 0                        | 0                          | $-\frac{\sqrt{11}i}{11}$               | 0                        | 0                          | 0                        | 0                           | 0                        | 0                          | $-\frac{\sqrt{33}i}{66}$  | 0                         | 0                           | 0                        | $\frac{\sqrt{1155}i}{462}$ |  |
|                                  | 0                        | 0                          | 0                                      | $\frac{\sqrt{33}i}{33}$  | 0                          | 0                        | 0                           | 0                        | 0                          | 0                         | $\frac{\sqrt{11}i}{22}$   | 0                           | 0                        | 0                          |  |
|                                  | 0                        | 0                          | 0                                      | 0                        | $-\frac{\sqrt{462}i}{462}$ | 0                        | 0                           | 0                        | 0                          | 0                         | 0                         | $-\frac{\sqrt{1155}i}{462}$ | 0                        | 0                          |  |
|                                  | 857                      | symmetry                   | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |                          |                            |                          |                             |                          |                            |                           |                           |                             |                          |                            |  |

continued ...

Table 10

| No.                              | multipole | matrix                         |                            |                          |                          |                           |                           |                        |                            |                            |                          |                          |                           |                           |                        |
|----------------------------------|-----------|--------------------------------|----------------------------|--------------------------|--------------------------|---------------------------|---------------------------|------------------------|----------------------------|----------------------------|--------------------------|--------------------------|---------------------------|---------------------------|------------------------|
| $\mathbb{Q}_{2,0}^{(1,-1;a)}(E)$ |           | $-\frac{5\sqrt{21}}{147}$      | 0                          | 0                        | 0                        | 0                         | 0                         | 0                      | $-\frac{15\sqrt{14}}{196}$ | 0                          | 0                        | 0                        | 0                         | 0                         | 0                      |
|                                  |           | 0                              | $\frac{\sqrt{21}}{147}$    | 0                        | 0                        | 0                         | 0                         | 0                      | 0                          | $-\frac{3\sqrt{210}}{196}$ | 0                        | 0                        | 0                         | 0                         | 0                      |
|                                  |           | 0                              | 0                          | $\frac{4\sqrt{21}}{147}$ | 0                        | 0                         | 0                         | 0                      | 0                          | 0                          | $-\frac{3\sqrt{7}}{98}$  | 0                        | 0                         | 0                         | 0                      |
|                                  |           | 0                              | 0                          | 0                        | $\frac{4\sqrt{21}}{147}$ | 0                         | 0                         | 0                      | 0                          | 0                          | 0                        | $\frac{3\sqrt{7}}{98}$   | 0                         | 0                         | 0                      |
|                                  |           | 0                              | 0                          | 0                        | 0                        | $\frac{\sqrt{21}}{147}$   | 0                         | 0                      | 0                          | 0                          | 0                        | 0                        | $\frac{3\sqrt{210}}{196}$ | 0                         | 0                      |
|                                  |           | 0                              | 0                          | 0                        | 0                        | 0                         | $-\frac{5\sqrt{21}}{147}$ | 0                      | 0                          | 0                          | 0                        | 0                        | 0                         | $\frac{15\sqrt{14}}{196}$ | 0                      |
|                                  |           | 0                              | 0                          | 0                        | 0                        | 0                         | 0                         | $\frac{\sqrt{21}}{14}$ | 0                          | 0                          | 0                        | 0                        | 0                         | 0                         | 0                      |
|                                  |           | $-\frac{15\sqrt{14}}{196}$     | 0                          | 0                        | 0                        | 0                         | 0                         | 0                      | $\frac{\sqrt{21}}{98}$     | 0                          | 0                        | 0                        | 0                         | 0                         | 0                      |
|                                  |           | 0                              | $-\frac{3\sqrt{210}}{196}$ | 0                        | 0                        | 0                         | 0                         | 0                      | 0                          | $-\frac{3\sqrt{21}}{98}$   | 0                        | 0                        | 0                         | 0                         | 0                      |
|                                  |           | 0                              | 0                          | $-\frac{3\sqrt{7}}{98}$  | 0                        | 0                         | 0                         | 0                      | 0                          | 0                          | $-\frac{5\sqrt{21}}{98}$ | 0                        | 0                         | 0                         | 0                      |
|                                  |           | 0                              | 0                          | 0                        | $\frac{3\sqrt{7}}{98}$   | 0                         | 0                         | 0                      | 0                          | 0                          | 0                        | $-\frac{5\sqrt{21}}{98}$ | 0                         | 0                         | 0                      |
|                                  |           | 0                              | 0                          | 0                        | 0                        | $\frac{3\sqrt{210}}{196}$ | 0                         | 0                      | 0                          | 0                          | 0                        | 0                        | $-\frac{3\sqrt{21}}{98}$  | 0                         | 0                      |
|                                  |           | 0                              | 0                          | 0                        | 0                        | 0                         | $\frac{15\sqrt{14}}{196}$ | 0                      | 0                          | 0                          | 0                        | 0                        | 0                         | $\frac{\sqrt{21}}{98}$    | 0                      |
|                                  |           | 0                              | 0                          | 0                        | 0                        | 0                         | 0                         | 0                      | 0                          | 0                          | 0                        | 0                        | 0                         | 0                         | $\frac{\sqrt{21}}{14}$ |
| 858                              | symmetry  | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ |                            |                          |                          |                           |                           |                        |                            |                            |                          |                          |                           |                           |                        |

*continued ...*

Table 10

| No.                              | multipole | matrix                    |                          |                          |                          |                          |                          |                        |                         |                           |                          |                          |                          |                         |  |
|----------------------------------|-----------|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|------------------------|-------------------------|---------------------------|--------------------------|--------------------------|--------------------------|-------------------------|--|
| $\mathbb{Q}_{2,1}^{(1,-1;a)}(E)$ |           | 0                         | 0                        | $-\frac{\sqrt{70}}{98}$  | 0                        | 0                        | 0                        | 0                      | 0                       | $-\frac{\sqrt{210}}{196}$ | 0                        | 0                        | 0                        | 0                       |  |
|                                  |           | 0                         | 0                        | 0                        | $-\frac{3\sqrt{14}}{98}$ | 0                        | 0                        | $\frac{\sqrt{30}}{28}$ | 0                       | 0                         | $-\frac{\sqrt{42}}{49}$  | 0                        | 0                        | 0                       |  |
|                                  |           | $-\frac{\sqrt{70}}{98}$   | 0                        | 0                        | 0                        | $-\frac{3\sqrt{14}}{98}$ | 0                        | 0                      | $\frac{\sqrt{105}}{49}$ | 0                         | 0                        | $-\frac{3\sqrt{35}}{98}$ | 0                        | 0                       |  |
|                                  |           | 0                         | $-\frac{3\sqrt{14}}{98}$ | 0                        | 0                        | 0                        | $-\frac{\sqrt{70}}{98}$  | 0                      | 0                       | $\frac{3\sqrt{35}}{98}$   | 0                        | 0                        | $-\frac{\sqrt{105}}{49}$ | 0                       |  |
|                                  |           | 0                         | 0                        | $-\frac{3\sqrt{14}}{98}$ | 0                        | 0                        | 0                        | 0                      | 0                       | $\frac{\sqrt{42}}{49}$    | 0                        | 0                        | 0                        | $-\frac{\sqrt{30}}{28}$ |  |
|                                  |           | 0                         | 0                        | 0                        | $-\frac{\sqrt{70}}{98}$  | 0                        | 0                        | 0                      | 0                       | 0                         | $\frac{\sqrt{210}}{196}$ | 0                        | 0                        | 0                       |  |
|                                  |           | 0                         | $\frac{\sqrt{30}}{28}$   | 0                        | 0                        | 0                        | 0                        | 0                      | $\frac{\sqrt{3}}{14}$   | 0                         | 0                        | 0                        | 0                        | 0                       |  |
|                                  |           | 0                         | 0                        | $\frac{\sqrt{105}}{49}$  | 0                        | 0                        | 0                        | 0                      | 0                       | $\frac{3\sqrt{35}}{98}$   | 0                        | 0                        | 0                        | 0                       |  |
|                                  |           | 0                         | 0                        | 0                        | $\frac{3\sqrt{35}}{98}$  | 0                        | 0                        | $\frac{\sqrt{3}}{14}$  | 0                       | 0                         | $\frac{\sqrt{105}}{49}$  | 0                        | 0                        | 0                       |  |
|                                  |           | $-\frac{\sqrt{210}}{196}$ | 0                        | 0                        | 0                        | $\frac{\sqrt{42}}{49}$   | 0                        | 0                      | $\frac{3\sqrt{35}}{98}$ | 0                         | 0                        | $\frac{\sqrt{105}}{49}$  | 0                        | 0                       |  |
|                                  |           | 0                         | $-\frac{\sqrt{42}}{49}$  | 0                        | 0                        | 0                        | $\frac{\sqrt{210}}{196}$ | 0                      | 0                       | $\frac{\sqrt{105}}{49}$   | 0                        | 0                        | $\frac{3\sqrt{35}}{98}$  | 0                       |  |
|                                  |           | 0                         | 0                        | $-\frac{3\sqrt{35}}{98}$ | 0                        | 0                        | 0                        | 0                      | 0                       | $\frac{\sqrt{105}}{49}$   | 0                        | 0                        | 0                        | $\frac{\sqrt{3}}{14}$   |  |
|                                  |           | 0                         | 0                        | 0                        | $-\frac{\sqrt{105}}{49}$ | 0                        | 0                        | 0                      | 0                       | 0                         | $\frac{3\sqrt{35}}{98}$  | 0                        | 0                        | 0                       |  |
|                                  |           | 0                         | 0                        | 0                        | 0                        | $-\frac{\sqrt{30}}{28}$  | 0                        | 0                      | 0                       | 0                         | 0                        | $\frac{\sqrt{3}}{14}$    | 0                        | 0                       |  |
| 859                              | symmetry  | $\sqrt{3}yz$              |                          |                          |                          |                          |                          |                        |                         |                           |                          |                          |                          |                         |  |

*continued ...*

Table 10

| No.                                | multipole | matrix                      |                             |                           |                            |                            |                            |                         |                           |                            |                            |                             |                             |                            |                          |
|------------------------------------|-----------|-----------------------------|-----------------------------|---------------------------|----------------------------|----------------------------|----------------------------|-------------------------|---------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|----------------------------|--------------------------|
| $\mathbb{Q}_{2,0}^{(1,-1;a)}(T_2)$ |           | 0                           | $\frac{\sqrt{35}i}{49}$     | 0                         | 0                          | 0                          | 0                          | $\frac{5\sqrt{6}i}{56}$ | 0                         | $\frac{15\sqrt{14}i}{392}$ | 0                          | 0                           | 0                           | 0                          | 0                        |
|                                    |           | $-\frac{\sqrt{35}i}{49}$    | 0                           | $\frac{\sqrt{14}i}{49}$   | 0                          | 0                          | 0                          | 0                       | $\frac{\sqrt{210}i}{392}$ | 0                          | $\frac{11\sqrt{42}i}{392}$ | 0                           | 0                           | 0                          | 0                        |
|                                    |           | 0                           | $-\frac{\sqrt{14}i}{49}$    | 0                         | 0                          | 0                          | 0                          | 0                       | 0                         | $-\frac{3\sqrt{35}i}{196}$ | 0                          | $\frac{\sqrt{21}i}{28}$     | 0                           | 0                          | 0                        |
|                                    |           | 0                           | 0                           | 0                         | 0                          | $-\frac{\sqrt{14}i}{49}$   | 0                          | 0                       | 0                         | 0                          | $-\frac{\sqrt{21}i}{28}$   | 0                           | $\frac{3\sqrt{35}i}{196}$   | 0                          | 0                        |
|                                    |           | 0                           | 0                           | 0                         | $\frac{\sqrt{14}i}{49}$    | 0                          | $-\frac{\sqrt{35}i}{49}$   | 0                       | 0                         | 0                          | 0                          | $-\frac{11\sqrt{42}i}{392}$ | 0                           | $-\frac{\sqrt{210}i}{392}$ | 0                        |
|                                    |           | 0                           | 0                           | 0                         | 0                          | $\frac{\sqrt{35}i}{49}$    | 0                          | 0                       | 0                         | 0                          | 0                          | 0                           | $-\frac{15\sqrt{14}i}{392}$ | 0                          | $-\frac{5\sqrt{6}i}{56}$ |
|                                    |           | $-\frac{5\sqrt{6}i}{56}$    | 0                           | 0                         | 0                          | 0                          | 0                          | 0                       | $-\frac{3i}{14}$          | 0                          | 0                          | 0                           | 0                           | 0                          | 0                        |
|                                    |           | 0                           | $-\frac{\sqrt{210}i}{392}$  | 0                         | 0                          | 0                          | 0                          | $\frac{3i}{14}$         | 0                         | $-\frac{2\sqrt{21}i}{49}$  | 0                          | 0                           | 0                           | 0                          | 0                        |
|                                    |           | $-\frac{15\sqrt{14}i}{392}$ | 0                           | $\frac{3\sqrt{35}i}{196}$ | 0                          | 0                          | 0                          | 0                       | $\frac{2\sqrt{21}i}{49}$  | 0                          | $-\frac{\sqrt{105}i}{98}$  | 0                           | 0                           | 0                          | 0                        |
|                                    |           | 0                           | $-\frac{11\sqrt{42}i}{392}$ | 0                         | $\frac{\sqrt{21}i}{28}$    | 0                          | 0                          | 0                       | 0                         | $\frac{\sqrt{105}i}{98}$   | 0                          | 0                           | 0                           | 0                          | 0                        |
|                                    |           | 0                           | 0                           | $-\frac{\sqrt{21}i}{28}$  | 0                          | $\frac{11\sqrt{42}i}{392}$ | 0                          | 0                       | 0                         | 0                          | 0                          | $\frac{\sqrt{105}i}{98}$    | 0                           | 0                          | 0                        |
|                                    |           | 0                           | 0                           | 0                         | $-\frac{3\sqrt{35}i}{196}$ | 0                          | $\frac{15\sqrt{14}i}{392}$ | 0                       | 0                         | 0                          | 0                          | $-\frac{\sqrt{105}i}{98}$   | 0                           | $\frac{2\sqrt{21}i}{49}$   | 0                        |
|                                    |           | 0                           | 0                           | 0                         | 0                          | $\frac{\sqrt{210}i}{392}$  | 0                          | 0                       | 0                         | 0                          | 0                          | 0                           | $-\frac{2\sqrt{21}i}{49}$   | 0                          | $\frac{3i}{14}$          |
|                                    |           | 0                           | 0                           | 0                         | 0                          | 0                          | $\frac{5\sqrt{6}i}{56}$    | 0                       | 0                         | 0                          | 0                          | 0                           | 0                           | $-\frac{3i}{14}$           | 0                        |
| 860                                | symmetry  | $\sqrt{3}xz$                |                             |                           |                            |                            |                            |                         |                           |                            |                            |                             |                             |                            |                          |

*continued ...*

Table 10

| No.                                | multipole | matrix                     |                            |                           |                           |                            |                            |                        |                          |                            |                            |                            |                            |                          |                        |   |
|------------------------------------|-----------|----------------------------|----------------------------|---------------------------|---------------------------|----------------------------|----------------------------|------------------------|--------------------------|----------------------------|----------------------------|----------------------------|----------------------------|--------------------------|------------------------|---|
| $\mathbb{Q}_{2,1}^{(1,-1;a)}(T_2)$ |           | 0                          | $-\frac{\sqrt{35}}{49}$    | 0                         | 0                         | 0                          | 0                          | $\frac{5\sqrt{6}}{56}$ | 0                        | $-\frac{15\sqrt{14}}{392}$ | 0                          | 0                          | 0                          | 0                        | 0                      | 0 |
|                                    |           | $-\frac{\sqrt{35}}{49}$    | 0                          | $-\frac{\sqrt{14}}{49}$   | 0                         | 0                          | 0                          | 0                      | $\frac{\sqrt{210}}{392}$ | 0                          | $-\frac{11\sqrt{42}}{392}$ | 0                          | 0                          | 0                        | 0                      | 0 |
|                                    |           | 0                          | $-\frac{\sqrt{14}}{49}$    | 0                         | 0                         | 0                          | 0                          | 0                      | 0                        | $-\frac{3\sqrt{35}}{196}$  | 0                          | $-\frac{\sqrt{21}}{28}$    | 0                          | 0                        | 0                      | 0 |
|                                    |           | 0                          | 0                          | 0                         | 0                         | $\frac{\sqrt{14}}{49}$     | 0                          | 0                      | 0                        | 0                          | $-\frac{\sqrt{21}}{28}$    | 0                          | $-\frac{3\sqrt{35}}{196}$  | 0                        | 0                      | 0 |
|                                    |           | 0                          | 0                          | 0                         | $\frac{\sqrt{14}}{49}$    | 0                          | $\frac{\sqrt{35}}{49}$     | 0                      | 0                        | 0                          | 0                          | $-\frac{11\sqrt{42}}{392}$ | 0                          | $\frac{\sqrt{210}}{392}$ | 0                      | 0 |
|                                    |           | 0                          | 0                          | 0                         | 0                         | $\frac{\sqrt{35}}{49}$     | 0                          | 0                      | 0                        | 0                          | 0                          | 0                          | $-\frac{15\sqrt{14}}{392}$ | 0                        | $\frac{5\sqrt{6}}{56}$ | 0 |
|                                    |           | $\frac{5\sqrt{6}}{56}$     | 0                          | 0                         | 0                         | 0                          | 0                          | 0                      | $\frac{3}{14}$           | 0                          | 0                          | 0                          | 0                          | 0                        | 0                      | 0 |
|                                    |           | 0                          | $\frac{\sqrt{210}}{392}$   | 0                         | 0                         | 0                          | 0                          | $\frac{3}{14}$         | 0                        | $\frac{2\sqrt{21}}{49}$    | 0                          | 0                          | 0                          | 0                        | 0                      | 0 |
|                                    |           | $-\frac{15\sqrt{14}}{392}$ | 0                          | $-\frac{3\sqrt{35}}{196}$ | 0                         | 0                          | 0                          | 0                      | $\frac{2\sqrt{21}}{49}$  | 0                          | $\frac{\sqrt{105}}{98}$    | 0                          | 0                          | 0                        | 0                      | 0 |
|                                    |           | 0                          | $-\frac{11\sqrt{42}}{392}$ | 0                         | $-\frac{\sqrt{21}}{28}$   | 0                          | 0                          | 0                      | 0                        | $\frac{\sqrt{105}}{98}$    | 0                          | 0                          | 0                          | 0                        | 0                      | 0 |
|                                    |           | 0                          | 0                          | $-\frac{\sqrt{21}}{28}$   | 0                         | $-\frac{11\sqrt{42}}{392}$ | 0                          | 0                      | 0                        | 0                          | 0                          | 0                          | $-\frac{\sqrt{105}}{98}$   | 0                        | 0                      | 0 |
|                                    |           | 0                          | 0                          | 0                         | $-\frac{3\sqrt{35}}{196}$ | 0                          | $-\frac{15\sqrt{14}}{392}$ | 0                      | 0                        | 0                          | 0                          | $-\frac{\sqrt{105}}{98}$   | 0                          | $-\frac{2\sqrt{21}}{49}$ | 0                      | 0 |
|                                    |           | 0                          | 0                          | 0                         | 0                         | $\frac{\sqrt{210}}{392}$   | 0                          | 0                      | 0                        | 0                          | 0                          | 0                          | $-\frac{2\sqrt{21}}{49}$   | 0                        | $-\frac{3}{14}$        | 0 |
|                                    |           | 0                          | 0                          | 0                         | 0                         | 0                          | $\frac{5\sqrt{6}}{56}$     | 0                      | 0                        | 0                          | 0                          | 0                          | 0                          | 0                        | $-\frac{3}{14}$        | 0 |
| 861                                | symmetry  | $\sqrt{3}xy$               |                            |                           |                           |                            |                            |                        |                          |                            |                            |                            |                            |                          |                        |   |

*continued ...*

Table 10

| No.                                | multipole                  | matrix   |                           |                           |                          |                            |                         |                          |                          |                           |                           |                           |                           |                         |  |
|------------------------------------|----------------------------|--|---------------------------|---------------------------|--------------------------|----------------------------|-------------------------|--------------------------|--------------------------|---------------------------|---------------------------|---------------------------|---------------------------|-------------------------|--|
| $\mathbb{Q}_{2,2}^{(1,-1;a)}(T_2)$ | 0                          | 0  | $\frac{\sqrt{70i}}{98}$   | 0                         | 0                        | 0                          | 0                       | 0                        | 0                        | $\frac{\sqrt{210i}}{196}$ | 0                         | 0                         | 0                         | 0                       |  |
|                                    | 0                          | 0  | 0                         | $\frac{3\sqrt{14i}}{98}$  | 0                        | 0                          | $\frac{\sqrt{30i}}{28}$ | 0                        | 0                        | 0                         | $\frac{\sqrt{42i}}{49}$   | 0                         | 0                         | 0                       |  |
|                                    | $-\frac{\sqrt{70i}}{98}$   | 0  | 0                         | 0                         | $\frac{3\sqrt{14i}}{98}$ | 0                          | 0                       | $\frac{\sqrt{105i}}{49}$ | 0                        | 0                         | 0                         | $\frac{3\sqrt{35i}}{98}$  | 0                         | 0                       |  |
|                                    | 0                          | $-\frac{3\sqrt{14i}}{98}$                                  | 0                         | 0                         | 0                        | $\frac{\sqrt{70i}}{98}$    | 0                       | 0                        | $\frac{3\sqrt{35i}}{98}$ | 0                         | 0                         | 0                         | $\frac{\sqrt{105i}}{49}$  | 0                       |  |
|                                    | 0                          | 0  | $-\frac{3\sqrt{14i}}{98}$ | 0                         | 0                        | 0                          | 0                       | 0                        | 0                        | $\frac{\sqrt{42i}}{49}$   | 0                         | 0                         | 0                         | $\frac{\sqrt{30i}}{28}$ |  |
|                                    | 0                          | 0  | 0                         | $-\frac{\sqrt{70i}}{98}$  | 0                        | 0                          | 0                       | 0                        | 0                        | 0                         | $\frac{\sqrt{210i}}{196}$ | 0                         | 0                         | 0                       |  |
|                                    | 0                          | $-\frac{\sqrt{30i}}{28}$                                   | 0                         | 0                         | 0                        | 0                          | 0                       | 0                        | $-\frac{\sqrt{3i}}{14}$  | 0                         | 0                         | 0                         | 0                         | 0                       |  |
|                                    | 0                          | 0  | $-\frac{\sqrt{105i}}{49}$ | 0                         | 0                        | 0                          | 0                       | 0                        | 0                        | $-\frac{3\sqrt{35i}}{98}$ | 0                         | 0                         | 0                         | 0                       |  |
|                                    | 0                          | 0  | 0                         | $-\frac{3\sqrt{35i}}{98}$ | 0                        | 0                          | $\frac{\sqrt{3i}}{14}$  | 0                        | 0                        | 0                         | $-\frac{\sqrt{105i}}{49}$ | 0                         | 0                         | 0                       |  |
|                                    | $-\frac{\sqrt{210i}}{196}$ | 0  | 0                         | 0                         | $-\frac{\sqrt{42i}}{49}$ | 0                          | 0                       | $\frac{3\sqrt{35i}}{98}$ | 0                        | 0                         | 0                         | $-\frac{\sqrt{105i}}{49}$ | 0                         | 0                       |  |
|                                    | 0                          | $-\frac{\sqrt{42i}}{49}$                                   | 0                         | 0                         | 0                        | $-\frac{\sqrt{210i}}{196}$ | 0                       | 0                        | $\frac{\sqrt{105i}}{49}$ | 0                         | 0                         | 0                         | $-\frac{3\sqrt{35i}}{98}$ | 0                       |  |
|                                    | 0                          | 0  | $-\frac{3\sqrt{35i}}{98}$ | 0                         | 0                        | 0                          | 0                       | 0                        | 0                        | $\frac{\sqrt{105i}}{49}$  | 0                         | 0                         | 0                         | $-\frac{\sqrt{3i}}{14}$ |  |
|                                    | 0                          | 0  | 0                         | $-\frac{\sqrt{105i}}{49}$ | 0                        | 0                          | 0                       | 0                        | 0                        | 0                         | $\frac{3\sqrt{35i}}{98}$  | 0                         | 0                         | 0                       |  |
|                                    | 0                          | 0  | 0                         | 0                         | $-\frac{\sqrt{30i}}{28}$ | 0                          | 0                       | 0                        | 0                        | 0                         | 0                         | $\frac{\sqrt{3i}}{14}$    | 0                         | 0                       |  |
| 862                                | symmetry                   | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$ |                           |                           |                          |                            |                         |                          |                          |                           |                           |                           |                           |                         |  |

*continued ...*



Table 10

| No. | multipole                      | matrix   |                         |                         |                          |                         |                         |                          |                         |                         |                         |                         |                         |                         |                         |
|-----|--------------------------------|--|-------------------------|-------------------------|--------------------------|-------------------------|-------------------------|--------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| 863 | $\mathbb{Q}_4^{(1,-1;a)}(A_1)$ | $\frac{1}{42}$   | 0                       | 0                       | 0                        | $\frac{\sqrt{5}}{42}$   | 0                       | 0                        | $\frac{5\sqrt{6}}{84}$  | 0                       | 0                       | 0                       | $\frac{5\sqrt{2}}{84}$  | 0                       | 0                       |
|     |                                | 0  | $-\frac{1}{14}$         | 0                       | 0                        | 0                       | $\frac{\sqrt{5}}{42}$   | 0                        | 0                       | $-\frac{\sqrt{10}}{21}$ | 0                       | 0                       | 0                       | $\frac{\sqrt{30}}{42}$  | 0                       |
|     |                                | 0  | 0                       | $\frac{1}{21}$          | 0                        | 0                       | 0                       | 0                        | 0                       | 0                       | $-\frac{5\sqrt{3}}{84}$ | 0                       | 0                       | 0                       | $\frac{\sqrt{105}}{84}$ |
|     |                                | 0  | 0                       | 0                       | $\frac{1}{21}$           | 0                       | 0                       | $-\frac{\sqrt{105}}{84}$ | 0                       | 0                       | 0                       | $\frac{5\sqrt{3}}{84}$  | 0                       | 0                       | 0                       |
|     |                                | $\frac{\sqrt{5}}{42}$  | 0                       | 0                       | 0                        | $-\frac{1}{14}$         | 0                       | 0                        | $-\frac{\sqrt{30}}{42}$ | 0                       | 0                       | 0                       | $\frac{\sqrt{10}}{21}$  | 0                       | 0                       |
|     |                                | 0  | $\frac{\sqrt{5}}{42}$   | 0                       | 0                        | 0                       | $\frac{1}{42}$          | 0                        | 0                       | $-\frac{5\sqrt{2}}{84}$ | 0                       | 0                       | 0                       | $-\frac{5\sqrt{6}}{84}$ | 0                       |
|     |                                | 0  | 0                       | 0                       | $-\frac{\sqrt{105}}{84}$ | 0                       | 0                       | $-\frac{1}{6}$           | 0                       | 0                       | 0                       | $-\frac{\sqrt{35}}{42}$ | 0                       | 0                       | 0                       |
|     |                                | $\frac{5\sqrt{6}}{84}$   | 0                       | 0                       | 0                        | $-\frac{\sqrt{30}}{42}$ | 0                       | 0                        | $\frac{13}{42}$         | 0                       | 0                       | 0                       | $-\frac{5\sqrt{3}}{42}$ | 0                       | 0                       |
|     |                                | 0  | $-\frac{\sqrt{10}}{21}$ | 0                       | 0                        | 0                       | $-\frac{5\sqrt{2}}{84}$ | 0                        | 0                       | $\frac{1}{14}$          | 0                       | 0                       | 0                       | $-\frac{5\sqrt{3}}{42}$ | 0                       |
|     |                                | 0  | 0                       | $-\frac{5\sqrt{3}}{84}$ | 0                        | 0                       | 0                       | 0                        | 0                       | 0                       | $-\frac{3}{14}$         | 0                       | 0                       | 0                       | $-\frac{\sqrt{35}}{42}$ |
|     |                                | 0  | 0                       | 0                       | $\frac{5\sqrt{3}}{84}$   | 0                       | 0                       | $-\frac{\sqrt{35}}{42}$  | 0                       | 0                       | 0                       | $-\frac{3}{14}$         | 0                       | 0                       | 0                       |
|     |                                | $\frac{5\sqrt{2}}{84}$   | 0                       | 0                       | 0                        | $\frac{\sqrt{10}}{21}$  | 0                       | 0                        | $-\frac{5\sqrt{3}}{42}$ | 0                       | 0                       | 0                       | $\frac{1}{14}$          | 0                       | 0                       |
|     |                                | 0  | $\frac{\sqrt{30}}{42}$  | 0                       | 0                        | 0                       | $-\frac{5\sqrt{6}}{84}$ | 0                        | 0                       | $-\frac{5\sqrt{3}}{42}$ | 0                       | 0                       | 0                       | $\frac{13}{42}$         | 0                       |
|     |                                | 0  | 0                       | $\frac{\sqrt{105}}{84}$ | 0                        | 0                       | 0                       | 0                        | 0                       | $-\frac{\sqrt{35}}{42}$ | 0                       | 0                       | 0                       | 0                       | $-\frac{1}{6}$          |
| 863 | symmetry                       | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ |                         |                         |                          |                         |                         |                          |                         |                         |                         |                         |                         |                         |                         |

*continued ...*

Table 10

| No.                              | multipole | matrix                                       |                           |                            |                           |                          |                            |                         |                           |                           |                            |                           |                          |                            |                         |
|----------------------------------|-----------|--|---------------------------|----------------------------|---------------------------|--------------------------|----------------------------|-------------------------|---------------------------|---------------------------|----------------------------|---------------------------|--------------------------|----------------------------|-------------------------|
| $\mathbb{Q}_{4,0}^{(1,-1;a)}(E)$ |           | $\frac{\sqrt{35}}{294}$                      | 0                         | 0                          | 0                         | $-\frac{\sqrt{7}}{42}$   | 0                          | 0                       | $\frac{5\sqrt{210}}{588}$ | 0                         | 0                          | 0                         | $-\frac{\sqrt{70}}{84}$  | 0                          | 0                       |
|                                  |           | 0  | $-\frac{\sqrt{35}}{98}$   | 0                          | 0                         | 0                        | $-\frac{\sqrt{7}}{42}$     | 0                       | 0                         | $-\frac{5\sqrt{14}}{147}$ | 0                          | 0                         | 0                        | $-\frac{\sqrt{42}}{42}$    | 0                       |
|                                  |           | 0  | 0                         | $\frac{\sqrt{35}}{147}$    | 0                         | 0                        | 0                          | 0                       | 0                         | 0                         | $-\frac{5\sqrt{105}}{588}$ | 0                         | 0                        | 0                          | $-\frac{\sqrt{3}}{12}$  |
|                                  |           | 0  | 0                         | 0                          | $\frac{\sqrt{35}}{147}$   | 0                        | 0                          | $\frac{\sqrt{3}}{12}$   | 0                         | 0                         | 0                          | $\frac{5\sqrt{105}}{588}$ | 0                        | 0                          | 0                       |
|                                  |           | $-\frac{\sqrt{7}}{42}$                       | 0                         | 0                          | 0                         | $-\frac{\sqrt{35}}{98}$  | 0                          | 0                       | $\frac{\sqrt{42}}{42}$    | 0                         | 0                          | 0                         | $\frac{5\sqrt{14}}{147}$ | 0                          | 0                       |
|                                  |           | 0  | $-\frac{\sqrt{7}}{42}$    | 0                          | 0                         | 0                        | $\frac{\sqrt{35}}{294}$    | 0                       | 0                         | $\frac{\sqrt{70}}{84}$    | 0                          | 0                         | 0                        | $-\frac{5\sqrt{210}}{588}$ | 0                       |
|                                  |           | 0  | 0                         | 0                          | $\frac{\sqrt{3}}{12}$     | 0                        | 0                          | $-\frac{\sqrt{35}}{42}$ | 0                         | 0                         | 0                          | $\frac{1}{6}$             | 0                        | 0                          | 0                       |
|                                  |           | $\frac{5\sqrt{210}}{588}$                    | 0                         | 0                          | 0                         | $\frac{\sqrt{42}}{42}$   | 0                          | 0                       | $\frac{13\sqrt{35}}{294}$ | 0                         | 0                          | 0                         | $\frac{\sqrt{105}}{42}$  | 0                          | 0                       |
|                                  |           | 0  | $-\frac{5\sqrt{14}}{147}$ | 0                          | 0                         | 0                        | $\frac{\sqrt{70}}{84}$     | 0                       | 0                         | $\frac{\sqrt{35}}{98}$    | 0                          | 0                         | 0                        | $\frac{\sqrt{105}}{42}$    | 0                       |
|                                  |           | 0  | 0                         | $-\frac{5\sqrt{105}}{588}$ | 0                         | 0                        | 0                          | 0                       | 0                         | 0                         | $-\frac{3\sqrt{35}}{98}$   | 0                         | 0                        | 0                          | $\frac{1}{6}$           |
|                                  |           | 0  | 0                         | 0                          | $\frac{5\sqrt{105}}{588}$ | 0                        | 0                          | $\frac{1}{6}$           | 0                         | 0                         | 0                          | $-\frac{3\sqrt{35}}{98}$  | 0                        | 0                          | 0                       |
|                                  |           | $-\frac{\sqrt{70}}{84}$                      | 0                         | 0                          | 0                         | $\frac{5\sqrt{14}}{147}$ | 0                          | 0                       | $\frac{\sqrt{105}}{42}$   | 0                         | 0                          | 0                         | $\frac{\sqrt{35}}{98}$   | 0                          | 0                       |
|                                  |           | 0  | $-\frac{\sqrt{42}}{42}$   | 0                          | 0                         | 0                        | $-\frac{5\sqrt{210}}{588}$ | 0                       | 0                         | $\frac{\sqrt{105}}{42}$   | 0                          | 0                         | 0                        | $\frac{13\sqrt{35}}{294}$  | 0                       |
|                                  |           | 0  | 0                         | $-\frac{\sqrt{3}}{12}$     | 0                         | 0                        | 0                          | 0                       | 0                         | 0                         | $\frac{1}{6}$              | 0                         | 0                        | 0                          | $-\frac{\sqrt{35}}{42}$ |
| 864                              | symmetry  | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ |                           |                            |                           |                          |                            |                         |                           |                           |                            |                           |                          |                            |                         |

*continued ...*

Table 10

| No.                              | multipole | matrix                            |                          |                           |                            |                          |                         |                        |                          |                            |                         |                          |                           |                         |                         |
|----------------------------------|-----------|-----------------------------------|--------------------------|---------------------------|----------------------------|--------------------------|-------------------------|------------------------|--------------------------|----------------------------|-------------------------|--------------------------|---------------------------|-------------------------|-------------------------|
| $\mathbb{Q}_{4,1}^{(1,-1;a)}(E)$ |           | 0                                 | 0                        | $-\frac{\sqrt{42}}{98}$   | 0                          | 0                        | 0                       | 0                      | 0                        | $-\frac{5\sqrt{14}}{98}$   | 0                       | 0                        | 0                         | 0                       |                         |
|                                  |           | 0                                 | 0                        | 0                         | $\frac{\sqrt{210}}{294}$   | 0                        | 0                       | $\frac{3\sqrt{2}}{28}$ | 0                        | 0                          | 0                       | $-\frac{\sqrt{70}}{196}$ | 0                         | 0                       | 0                       |
|                                  |           | $-\frac{\sqrt{42}}{98}$           | 0                        | 0                         | 0                          | $\frac{\sqrt{210}}{294}$ | 0                       | 0                      | $-\frac{9\sqrt{7}}{196}$ | 0                          | 0                       | 0                        | $\frac{17\sqrt{21}}{588}$ | 0                       | 0                       |
|                                  |           | 0                                 | $\frac{\sqrt{210}}{294}$ | 0                         | 0                          | 0                        | $-\frac{\sqrt{42}}{98}$ | 0                      | 0                        | $-\frac{17\sqrt{21}}{588}$ | 0                       | 0                        | 0                         | $\frac{9\sqrt{7}}{196}$ | 0                       |
|                                  |           | 0                                 | 0                        | $\frac{\sqrt{210}}{294}$  | 0                          | 0                        | 0                       | 0                      | 0                        | $\frac{\sqrt{70}}{196}$    | 0                       | 0                        | 0                         | 0                       | $-\frac{3\sqrt{2}}{28}$ |
|                                  |           | 0                                 | 0                        | 0                         | $-\frac{\sqrt{42}}{98}$    | 0                        | 0                       | 0                      | 0                        | 0                          | 0                       | $\frac{5\sqrt{14}}{98}$  | 0                         | 0                       | 0                       |
|                                  |           | 0                                 | $\frac{3\sqrt{2}}{28}$   | 0                         | 0                          | 0                        | 0                       | 0                      | 0                        | $\frac{\sqrt{5}}{7}$       | 0                       | 0                        | 0                         | 0                       | 0                       |
|                                  |           | 0                                 | 0                        | $-\frac{9\sqrt{7}}{196}$  | 0                          | 0                        | 0                       | 0                      | 0                        | 0                          | $\frac{\sqrt{21}}{147}$ | 0                        | 0                         | 0                       | 0                       |
|                                  |           | 0                                 | 0                        | 0                         | $-\frac{17\sqrt{21}}{588}$ | 0                        | 0                       | $\frac{\sqrt{5}}{7}$   | 0                        | 0                          | 0                       | $-\frac{4\sqrt{7}}{49}$  | 0                         | 0                       | 0                       |
|                                  |           | $-\frac{5\sqrt{14}}{98}$          | 0                        | 0                         | 0                          | $\frac{\sqrt{70}}{196}$  | 0                       | 0                      | $\frac{\sqrt{21}}{147}$  | 0                          | 0                       | 0                        | $-\frac{4\sqrt{7}}{49}$   | 0                       | 0                       |
|                                  |           | 0                                 | $-\frac{\sqrt{70}}{196}$ | 0                         | 0                          | 0                        | $\frac{5\sqrt{14}}{98}$ | 0                      | 0                        | $-\frac{4\sqrt{7}}{49}$    | 0                       | 0                        | 0                         | $\frac{\sqrt{21}}{147}$ | 0                       |
|                                  |           | 0                                 | 0                        | $\frac{17\sqrt{21}}{588}$ | 0                          | 0                        | 0                       | 0                      | 0                        | 0                          | $-\frac{4\sqrt{7}}{49}$ | 0                        | 0                         | 0                       | $\frac{\sqrt{5}}{7}$    |
|                                  |           | 0                                 | 0                        | 0                         | $\frac{9\sqrt{7}}{196}$    | 0                        | 0                       | 0                      | 0                        | 0                          | 0                       | $\frac{\sqrt{21}}{147}$  | 0                         | 0                       | 0                       |
|                                  |           | 0                                 | 0                        | 0                         | 0                          | $-\frac{3\sqrt{2}}{28}$  | 0                       | 0                      | 0                        | 0                          | 0                       | 0                        | $\frac{\sqrt{5}}{7}$      | 0                       | 0                       |
| 865                              | symmetry  | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$ |                          |                           |                            |                          |                         |                        |                          |                            |                         |                          |                           |                         |                         |

*continued ...*

Table 10

| No.                                | multipole                  | matrix                    |                                    |                          |                            |                           |                          |                            |                           |                           |                          |                            |                           |                           |  |  |
|------------------------------------|----------------------------|---------------------------|------------------------------------|--------------------------|----------------------------|---------------------------|--------------------------|----------------------------|---------------------------|---------------------------|--------------------------|----------------------------|---------------------------|---------------------------|--|--|
| $\mathbb{Q}_{4,0}^{(1,-1;a)}(T_1)$ | 0                          | $\frac{\sqrt{3}i}{42}$    | 0                                  | $\frac{\sqrt{6}i}{84}$   | 0                          | 0                         | $\frac{\sqrt{70}i}{112}$ | 0                          | $\frac{5\sqrt{30}i}{168}$ | 0                         | $\frac{5\sqrt{2}i}{112}$ | 0                          | 0                         | 0                         |  |  |
|                                    | $-\frac{\sqrt{3}i}{42}$    | 0                         | $-\frac{\sqrt{30}i}{84}$           | 0                        | 0                          | 0                         | 0                        | $-\frac{13\sqrt{2}i}{112}$ | 0                         | $-\frac{\sqrt{10}i}{56}$  | 0                        | $\frac{\sqrt{6}i}{48}$     | 0                         | 0                         |  |  |
|                                    | 0                          | $\frac{\sqrt{30}i}{84}$   | 0                                  | 0                        | 0                          | $-\frac{\sqrt{6}i}{84}$   | $\frac{3\sqrt{7}i}{112}$ | 0                          | $\frac{\sqrt{3}i}{336}$   | 0                         | $-\frac{\sqrt{5}i}{16}$  | 0                          | $-\frac{i}{112}$          | 0                         |  |  |
|                                    | $-\frac{\sqrt{6}i}{84}$    | 0                         | 0                                  | 0                        | $\frac{\sqrt{30}i}{84}$    | 0                         | 0                        | $\frac{i}{112}$            | 0                         | $\frac{\sqrt{5}i}{16}$    | 0                        | $-\frac{\sqrt{3}i}{336}$   | 0                         | $-\frac{3\sqrt{7}i}{112}$ |  |  |
|                                    | 0                          | 0                         | 0                                  | $-\frac{\sqrt{30}i}{84}$ | 0                          | $-\frac{\sqrt{3}i}{42}$   | 0                        | 0                          | $-\frac{\sqrt{6}i}{48}$   | 0                         | $\frac{\sqrt{10}i}{56}$  | 0                          | $\frac{13\sqrt{2}i}{112}$ | 0                         |  |  |
|                                    | 0                          | 0                         | $\frac{\sqrt{6}i}{84}$             | 0                        | $\frac{\sqrt{3}i}{42}$     | 0                         | 0                        | 0                          | 0                         | $-\frac{5\sqrt{2}i}{112}$ | 0                        | $-\frac{5\sqrt{30}i}{168}$ | 0                         | $-\frac{\sqrt{70}i}{112}$ |  |  |
|                                    | $-\frac{\sqrt{70}i}{112}$  | 0                         | $-\frac{3\sqrt{7}i}{112}$          | 0                        | 0                          | 0                         | 0                        | $-\frac{\sqrt{105}i}{42}$  | 0                         | $-\frac{\sqrt{21}i}{42}$  | 0                        | 0                          | 0                         | 0                         |  |  |
|                                    | 0                          | $\frac{13\sqrt{2}i}{112}$ | 0                                  | $-\frac{i}{112}$         | 0                          | 0                         | $\frac{\sqrt{105}i}{42}$ | 0                          | $\frac{\sqrt{5}i}{14}$    | 0                         | $-\frac{\sqrt{3}i}{21}$  | 0                          | 0                         | 0                         |  |  |
|                                    | $-\frac{5\sqrt{30}i}{168}$ | 0                         | $-\frac{\sqrt{3}i}{336}$           | 0                        | $\frac{\sqrt{6}i}{48}$     | 0                         | 0                        | $-\frac{\sqrt{5}i}{14}$    | 0                         | $\frac{3i}{14}$           | 0                        | 0                          | 0                         | 0                         |  |  |
|                                    | 0                          | $\frac{\sqrt{10}i}{56}$   | 0                                  | $-\frac{\sqrt{5}i}{16}$  | 0                          | $\frac{5\sqrt{2}i}{112}$  | $\frac{\sqrt{21}i}{42}$  | 0                          | $-\frac{3i}{14}$          | 0                         | 0                        | 0                          | $\frac{\sqrt{3}i}{21}$    | 0                         |  |  |
|                                    | $-\frac{5\sqrt{2}i}{112}$  | 0                         | $\frac{\sqrt{5}i}{16}$             | 0                        | $-\frac{\sqrt{10}i}{56}$   | 0                         | 0                        | $\frac{\sqrt{3}i}{21}$     | 0                         | 0                         | 0                        | $-\frac{3i}{14}$           | 0                         | $\frac{\sqrt{21}i}{42}$   |  |  |
|                                    | 0                          | $-\frac{\sqrt{6}i}{48}$   | 0                                  | $\frac{\sqrt{3}i}{336}$  | 0                          | $\frac{5\sqrt{30}i}{168}$ | 0                        | 0                          | 0                         | 0                         | $\frac{3i}{14}$          | 0                          | $-\frac{\sqrt{5}i}{14}$   | 0                         |  |  |
|                                    | 0                          | 0                         | $\frac{i}{112}$                    | 0                        | $-\frac{13\sqrt{2}i}{112}$ | 0                         | 0                        | 0                          | 0                         | $-\frac{\sqrt{3}i}{21}$   | 0                        | $\frac{\sqrt{5}i}{14}$     | 0                         | $\frac{\sqrt{105}i}{42}$  |  |  |
|                                    | 0                          | 0                         | 0                                  | $\frac{3\sqrt{7}i}{112}$ | 0                          | $\frac{\sqrt{70}i}{112}$  | 0                        | 0                          | 0                         | 0                         | $-\frac{\sqrt{21}i}{42}$ | 0                          | $-\frac{\sqrt{105}i}{42}$ | 0                         |  |  |
|                                    | 866                        | symmetry                  | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ |                          |                            |                           |                          |                            |                           |                           |                          |                            |                           |                           |  |  |

*continued ...*

Table 10

| No.                                | multipole | matrix                            |                          |                         |                         |                          |                          |                          |                          |                          |                        |                          |                         |                          |                         |
|------------------------------------|-----------|-----------------------------------|--------------------------|-------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|------------------------|--------------------------|-------------------------|--------------------------|-------------------------|
| $\mathbb{Q}_{4,1}^{(1,-1;a)}(T_1)$ |           | 0                                 | $\frac{\sqrt{3}}{42}$    | 0                       | $-\frac{\sqrt{6}}{84}$  | 0                        | 0                        | $-\frac{\sqrt{70}}{112}$ | 0                        | $\frac{5\sqrt{30}}{168}$ | 0                      | $-\frac{5\sqrt{2}}{112}$ | 0                       | 0                        | 0                       |
|                                    |           | $\frac{\sqrt{3}}{42}$             | 0                        | $-\frac{\sqrt{30}}{84}$ | 0                       | 0                        | 0                        | $\frac{13\sqrt{2}}{112}$ | 0                        | $-\frac{\sqrt{10}}{56}$  | 0                      | $-\frac{\sqrt{6}}{48}$   | 0                       | 0                        | 0                       |
|                                    |           | 0                                 | $-\frac{\sqrt{30}}{84}$  | 0                       | 0                       | 0                        | $\frac{\sqrt{6}}{84}$    | $\frac{3\sqrt{7}}{112}$  | 0                        | $-\frac{\sqrt{3}}{336}$  | 0                      | $-\frac{\sqrt{5}}{16}$   | 0                       | $\frac{1}{112}$          | 0                       |
|                                    |           | $-\frac{\sqrt{6}}{84}$            | 0                        | 0                       | 0                       | $\frac{\sqrt{30}}{84}$   | 0                        | 0                        | $\frac{1}{112}$          | 0                        | $-\frac{\sqrt{5}}{16}$ | 0                        | $-\frac{\sqrt{3}}{336}$ | 0                        | $\frac{3\sqrt{7}}{112}$ |
|                                    |           | 0                                 | 0                        | 0                       | $\frac{\sqrt{30}}{84}$  | 0                        | $-\frac{\sqrt{3}}{42}$   | 0                        | 0                        | $-\frac{\sqrt{6}}{48}$   | 0                      | $-\frac{\sqrt{10}}{56}$  | 0                       | $\frac{13\sqrt{2}}{112}$ | 0                       |
|                                    |           | 0                                 | 0                        | $\frac{\sqrt{6}}{84}$   | 0                       | $-\frac{\sqrt{3}}{42}$   | 0                        | 0                        | 0                        | $-\frac{5\sqrt{2}}{112}$ | 0                      | $\frac{5\sqrt{30}}{168}$ | 0                       | $-\frac{\sqrt{70}}{112}$ | 0                       |
|                                    |           | $-\frac{\sqrt{70}}{112}$          | 0                        | $\frac{3\sqrt{7}}{112}$ | 0                       | 0                        | 0                        | 0                        | $-\frac{\sqrt{105}}{42}$ | 0                        | $\frac{\sqrt{21}}{42}$ | 0                        | 0                       | 0                        | 0                       |
|                                    |           | 0                                 | $\frac{13\sqrt{2}}{112}$ | 0                       | $\frac{1}{112}$         | 0                        | 0                        | $-\frac{\sqrt{105}}{42}$ | 0                        | $\frac{\sqrt{5}}{14}$    | 0                      | $\frac{\sqrt{3}}{21}$    | 0                       | 0                        | 0                       |
|                                    |           | $\frac{5\sqrt{30}}{168}$          | 0                        | $-\frac{\sqrt{3}}{336}$ | 0                       | $-\frac{\sqrt{6}}{48}$   | 0                        | 0                        | $\frac{\sqrt{5}}{14}$    | 0                        | $\frac{3}{14}$         | 0                        | 0                       | 0                        | 0                       |
|                                    |           | 0                                 | $-\frac{\sqrt{10}}{56}$  | 0                       | $-\frac{\sqrt{5}}{16}$  | 0                        | $-\frac{5\sqrt{2}}{112}$ | $\frac{\sqrt{21}}{42}$   | 0                        | $\frac{3}{14}$           | 0                      | 0                        | 0                       | $-\frac{\sqrt{3}}{21}$   | 0                       |
|                                    |           | $-\frac{5\sqrt{2}}{112}$          | 0                        | $-\frac{\sqrt{5}}{16}$  | 0                       | $-\frac{\sqrt{10}}{56}$  | 0                        | 0                        | $\frac{\sqrt{3}}{21}$    | 0                        | 0                      | 0                        | $-\frac{3}{14}$         | 0                        | $-\frac{\sqrt{21}}{42}$ |
|                                    |           | 0                                 | $-\frac{\sqrt{6}}{48}$   | 0                       | $-\frac{\sqrt{3}}{336}$ | 0                        | $\frac{5\sqrt{30}}{168}$ | 0                        | 0                        | 0                        | 0                      | $-\frac{3}{14}$          | 0                       | $-\frac{\sqrt{5}}{14}$   | 0                       |
|                                    |           | 0                                 | 0                        | $\frac{1}{112}$         | 0                       | $\frac{13\sqrt{2}}{112}$ | 0                        | 0                        | 0                        | $-\frac{\sqrt{3}}{21}$   | 0                      | $-\frac{\sqrt{5}}{14}$   | 0                       | $\frac{\sqrt{105}}{42}$  | 0                       |
|                                    |           | 0                                 | 0                        | 0                       | $\frac{3\sqrt{7}}{112}$ | 0                        | $-\frac{\sqrt{70}}{112}$ | 0                        | 0                        | 0                        | 0                      | $-\frac{\sqrt{21}}{42}$  | 0                       | $\frac{\sqrt{105}}{42}$  | 0                       |
| 867                                | symmetry  | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$ |                          |                         |                         |                          |                          |                          |                          |                          |                        |                          |                         |                          |                         |

*continued ...*

Table 10

| No.                                | multipole | matrix                               |                        |                        |                        |                         |                         |                          |                        |                          |                          |                         |                          |                        |                         |
|------------------------------------|-----------|--------------------------------------|------------------------|------------------------|------------------------|-------------------------|-------------------------|--------------------------|------------------------|--------------------------|--------------------------|-------------------------|--------------------------|------------------------|-------------------------|
| $\mathbb{Q}_{4,2}^{(1,-1;a)}(T_1)$ |           | 0                                    | 0                      | 0                      | 0                      | $-\frac{\sqrt{3}i}{21}$ | 0                       | 0                        | 0                      | 0                        | 0                        | 0                       | $-\frac{\sqrt{30}i}{42}$ | 0                      | 0                       |
|                                    |           | 0                                    | 0                      | 0                      | 0                      | 0                       | $-\frac{\sqrt{3}i}{21}$ | 0                        | 0                      | 0                        | 0                        | 0                       | 0                        | $-\frac{\sqrt{2}i}{7}$ | 0                       |
|                                    |           | 0                                    | 0                      | 0                      | 0                      | 0                       | 0                       | 0                        | 0                      | 0                        | 0                        | 0                       | 0                        | 0                      | $-\frac{\sqrt{7}i}{14}$ |
|                                    |           | 0                                    | 0                      | 0                      | 0                      | 0                       | 0                       | $-\frac{\sqrt{7}i}{14}$  | 0                      | 0                        | 0                        | 0                       | 0                        | 0                      | 0                       |
|                                    |           | $\frac{\sqrt{3}i}{21}$               | 0                      | 0                      | 0                      | 0                       | 0                       | 0                        | $-\frac{\sqrt{2}i}{7}$ | 0                        | 0                        | 0                       | 0                        | 0                      | 0                       |
|                                    |           | 0                                    | $\frac{\sqrt{3}i}{21}$ | 0                      | 0                      | 0                       | 0                       | 0                        | 0                      | $-\frac{\sqrt{30}i}{42}$ | 0                        | 0                       | 0                        | 0                      | 0                       |
|                                    |           | 0                                    | 0                      | 0                      | $\frac{\sqrt{7}i}{14}$ | 0                       | 0                       | 0                        | 0                      | 0                        | 0                        | $\frac{\sqrt{21}i}{21}$ | 0                        | 0                      | 0                       |
|                                    |           | 0                                    | 0                      | 0                      | 0                      | $\frac{\sqrt{2}i}{7}$   | 0                       | 0                        | 0                      | 0                        | 0                        | 0                       | $\frac{\sqrt{5}i}{7}$    | 0                      | 0                       |
|                                    |           | 0                                    | 0                      | 0                      | 0                      | 0                       | $\frac{\sqrt{30}i}{42}$ | 0                        | 0                      | 0                        | 0                        | 0                       | 0                        | $\frac{\sqrt{5}i}{7}$  | 0                       |
|                                    |           | 0                                    | 0                      | 0                      | 0                      | 0                       | 0                       | 0                        | 0                      | 0                        | 0                        | 0                       | 0                        | 0                      | $\frac{\sqrt{21}i}{21}$ |
|                                    |           | 0                                    | 0                      | 0                      | 0                      | 0                       | 0                       | $-\frac{\sqrt{21}i}{21}$ | 0                      | 0                        | 0                        | 0                       | 0                        | 0                      | 0                       |
|                                    |           | $\frac{\sqrt{30}i}{42}$              | 0                      | 0                      | 0                      | 0                       | 0                       | 0                        | $-\frac{\sqrt{5}i}{7}$ | 0                        | 0                        | 0                       | 0                        | 0                      | 0                       |
|                                    |           | 0                                    | $\frac{\sqrt{2}i}{7}$  | 0                      | 0                      | 0                       | 0                       | 0                        | 0                      | $-\frac{\sqrt{5}i}{7}$   | 0                        | 0                       | 0                        | 0                      | 0                       |
|                                    |           | 0                                    | 0                      | $\frac{\sqrt{7}i}{14}$ | 0                      | 0                       | 0                       | 0                        | 0                      | 0                        | $-\frac{\sqrt{21}i}{21}$ | 0                       | 0                        | 0                      | 0                       |
| 868                                | symmetry  | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$ |                        |                        |                        |                         |                         |                          |                        |                          |                          |                         |                          |                        |                         |

*continued ...*

Table 10

| No.                                | multipole | matrix                                |                            |                            |                            |                             |                             |                          |                             |                             |                           |                            |                              |                            |                           |
|------------------------------------|-----------|---------------------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|--------------------------|-----------------------------|-----------------------------|---------------------------|----------------------------|------------------------------|----------------------------|---------------------------|
| $\mathbb{Q}_{4,0}^{(1,-1;a)}(T_2)$ |           | 0                                     | $\frac{\sqrt{21}i}{294}$   | 0                          | $-\frac{\sqrt{42}i}{84}$   | 0                           | 0                           | $\frac{\sqrt{10}i}{112}$ | 0                           | $\frac{5\sqrt{210}i}{1176}$ | 0                         | $-\frac{5\sqrt{14}i}{112}$ | 0                            | 0                          | 0                         |
|                                    |           | $-\frac{\sqrt{21}i}{294}$             | 0                          | $-\frac{\sqrt{210}i}{588}$ | 0                          | 0                           | 0                           | 0                        | $-\frac{13\sqrt{14}i}{784}$ | 0                           | $-\frac{\sqrt{70}i}{392}$ | 0                          | $-\frac{\sqrt{42}i}{48}$     | 0                          | 0                         |
|                                    |           | 0                                     | $\frac{\sqrt{210}i}{588}$  | 0                          | 0                          | 0                           | $\frac{\sqrt{42}i}{84}$     | $-\frac{3i}{16}$         | 0                           | $\frac{\sqrt{21}i}{2352}$   | 0                         | $-\frac{\sqrt{35}i}{112}$  | 0                            | $\frac{\sqrt{7}i}{112}$    | 0                         |
|                                    |           | $\frac{\sqrt{42}i}{84}$               | 0                          | 0                          | 0                          | $\frac{\sqrt{210}i}{588}$   | 0                           | 0                        | $-\frac{\sqrt{7}i}{112}$    | 0                           | $\frac{\sqrt{35}i}{112}$  | 0                          | $-\frac{\sqrt{21}i}{2352}$   | 0                          | $\frac{3i}{16}$           |
|                                    |           | 0                                     | 0                          | 0                          | $-\frac{\sqrt{210}i}{588}$ | 0                           | $-\frac{\sqrt{21}i}{294}$   | 0                        | 0                           | $\frac{\sqrt{42}i}{48}$     | 0                         | $\frac{\sqrt{70}i}{392}$   | 0                            | $\frac{13\sqrt{14}i}{784}$ | 0                         |
|                                    |           | 0                                     | 0                          | $-\frac{\sqrt{42}i}{84}$   | 0                          | $\frac{\sqrt{21}i}{294}$    | 0                           | 0                        | 0                           | 0                           | $\frac{5\sqrt{14}i}{112}$ | 0                          | $-\frac{5\sqrt{210}i}{1176}$ | 0                          | $-\frac{\sqrt{10}i}{112}$ |
|                                    |           | $-\frac{\sqrt{10}i}{112}$             | 0                          | $\frac{3i}{16}$            | 0                          | 0                           | 0                           | 0                        | $-\frac{\sqrt{15}i}{42}$    | 0                           | $\frac{\sqrt{3}i}{6}$     | 0                          | 0                            | 0                          | 0                         |
|                                    |           | 0                                     | $\frac{13\sqrt{14}i}{784}$ | 0                          | $\frac{\sqrt{7}i}{112}$    | 0                           | 0                           | $\frac{\sqrt{15}i}{42}$  | 0                           | $\frac{\sqrt{35}i}{98}$     | 0                         | $\frac{\sqrt{21}i}{21}$    | 0                            | 0                          | 0                         |
|                                    |           | $-\frac{5\sqrt{210}i}{1176}$          | 0                          | $-\frac{\sqrt{21}i}{2352}$ | 0                          | $-\frac{\sqrt{42}i}{48}$    | 0                           | 0                        | $-\frac{\sqrt{35}i}{98}$    | 0                           | $\frac{3\sqrt{7}i}{98}$   | 0                          | 0                            | 0                          | 0                         |
|                                    |           | 0                                     | $\frac{\sqrt{70}i}{392}$   | 0                          | $-\frac{\sqrt{35}i}{112}$  | 0                           | $-\frac{5\sqrt{14}i}{112}$  | $-\frac{\sqrt{3}i}{6}$   | 0                           | $-\frac{3\sqrt{7}i}{98}$    | 0                         | 0                          | 0                            | $-\frac{\sqrt{21}i}{21}$   | 0                         |
|                                    |           | $\frac{5\sqrt{14}i}{112}$             | 0                          | $\frac{\sqrt{35}i}{112}$   | 0                          | $-\frac{\sqrt{70}i}{392}$   | 0                           | 0                        | $-\frac{\sqrt{21}i}{21}$    | 0                           | 0                         | 0                          | $-\frac{3\sqrt{7}i}{98}$     | 0                          | $-\frac{\sqrt{3}i}{6}$    |
|                                    |           | 0                                     | $\frac{\sqrt{42}i}{48}$    | 0                          | $\frac{\sqrt{21}i}{2352}$  | 0                           | $\frac{5\sqrt{210}i}{1176}$ | 0                        | 0                           | 0                           | 0                         | $\frac{3\sqrt{7}i}{98}$    | 0                            | $-\frac{\sqrt{35}i}{98}$   | 0                         |
|                                    |           | 0                                     | 0                          | $-\frac{\sqrt{7}i}{112}$   | 0                          | $-\frac{13\sqrt{14}i}{784}$ | 0                           | 0                        | 0                           | 0                           | $\frac{\sqrt{21}i}{21}$   | 0                          | $\frac{\sqrt{35}i}{98}$      | 0                          | $\frac{\sqrt{15}i}{42}$   |
|                                    |           | 0                                     | 0                          | 0                          | $-\frac{3i}{16}$           | 0                           | $\frac{\sqrt{10}i}{112}$    | 0                        | 0                           | 0                           | 0                         | $\frac{\sqrt{3}i}{6}$      | 0                            | $-\frac{\sqrt{15}i}{42}$   | 0                         |
| 869                                | symmetry  | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ |                            |                            |                            |                             |                             |                          |                             |                             |                           |                            |                              |                            |                           |

continued ...

Table 10

| No.                                | multipole | matrix                                |                            |                          |                           |                            |                             |                         |                            |                             |                         |                             |                          |                            |                         |  |
|------------------------------------|-----------|---------------------------------------|----------------------------|--------------------------|---------------------------|----------------------------|-----------------------------|-------------------------|----------------------------|-----------------------------|-------------------------|-----------------------------|--------------------------|----------------------------|-------------------------|--|
| $\mathbb{Q}_{4,1}^{(1,-1;a)}(T_2)$ |           | 0                                     | $-\frac{\sqrt{21}}{294}$   | 0                        | $-\frac{\sqrt{42}}{84}$   | 0                          | 0                           | $\frac{\sqrt{10}}{112}$ | 0                          | $-\frac{5\sqrt{210}}{1176}$ | 0                       | $-\frac{5\sqrt{14}}{112}$   | 0                        | 0                          | 0                       |  |
|                                    |           | $-\frac{\sqrt{21}}{294}$              | 0                          | $\frac{\sqrt{210}}{588}$ | 0                         | 0                          | 0                           | 0                       | $-\frac{13\sqrt{14}}{784}$ | 0                           | $\frac{\sqrt{70}}{392}$ | 0                           | $-\frac{\sqrt{42}}{48}$  | 0                          | 0                       |  |
|                                    |           | 0                                     | $\frac{\sqrt{210}}{588}$   | 0                        | 0                         | 0                          | $\frac{\sqrt{42}}{84}$      | $\frac{3}{16}$          | 0                          | $\frac{\sqrt{21}}{2352}$    | 0                       | $\frac{\sqrt{35}}{112}$     | 0                        | $\frac{\sqrt{7}}{112}$     | 0                       |  |
|                                    |           | $-\frac{\sqrt{42}}{84}$               | 0                          | 0                        | 0                         | $-\frac{\sqrt{210}}{588}$  | 0                           | 0                       | $\frac{\sqrt{7}}{112}$     | 0                           | $\frac{\sqrt{35}}{112}$ | 0                           | $\frac{\sqrt{21}}{2352}$ | 0                          | $\frac{3}{16}$          |  |
|                                    |           | 0                                     | 0                          | 0                        | $-\frac{\sqrt{210}}{588}$ | 0                          | $\frac{\sqrt{21}}{294}$     | 0                       | 0                          | $-\frac{\sqrt{42}}{48}$     | 0                       | $\frac{\sqrt{70}}{392}$     | 0                        | $-\frac{13\sqrt{14}}{784}$ | 0                       |  |
|                                    |           | 0                                     | 0                          | $\frac{\sqrt{42}}{84}$   | 0                         | $\frac{\sqrt{21}}{294}$    | 0                           | 0                       | 0                          | $-\frac{5\sqrt{14}}{112}$   | 0                       | $-\frac{5\sqrt{210}}{1176}$ | 0                        | $\frac{\sqrt{10}}{112}$    |                         |  |
|                                    |           | $\frac{\sqrt{10}}{112}$               | 0                          | $\frac{3}{16}$           | 0                         | 0                          | 0                           | 0                       | $\frac{\sqrt{15}}{42}$     | 0                           | $\frac{\sqrt{3}}{6}$    | 0                           | 0                        | 0                          | 0                       |  |
|                                    |           | 0                                     | $-\frac{13\sqrt{14}}{784}$ | 0                        | $\frac{\sqrt{7}}{112}$    | 0                          | 0                           | $\frac{\sqrt{15}}{42}$  | 0                          | $-\frac{\sqrt{35}}{98}$     | 0                       | $\frac{\sqrt{21}}{21}$      | 0                        | 0                          | 0                       |  |
|                                    |           | $-\frac{5\sqrt{210}}{1176}$           | 0                          | $\frac{\sqrt{21}}{2352}$ | 0                         | $-\frac{\sqrt{42}}{48}$    | 0                           | 0                       | $-\frac{\sqrt{35}}{98}$    | 0                           | $-\frac{3\sqrt{7}}{98}$ | 0                           | 0                        | 0                          | 0                       |  |
|                                    |           | 0                                     | $\frac{\sqrt{70}}{392}$    | 0                        | $\frac{\sqrt{35}}{112}$   | 0                          | $-\frac{5\sqrt{14}}{112}$   | $\frac{\sqrt{3}}{6}$    | 0                          | $-\frac{3\sqrt{7}}{98}$     | 0                       | 0                           | 0                        | $-\frac{\sqrt{21}}{21}$    | 0                       |  |
|                                    |           | $-\frac{5\sqrt{14}}{112}$             | 0                          | $\frac{\sqrt{35}}{112}$  | 0                         | $\frac{\sqrt{70}}{392}$    | 0                           | 0                       | $\frac{\sqrt{21}}{21}$     | 0                           | 0                       | 0                           | $\frac{3\sqrt{7}}{98}$   | 0                          | $-\frac{\sqrt{3}}{6}$   |  |
|                                    |           | 0                                     | $-\frac{\sqrt{42}}{48}$    | 0                        | $\frac{\sqrt{21}}{2352}$  | 0                          | $-\frac{5\sqrt{210}}{1176}$ | 0                       | 0                          | 0                           | 0                       | $\frac{3\sqrt{7}}{98}$      | 0                        | $\frac{\sqrt{35}}{98}$     | 0                       |  |
|                                    |           | 0                                     | 0                          | $\frac{\sqrt{7}}{112}$   | 0                         | $-\frac{13\sqrt{14}}{784}$ | 0                           | 0                       | 0                          | 0                           | $-\frac{\sqrt{21}}{21}$ | 0                           | $\frac{\sqrt{35}}{98}$   | 0                          | $-\frac{\sqrt{15}}{42}$ |  |
|                                    |           | 0                                     | 0                          | 0                        | $\frac{3}{16}$            | 0                          | $\frac{\sqrt{10}}{112}$     | 0                       | 0                          | 0                           | 0                       | $-\frac{\sqrt{3}}{6}$       | 0                        | $-\frac{\sqrt{15}}{42}$    | 0                       |  |
| 870                                | symmetry  | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ |                            |                          |                           |                            |                             |                         |                            |                             |                         |                             |                          |                            |                         |  |

*continued ...*



Table 10

| No.                                | multipole | matrix  |                            |                             |                             |                           |                          |                          |                           |                            |                           |                           |                            |                          |                          |
|------------------------------------|-----------|---|----------------------------|-----------------------------|-----------------------------|---------------------------|--------------------------|--------------------------|---------------------------|----------------------------|---------------------------|---------------------------|----------------------------|--------------------------|--------------------------|
| $\mathbb{Q}_{4,2}^{(1,-1;a)}(T_2)$ |           | 0   | 0                          | $-\frac{\sqrt{42}i}{98}$    | 0                           | 0                         | 0                        | 0                        | 0                         | 0                          | $-\frac{5\sqrt{14}i}{98}$ | 0                         | 0                          | 0                        | 0                        |
|                                    |           | 0   | 0                          | 0                           | $\frac{\sqrt{210}i}{294}$   | 0                         | 0                        | $-\frac{3\sqrt{2}i}{28}$ | 0                         | 0                          | 0                         | $-\frac{\sqrt{70}i}{196}$ | 0                          | 0                        | 0                        |
|                                    |           | $\frac{\sqrt{42}i}{98}$   | 0                          | 0                           | 0                           | $\frac{\sqrt{210}i}{294}$ | 0                        | 0                        | $\frac{9\sqrt{7}i}{196}$  | 0                          | 0                         | 0                         | $\frac{17\sqrt{21}i}{588}$ | 0                        | 0                        |
|                                    |           | 0   | $-\frac{\sqrt{210}i}{294}$ | 0                           | 0                           | 0                         | $-\frac{\sqrt{42}i}{98}$ | 0                        | 0                         | $\frac{17\sqrt{21}i}{588}$ | 0                         | 0                         | 0                          | $\frac{9\sqrt{7}i}{196}$ | 0                        |
|                                    |           | 0   | 0                          | $-\frac{\sqrt{210}i}{294}$  | 0                           | 0                         | 0                        | 0                        | 0                         | 0                          | $-\frac{\sqrt{70}i}{196}$ | 0                         | 0                          | 0                        | $-\frac{3\sqrt{2}i}{28}$ |
|                                    |           | 0   | 0                          | 0                           | $\frac{\sqrt{42}i}{98}$     | 0                         | 0                        | 0                        | 0                         | 0                          | 0                         | $-\frac{5\sqrt{14}i}{98}$ | 0                          | 0                        | 0                        |
|                                    |           | 0   | $\frac{3\sqrt{2}i}{28}$    | 0                           | 0                           | 0                         | 0                        | 0                        | 0                         | $\frac{\sqrt{5}i}{7}$      | 0                         | 0                         | 0                          | 0                        | 0                        |
|                                    |           | 0   | 0                          | $-\frac{9\sqrt{7}i}{196}$   | 0                           | 0                         | 0                        | 0                        | 0                         | 0                          | $\frac{\sqrt{21}i}{147}$  | 0                         | 0                          | 0                        | 0                        |
|                                    |           | 0   | 0                          | 0                           | $-\frac{17\sqrt{21}i}{588}$ | 0                         | 0                        | $-\frac{\sqrt{5}i}{7}$   | 0                         | 0                          | 0                         | $-\frac{4\sqrt{7}i}{49}$  | 0                          | 0                        | 0                        |
|                                    |           | $\frac{5\sqrt{14}i}{98}$  | 0                          | 0                           | 0                           | $\frac{\sqrt{70}i}{196}$  | 0                        | 0                        | $-\frac{\sqrt{21}i}{147}$ | 0                          | 0                         | 0                         | $-\frac{4\sqrt{7}i}{49}$   | 0                        | 0                        |
|                                    |           | 0   | $\frac{\sqrt{70}i}{196}$   | 0                           | 0                           | 0                         | $\frac{5\sqrt{14}i}{98}$ | 0                        | 0                         | $\frac{4\sqrt{7}i}{49}$    | 0                         | 0                         | 0                          | $\frac{\sqrt{21}i}{147}$ | 0                        |
|                                    |           | 0   | 0                          | $-\frac{17\sqrt{21}i}{588}$ | 0                           | 0                         | 0                        | 0                        | 0                         | 0                          | $\frac{4\sqrt{7}i}{49}$   | 0                         | 0                          | 0                        | $\frac{\sqrt{5}i}{7}$    |
|                                    |           | 0   | 0                          | 0                           | $-\frac{9\sqrt{7}i}{196}$   | 0                         | 0                        | 0                        | 0                         | 0                          | 0                         | $-\frac{\sqrt{21}i}{147}$ | 0                          | 0                        | 0                        |
|                                    |           | 0   | 0                          | 0                           | 0                           | $\frac{3\sqrt{2}i}{28}$   | 0                        | 0                        | 0                         | 0                          | 0                         | 0                         | $-\frac{\sqrt{5}i}{7}$     | 0                        | 0                        |
| 871                                | symmetry  | $\frac{\sqrt{2}(2x^6-15x^4y^2-15x^4z^2-15x^2y^4+180x^2y^2z^2-15x^2z^4+2y^6-15y^4z^2-15y^2z^4+2z^6)}{8}$ |                            |                             |                             |                           |                          |                          |                           |                            |                           |                           |                            |                          |                          |

*continued ...*

Table 10

| No.                            | multipole | matrix   |                            |                             |                            |                           |                           |                           |                            |                            |                             |                            |                           |                            |                           |
|--------------------------------|-----------|--|----------------------------|-----------------------------|----------------------------|---------------------------|---------------------------|---------------------------|----------------------------|----------------------------|-----------------------------|----------------------------|---------------------------|----------------------------|---------------------------|
| $\mathbb{Q}_6^{(1,-1;a)}(A_1)$ |           | 0  | 0                          | 0                           | 0                          | 0                         | 0                         | 0                         | $-\frac{\sqrt{231}}{1848}$ | 0                          | 0                           | 0                          | $\frac{\sqrt{77}}{88}$    | 0                          | 0                         |
|                                |           | 0  | 0                          | 0                           | 0                          | 0                         | 0                         | 0                         | 0                          | $\frac{\sqrt{385}}{616}$   | 0                           | 0                          | 0                         | $-\frac{\sqrt{1155}}{264}$ | 0                         |
|                                |           | 0  | 0                          | 0                           | 0                          | 0                         | 0                         | 0                         | 0                          | 0                          | $-\frac{5\sqrt{462}}{1848}$ | 0                          | 0                         | 0                          | $\frac{\sqrt{330}}{264}$  |
|                                |           | 0  | 0                          | 0                           | 0                          | 0                         | 0                         | $-\frac{\sqrt{330}}{264}$ | 0                          | 0                          | 0                           | $\frac{5\sqrt{462}}{1848}$ | 0                         | 0                          | 0                         |
|                                |           | 0  | 0                          | 0                           | 0                          | 0                         | 0                         | 0                         | $\frac{\sqrt{1155}}{264}$  | 0                          | 0                           | 0                          | $-\frac{\sqrt{385}}{616}$ | 0                          | 0                         |
|                                |           | 0  | 0                          | 0                           | 0                          | 0                         | 0                         | 0                         | 0                          | $-\frac{\sqrt{77}}{88}$    | 0                           | 0                          | 0                         | $\frac{\sqrt{231}}{1848}$  | 0                         |
|                                |           | 0  | 0                          | 0                           | $-\frac{\sqrt{330}}{264}$  | 0                         | 0                         | $\frac{\sqrt{154}}{616}$  | 0                          | 0                          | 0                           | $-\frac{3\sqrt{110}}{88}$  | 0                         | 0                          | 0                         |
|                                |           | $-\frac{\sqrt{231}}{1848}$                             | 0                          | 0                           | 0                          | $\frac{\sqrt{1155}}{264}$ | 0                         | 0                         | $-\frac{5\sqrt{154}}{616}$ | 0                          | 0                           | 0                          | $\frac{\sqrt{462}}{88}$   | 0                          | 0                         |
|                                |           | 0  | $\frac{\sqrt{385}}{616}$   | 0                           | 0                          | 0                         | $-\frac{\sqrt{77}}{88}$   | 0                         | 0                          | $\frac{9\sqrt{154}}{616}$  | 0                           | 0                          | 0                         | $\frac{\sqrt{462}}{88}$    | 0                         |
|                                |           | 0  | 0                          | $-\frac{5\sqrt{462}}{1848}$ | 0                          | 0                         | 0                         | 0                         | 0                          | $-\frac{5\sqrt{154}}{616}$ | 0                           | 0                          | 0                         | 0                          | $-\frac{3\sqrt{110}}{88}$ |
|                                |           | 0  | 0                          | 0                           | $\frac{5\sqrt{462}}{1848}$ | 0                         | 0                         | $-\frac{3\sqrt{110}}{88}$ | 0                          | 0                          | 0                           | $-\frac{5\sqrt{154}}{616}$ | 0                         | 0                          | 0                         |
|                                |           | $\frac{\sqrt{77}}{88}$                                 | 0                          | 0                           | 0                          | $-\frac{\sqrt{385}}{616}$ | 0                         | 0                         | $\frac{\sqrt{462}}{88}$    | 0                          | 0                           | 0                          | $\frac{9\sqrt{154}}{616}$ | 0                          | 0                         |
|                                |           | 0  | $-\frac{\sqrt{1155}}{264}$ | 0                           | 0                          | 0                         | $\frac{\sqrt{231}}{1848}$ | 0                         | 0                          | $\frac{\sqrt{462}}{88}$    | 0                           | 0                          | 0                         | $-\frac{5\sqrt{154}}{616}$ | 0                         |
|                                |           | 0  | 0                          | $\frac{\sqrt{330}}{264}$    | 0                          | 0                         | 0                         | 0                         | 0                          | 0                          | $-\frac{3\sqrt{110}}{88}$   | 0                          | 0                         | 0                          | $\frac{\sqrt{154}}{616}$  |
| 872                            | symmetry  | $-\frac{\sqrt{2310}(x-y)(x+y)(x-z)(x+z)(y-z)(y+z)}{8}$ |                            |                             |                            |                           |                           |                           |                            |                            |                             |                            |                           |                            |                           |

*continued ...*

Table 10

| No.                            | multipole | matrix   |                         |                       |                        |                        |                        |                         |                         |                         |                       |                        |                         |                         |                         |
|--------------------------------|-----------|--|-------------------------|-----------------------|------------------------|------------------------|------------------------|-------------------------|-------------------------|-------------------------|-----------------------|------------------------|-------------------------|-------------------------|-------------------------|
| $\mathbb{Q}_6^{(1,-1;a)}(A_2)$ |           | 0  | 0                       | 0                     | 0                      | 0                      | 0                      | 0                       | 0                       | 0                       | $\frac{1}{24}$        | 0                      | 0                       | 0                       | $-\frac{\sqrt{35}}{56}$ |
|                                |           | 0  | 0                       | 0                     | 0                      | 0                      | 0                      | $-\frac{\sqrt{7}}{168}$ | 0                       | 0                       | 0                     | $-\frac{\sqrt{5}}{24}$ | 0                       | 0                       | 0                       |
|                                |           | 0  | 0                       | 0                     | 0                      | 0                      | 0                      | 0                       | $\frac{\sqrt{2}}{24}$   | 0                       | 0                     | 0                      | $\frac{\sqrt{6}}{24}$   | 0                       | 0                       |
|                                |           | 0  | 0                       | 0                     | 0                      | 0                      | 0                      | 0                       | 0                       | $-\frac{\sqrt{6}}{24}$  | 0                     | 0                      | 0                       | $-\frac{\sqrt{2}}{24}$  | 0                       |
|                                |           | 0  | 0                       | 0                     | 0                      | 0                      | 0                      | 0                       | 0                       | 0                       | $\frac{\sqrt{5}}{24}$ | 0                      | 0                       | 0                       | $\frac{\sqrt{7}}{168}$  |
|                                |           | 0  | 0                       | 0                     | 0                      | 0                      | 0                      | $\frac{\sqrt{35}}{56}$  | 0                       | 0                       | 0                     | $-\frac{1}{24}$        | 0                       | 0                       | 0                       |
|                                |           | 0  | $-\frac{\sqrt{7}}{168}$ | 0                     | 0                      | 0                      | $\frac{\sqrt{35}}{56}$ | 0                       | 0                       | $-\frac{\sqrt{70}}{56}$ | 0                     | 0                      | 0                       | $\frac{\sqrt{210}}{56}$ | 0                       |
|                                |           | 0  | 0                       | $\frac{\sqrt{2}}{24}$ | 0                      | 0                      | 0                      | 0                       | 0                       | 0                       | $\frac{\sqrt{6}}{8}$  | 0                      | 0                       | 0                       | $\frac{\sqrt{210}}{56}$ |
|                                |           | 0  | 0                       | 0                     | $-\frac{\sqrt{6}}{24}$ | 0                      | 0                      | $-\frac{\sqrt{70}}{56}$ | 0                       | 0                       | 0                     | $-\frac{\sqrt{2}}{8}$  | 0                       | 0                       | 0                       |
|                                |           | $\frac{1}{24}$   | 0                       | 0                     | 0                      | $\frac{\sqrt{5}}{24}$  | 0                      | 0                       | $\frac{\sqrt{6}}{8}$    | 0                       | 0                     | 0                      | $-\frac{\sqrt{2}}{8}$   | 0                       | 0                       |
|                                |           | 0  | $-\frac{\sqrt{5}}{24}$  | 0                     | 0                      | 0                      | $-\frac{1}{24}$        | 0                       | 0                       | $-\frac{\sqrt{2}}{8}$   | 0                     | 0                      | 0                       | $\frac{\sqrt{6}}{8}$    | 0                       |
|                                |           | 0  | 0                       | $\frac{\sqrt{6}}{24}$ | 0                      | 0                      | 0                      | 0                       | 0                       | 0                       | $-\frac{\sqrt{2}}{8}$ | 0                      | 0                       | 0                       | $-\frac{\sqrt{70}}{56}$ |
|                                |           | 0  | 0                       | 0                     | $-\frac{\sqrt{2}}{24}$ | 0                      | 0                      | $\frac{\sqrt{210}}{56}$ | 0                       | 0                       | 0                     | $\frac{\sqrt{6}}{8}$   | 0                       | 0                       | 0                       |
|                                |           | $-\frac{\sqrt{35}}{56}$  | 0                       | 0                     | 0                      | $\frac{\sqrt{7}}{168}$ | 0                      | 0                       | $\frac{\sqrt{210}}{56}$ | 0                       | 0                     | 0                      | $-\frac{\sqrt{70}}{56}$ | 0                       | 0                       |
| 873                            | symmetry  | $-\frac{\sqrt{14}(x^6-15x^4z^2+15x^2z^4+y^6-15y^4z^2+15y^2z^4-2z^6)}{8}$ |                         |                       |                        |                        |                        |                         |                         |                         |                       |                        |                         |                         |                         |

*continued ...*

Table 10

| No.                              | multipole | matrix  |                          |                             |                            |                           |                         |                            |                           |                          |                           |                           |                         |                          |                             |
|----------------------------------|-----------|---|--------------------------|-----------------------------|----------------------------|---------------------------|-------------------------|----------------------------|---------------------------|--------------------------|---------------------------|---------------------------|-------------------------|--------------------------|-----------------------------|
| $\mathbb{Q}_{6,0}^{(1,-1;a)}(E)$ |           | 0   | 0                        | 0                           | 0                          | 0                         | 0                       | 0                          | $-\frac{\sqrt{33}}{264}$  | 0                        | 0                         | 0                         | $-\frac{\sqrt{11}}{88}$ | 0                        | 0                           |
|                                  |           | 0   | 0                        | 0                           | 0                          | 0                         | 0                       | 0                          | 0                         | $\frac{\sqrt{55}}{88}$   | 0                         | 0                         | 0                       | $\frac{\sqrt{165}}{264}$ | 0                           |
|                                  |           | 0   | 0                        | 0                           | 0                          | 0                         | 0                       | 0                          | 0                         | 0                        | $-\frac{5\sqrt{66}}{264}$ | 0                         | 0                       | 0                        | $-\frac{\sqrt{2310}}{1848}$ |
|                                  |           | 0   | 0                        | 0                           | 0                          | 0                         | 0                       | $\frac{\sqrt{2310}}{1848}$ | 0                         | 0                        | 0                         | $\frac{5\sqrt{66}}{264}$  | 0                       | 0                        | 0                           |
|                                  |           | 0   | 0                        | 0                           | 0                          | 0                         | 0                       | 0                          | $-\frac{\sqrt{165}}{264}$ | 0                        | 0                         | 0                         | $-\frac{\sqrt{55}}{88}$ | 0                        | 0                           |
|                                  |           | 0   | 0                        | 0                           | 0                          | 0                         | 0                       | 0                          | 0                         | $\frac{\sqrt{11}}{88}$   | 0                         | 0                         | 0                       | $\frac{\sqrt{33}}{264}$  | 0                           |
|                                  |           | 0   | 0                        | 0                           | $\frac{\sqrt{2310}}{1848}$ | 0                         | 0                       | $\frac{\sqrt{22}}{88}$     | 0                         | 0                        | 0                         | $\frac{3\sqrt{770}}{616}$ | 0                       | 0                        | 0                           |
|                                  |           | $-\frac{\sqrt{33}}{264}$  | 0                        | 0                           | 0                          | $-\frac{\sqrt{165}}{264}$ | 0                       | 0                          | $-\frac{5\sqrt{22}}{88}$  | 0                        | 0                         | 0                         | $-\frac{\sqrt{66}}{88}$ | 0                        | 0                           |
|                                  |           | 0   | $\frac{\sqrt{55}}{88}$   | 0                           | 0                          | 0                         | $\frac{\sqrt{11}}{88}$  | 0                          | 0                         | $\frac{9\sqrt{22}}{88}$  | 0                         | 0                         | 0                       | $-\frac{\sqrt{66}}{88}$  | 0                           |
|                                  |           | 0   | 0                        | $-\frac{5\sqrt{66}}{264}$   | 0                          | 0                         | 0                       | 0                          | 0                         | $-\frac{5\sqrt{22}}{88}$ | 0                         | 0                         | 0                       | 0                        | $\frac{3\sqrt{770}}{616}$   |
|                                  |           | 0   | 0                        | 0                           | $\frac{5\sqrt{66}}{264}$   | 0                         | 0                       | $\frac{3\sqrt{770}}{616}$  | 0                         | 0                        | 0                         | $-\frac{5\sqrt{22}}{88}$  | 0                       | 0                        | 0                           |
|                                  |           | $-\frac{\sqrt{11}}{88}$   | 0                        | 0                           | 0                          | $-\frac{\sqrt{55}}{88}$   | 0                       | 0                          | $-\frac{\sqrt{66}}{88}$   | 0                        | 0                         | 0                         | $\frac{9\sqrt{22}}{88}$ | 0                        | 0                           |
|                                  |           | 0   | $\frac{\sqrt{165}}{264}$ | 0                           | 0                          | 0                         | $\frac{\sqrt{33}}{264}$ | 0                          | 0                         | $-\frac{\sqrt{66}}{88}$  | 0                         | 0                         | 0                       | $-\frac{5\sqrt{22}}{88}$ | 0                           |
|                                  |           | 0   | 0                        | $-\frac{\sqrt{2310}}{1848}$ | 0                          | 0                         | 0                       | 0                          | 0                         | 0                        | $\frac{3\sqrt{770}}{616}$ | 0                         | 0                       | 0                        | $\frac{\sqrt{22}}{88}$      |
| 874                              | symmetry  | $\frac{\sqrt{42}(x-y)(x+y)(x^4-9x^2y^2-5x^2z^2+y^4-5y^2z^2+5z^4)}{8}$ |                          |                             |                            |                           |                         |                            |                           |                          |                           |                           |                         |                          |                             |

*continued ...*

Table 10

| No.                              | multipole | matrix   |                           |                           |                          |                            |                         |                           |                           |                           |                           |                          |                           |                            |
|----------------------------------|-----------|--|---------------------------|---------------------------|--------------------------|----------------------------|-------------------------|---------------------------|---------------------------|---------------------------|---------------------------|--------------------------|---------------------------|----------------------------|
| $\mathbb{Q}_{6,1}^{(1,-1;a)}(E)$ |           | 0  | 0                         | 0                         | 0                        | 0                          | 0                       | 0                         | 0                         | 0                         | $-\frac{\sqrt{55}}{264}$  | 0                        | 0                         | $-\frac{\sqrt{77}}{56}$    |
|                                  |           | 0  | 0                         | 0                         | 0                        | 0                          | 0                       | $\frac{\sqrt{385}}{1848}$ | 0                         | 0                         | 0                         | $\frac{5\sqrt{11}}{264}$ | 0                         | 0                          |
|                                  |           | 0  | 0                         | 0                         | 0                        | 0                          | 0                       | 0                         | $-\frac{\sqrt{110}}{264}$ | 0                         | 0                         | 0                        | $-\frac{\sqrt{330}}{264}$ | 0                          |
|                                  |           | 0  | 0                         | 0                         | 0                        | 0                          | 0                       | 0                         | 0                         | $\frac{\sqrt{330}}{264}$  | 0                         | 0                        | 0                         | $\frac{\sqrt{110}}{264}$   |
|                                  |           | 0  | 0                         | 0                         | 0                        | 0                          | 0                       | 0                         | 0                         | 0                         | $-\frac{5\sqrt{11}}{264}$ | 0                        | 0                         | $-\frac{\sqrt{385}}{1848}$ |
|                                  |           | 0  | 0                         | 0                         | 0                        | 0                          | 0                       | $\frac{\sqrt{77}}{56}$    | 0                         | 0                         | 0                         | $\frac{\sqrt{55}}{264}$  | 0                         | 0                          |
|                                  |           | 0  | $\frac{\sqrt{385}}{1848}$ | 0                         | 0                        | 0                          | $\frac{\sqrt{77}}{56}$  | 0                         | 0                         | $\frac{5\sqrt{154}}{616}$ | 0                         | 0                        | 0                         | $\frac{\sqrt{462}}{56}$    |
|                                  |           | 0  | 0                         | $-\frac{\sqrt{110}}{264}$ | 0                        | 0                          | 0                       | 0                         | 0                         | 0                         | $-\frac{\sqrt{330}}{88}$  | 0                        | 0                         | $\frac{\sqrt{462}}{56}$    |
|                                  |           | 0  | 0                         | 0                         | $\frac{\sqrt{330}}{264}$ | 0                          | 0                       | $\frac{5\sqrt{154}}{616}$ | 0                         | 0                         | 0                         | $\frac{\sqrt{110}}{88}$  | 0                         | 0                          |
|                                  |           | $-\frac{\sqrt{55}}{264}$                         | 0                         | 0                         | 0                        | $-\frac{5\sqrt{11}}{264}$  | 0                       | 0                         | $-\frac{\sqrt{330}}{88}$  | 0                         | 0                         | 0                        | $\frac{\sqrt{110}}{88}$   | 0                          |
|                                  |           | 0  | $\frac{5\sqrt{11}}{264}$  | 0                         | 0                        | 0                          | $\frac{\sqrt{55}}{264}$ | 0                         | 0                         | $\frac{\sqrt{110}}{88}$   | 0                         | 0                        | 0                         | $-\frac{\sqrt{330}}{88}$   |
|                                  |           | 0  | 0                         | $-\frac{\sqrt{330}}{264}$ | 0                        | 0                          | 0                       | 0                         | 0                         | 0                         | $\frac{\sqrt{110}}{88}$   | 0                        | 0                         | $\frac{5\sqrt{154}}{616}$  |
|                                  |           | 0  | 0                         | 0                         | $\frac{\sqrt{110}}{264}$ | 0                          | 0                       | $\frac{\sqrt{462}}{56}$   | 0                         | 0                         | 0                         | $-\frac{\sqrt{330}}{88}$ | 0                         | 0                          |
|                                  |           | $-\frac{\sqrt{77}}{56}$                          | 0                         | 0                         | 0                        | $-\frac{\sqrt{385}}{1848}$ | 0                       | 0                         | $\frac{\sqrt{462}}{56}$   | 0                         | 0                         | 0                        | $\frac{5\sqrt{154}}{616}$ | 0                          |
| 875                              | symmetry  | $\frac{3\sqrt{7}yz(y-z)(y+z)(10x^2-y^2-z^2)}{4}$ |                           |                           |                          |                            |                         |                           |                           |                           |                           |                          |                           |                            |

*continued ...*

Table 10

| No.                       | multipole | matrix   |                             |                             |                              |                             |                            |                              |                            |                             |                            |                            |                          |                             |                             |
|---------------------------|-----------|--|-----------------------------|-----------------------------|------------------------------|-----------------------------|----------------------------|------------------------------|----------------------------|-----------------------------|----------------------------|----------------------------|--------------------------|-----------------------------|-----------------------------|
| $Q_{6,0}^{(1,-1;a)}(T_1)$ |           | 0  | 0                           | 0                           | 0                            | 0                           | 0                          | $\frac{\sqrt{462i}}{7392}$   | 0                          | $\frac{\sqrt{22i}}{352}$    | 0                          | $-\frac{\sqrt{330i}}{352}$ | 0                        | $-\frac{\sqrt{66i}}{96}$    | 0                           |
|                           |           | 0  | 0                           | 0                           | 0                            | 0                           | 0                          | $-\frac{\sqrt{330i}}{1056}$  | 0                          | $-\frac{5\sqrt{66i}}{1056}$ | 0                          | $\frac{3\sqrt{110i}}{352}$ | 0                        | $\frac{\sqrt{2310i}}{672}$  |                             |
|                           |           | 0  | 0                           | 0                           | 0                            | 0                           | 0                          | $-\frac{\sqrt{1155i}}{1232}$ | 0                          | $\frac{\sqrt{55i}}{176}$    | 0                          | $\frac{5\sqrt{33i}}{528}$  | 0                        | $-\frac{\sqrt{165i}}{176}$  | 0                           |
|                           |           | 0  | 0                           | 0                           | 0                            | 0                           | 0                          | $\frac{\sqrt{165i}}{176}$    | 0                          | $-\frac{5\sqrt{33i}}{528}$  | 0                          | $-\frac{\sqrt{55i}}{176}$  | 0                        | $\frac{\sqrt{1155i}}{1232}$ |                             |
|                           |           | 0  | 0                           | 0                           | 0                            | 0                           | 0                          | $-\frac{\sqrt{2310i}}{672}$  | 0                          | $-\frac{3\sqrt{110i}}{352}$ | 0                          | $\frac{5\sqrt{66i}}{1056}$ | 0                        | $\frac{\sqrt{330i}}{1056}$  | 0                           |
|                           |           | 0  | 0                           | 0                           | 0                            | 0                           | 0                          | $\frac{\sqrt{66i}}{96}$      | 0                          | $\frac{\sqrt{330i}}{352}$   | 0                          | $-\frac{\sqrt{22i}}{352}$  | 0                        | $-\frac{\sqrt{462i}}{7392}$ |                             |
|                           |           | $-\frac{\sqrt{462i}}{7392}$                      | 0                           | $\frac{\sqrt{1155i}}{1232}$ | 0                            | $\frac{\sqrt{2310i}}{672}$  | 0                          | 0                            | $-\frac{3\sqrt{77i}}{616}$ | 0                           | $\frac{3\sqrt{385i}}{308}$ | 0                          | $\frac{\sqrt{231i}}{56}$ | 0                           | 0                           |
|                           |           | 0  | $\frac{\sqrt{330i}}{1056}$  | 0                           | $-\frac{\sqrt{165i}}{176}$   | 0                           | $-\frac{\sqrt{66i}}{96}$   | $\frac{3\sqrt{77i}}{616}$    | 0                          | $\frac{\sqrt{33i}}{44}$     | 0                          | $-\frac{3\sqrt{55i}}{88}$  | 0                        | 0                           | 0                           |
|                           |           | $-\frac{\sqrt{22i}}{352}$                        | 0                           | $-\frac{\sqrt{55i}}{176}$   | 0                            | $\frac{3\sqrt{110i}}{352}$  | 0                          | 0                            | $-\frac{\sqrt{33i}}{44}$   | 0                           | $-\frac{\sqrt{165i}}{88}$  | 0                          | 0                        | 0                           | $-\frac{\sqrt{231i}}{56}$   |
|                           |           | 0  | $\frac{5\sqrt{66i}}{1056}$  | 0                           | $\frac{5\sqrt{33i}}{528}$    | 0                           | $-\frac{\sqrt{330i}}{352}$ | $-\frac{3\sqrt{385i}}{308}$  | 0                          | $\frac{\sqrt{165i}}{88}$    | 0                          | 0                          | 0                        | $\frac{3\sqrt{55i}}{88}$    | 0                           |
|                           |           | $\frac{\sqrt{330i}}{352}$                        | 0                           | $-\frac{5\sqrt{33i}}{528}$  | 0                            | $-\frac{5\sqrt{66i}}{1056}$ | 0                          | 0                            | $\frac{3\sqrt{55i}}{88}$   | 0                           | 0                          | 0                          | $\frac{\sqrt{165i}}{88}$ | 0                           | $-\frac{3\sqrt{385i}}{308}$ |
|                           |           | 0  | $-\frac{3\sqrt{110i}}{352}$ | 0                           | $\frac{\sqrt{55i}}{176}$     | 0                           | $\frac{\sqrt{22i}}{352}$   | $-\frac{\sqrt{231i}}{56}$    | 0                          | 0                           | 0                          | $-\frac{\sqrt{165i}}{88}$  | 0                        | $-\frac{\sqrt{33i}}{44}$    | 0                           |
|                           |           | $\frac{\sqrt{66i}}{96}$                          | 0                           | $\frac{\sqrt{165i}}{176}$   | 0                            | $-\frac{\sqrt{330i}}{1056}$ | 0                          | 0                            | 0                          | 0                           | $-\frac{3\sqrt{55i}}{88}$  | 0                          | $\frac{\sqrt{33i}}{44}$  | 0                           | $\frac{3\sqrt{77i}}{616}$   |
|                           |           | 0  | $-\frac{\sqrt{2310i}}{672}$ | 0                           | $-\frac{\sqrt{1155i}}{1232}$ | 0                           | $\frac{\sqrt{462i}}{7392}$ | 0                            | 0                          | $\frac{\sqrt{231i}}{56}$    | 0                          | $\frac{3\sqrt{385i}}{308}$ | 0                        | $-\frac{3\sqrt{77i}}{616}$  | 0                           |
| 876                       | symmetry  | $\frac{3\sqrt{7}xz(x-z)(x+z)(x^2-10y^2+z^2)}{4}$ |                             |                             |                              |                             |                            |                              |                            |                             |                            |                            |                          |                             |                             |

continued ...

Table 10

| No.                                | multipole | matrix  |                            |                             |                             |                            |                            |                             |                           |                            |                            |                            |                            |                           |                             |
|------------------------------------|-----------|---|----------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------|---------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|-----------------------------|
| $\mathbb{Q}_{6,1}^{(1,-1;a)}(T_1)$ |           | 0   | 0                          | 0                           | 0                           | 0                          | 0                          | $-\frac{\sqrt{462}}{7392}$  | 0                         | $\frac{\sqrt{22}}{352}$    | 0                          | $\frac{\sqrt{330}}{352}$   | 0                          | $-\frac{\sqrt{66}}{96}$   | 0                           |
|                                    |           | 0   | 0                          | 0                           | 0                           | 0                          | 0                          | 0                           | $\frac{\sqrt{330}}{1056}$ | 0                          | $-\frac{5\sqrt{66}}{1056}$ | 0                          | $-\frac{3\sqrt{110}}{352}$ | 0                         | $\frac{\sqrt{2310}}{672}$   |
|                                    |           | 0   | 0                          | 0                           | 0                           | 0                          | 0                          | $-\frac{\sqrt{1155}}{1232}$ | 0                         | $-\frac{\sqrt{55}}{176}$   | 0                          | $\frac{5\sqrt{33}}{528}$   | 0                          | $\frac{\sqrt{165}}{176}$  | 0                           |
|                                    |           | 0   | 0                          | 0                           | 0                           | 0                          | 0                          | 0                           | $\frac{\sqrt{165}}{176}$  | 0                          | $\frac{5\sqrt{33}}{528}$   | 0                          | $-\frac{\sqrt{55}}{176}$   | 0                         | $-\frac{\sqrt{1155}}{1232}$ |
|                                    |           | 0   | 0                          | 0                           | 0                           | 0                          | 0                          | $\frac{\sqrt{2310}}{672}$   | 0                         | $-\frac{3\sqrt{110}}{352}$ | 0                          | $-\frac{5\sqrt{66}}{1056}$ | 0                          | $\frac{\sqrt{330}}{1056}$ | 0                           |
|                                    |           | 0   | 0                          | 0                           | 0                           | 0                          | 0                          | 0                           | $-\frac{\sqrt{66}}{96}$   | 0                          | $\frac{\sqrt{330}}{352}$   | 0                          | $\frac{\sqrt{22}}{352}$    | 0                         | $-\frac{\sqrt{462}}{7392}$  |
|                                    |           | $-\frac{\sqrt{462}}{7392}$                        | 0                          | $-\frac{\sqrt{1155}}{1232}$ | 0                           | $\frac{\sqrt{2310}}{672}$  | 0                          | 0                           | $-\frac{3\sqrt{77}}{616}$ | 0                          | $-\frac{3\sqrt{385}}{308}$ | 0                          | $\frac{\sqrt{231}}{56}$    | 0                         | 0                           |
|                                    |           | 0   | $\frac{\sqrt{330}}{1056}$  | 0                           | $\frac{\sqrt{165}}{176}$    | 0                          | $-\frac{\sqrt{66}}{96}$    | $-\frac{3\sqrt{77}}{616}$   | 0                         | $\frac{\sqrt{33}}{44}$     | 0                          | $\frac{3\sqrt{55}}{88}$    | 0                          | 0                         | 0                           |
|                                    |           | $\frac{\sqrt{22}}{352}$                           | 0                          | $-\frac{\sqrt{55}}{176}$    | 0                           | $-\frac{3\sqrt{110}}{352}$ | 0                          | 0                           | $\frac{\sqrt{33}}{44}$    | 0                          | $-\frac{\sqrt{165}}{88}$   | 0                          | 0                          | 0                         | $-\frac{\sqrt{231}}{56}$    |
|                                    |           | 0   | $-\frac{5\sqrt{66}}{1056}$ | 0                           | $\frac{5\sqrt{33}}{528}$    | 0                          | $\frac{\sqrt{330}}{352}$   | $-\frac{3\sqrt{385}}{308}$  | 0                         | $-\frac{\sqrt{165}}{88}$   | 0                          | 0                          | 0                          | $-\frac{3\sqrt{55}}{88}$  | 0                           |
|                                    |           | $\frac{\sqrt{330}}{352}$                          | 0                          | $\frac{5\sqrt{33}}{528}$    | 0                           | $-\frac{5\sqrt{66}}{1056}$ | 0                          | 0                           | $\frac{3\sqrt{55}}{88}$   | 0                          | 0                          | 0                          | $\frac{\sqrt{165}}{88}$    | 0                         | $\frac{3\sqrt{385}}{308}$   |
|                                    |           | 0   | $-\frac{3\sqrt{110}}{352}$ | 0                           | $-\frac{\sqrt{55}}{176}$    | 0                          | $\frac{\sqrt{22}}{352}$    | $\frac{\sqrt{231}}{56}$     | 0                         | 0                          | 0                          | $\frac{\sqrt{165}}{88}$    | 0                          | $-\frac{\sqrt{33}}{44}$   | 0                           |
|                                    |           | $-\frac{\sqrt{66}}{96}$                           | 0                          | $\frac{\sqrt{165}}{176}$    | 0                           | $\frac{\sqrt{330}}{1056}$  | 0                          | 0                           | 0                         | 0                          | $-\frac{3\sqrt{55}}{88}$   | 0                          | $-\frac{\sqrt{33}}{44}$    | 0                         | $\frac{3\sqrt{77}}{616}$    |
|                                    |           | 0   | $\frac{\sqrt{2310}}{672}$  | 0                           | $-\frac{\sqrt{1155}}{1232}$ | 0                          | $-\frac{\sqrt{462}}{7392}$ | 0                           | 0                         | $-\frac{\sqrt{231}}{56}$   | 0                          | $\frac{3\sqrt{385}}{308}$  | 0                          | $\frac{3\sqrt{77}}{616}$  | 0                           |
| 877                                | symmetry  | $-\frac{3\sqrt{7}xy(x-y)(x+y)(x^2+y^2-10z^2)}{4}$ |                            |                             |                             |                            |                            |                             |                           |                            |                            |                            |                            |                           |                             |

continued ...

Table 10

| No.                                | multipole | matrix  |                           |                             |                             |                           |                          |                            |                            |                          |                             |                         |                            |                             |  |
|------------------------------------|-----------|---|---------------------------|-----------------------------|-----------------------------|---------------------------|--------------------------|----------------------------|----------------------------|--------------------------|-----------------------------|-------------------------|----------------------------|-----------------------------|--|
| $\mathbb{Q}_{6,2}^{(1,-1;a)}(T_1)$ |           | 0   | 0                         | 0                           | 0                           | 0                         | 0                        | 0                          | 0                          | 0                        | 0                           | $\frac{\sqrt{22}i}{44}$ | 0                          | 0                           |  |
|                                    |           | 0   | 0                         | 0                           | 0                           | 0                         | 0                        | 0                          | 0                          | 0                        | 0                           | 0                       | $-\frac{\sqrt{330}i}{132}$ | 0                           |  |
|                                    |           | 0   | 0                         | 0                           | 0                           | 0                         | 0                        | 0                          | 0                          | 0                        | 0                           | 0                       | 0                          | $\frac{\sqrt{1155}i}{462}$  |  |
|                                    |           | 0   | 0                         | 0                           | 0                           | 0                         | 0                        | $\frac{\sqrt{1155}i}{462}$ | 0                          | 0                        | 0                           | 0                       | 0                          | 0                           |  |
|                                    |           | 0   | 0                         | 0                           | 0                           | 0                         | 0                        | 0                          | $-\frac{\sqrt{330}i}{132}$ | 0                        | 0                           | 0                       | 0                          | 0                           |  |
|                                    |           | 0   | 0                         | 0                           | 0                           | 0                         | 0                        | 0                          | 0                          | $\frac{\sqrt{22}i}{44}$  | 0                           | 0                       | 0                          | 0                           |  |
|                                    |           | 0   | 0                         | 0                           | $-\frac{\sqrt{1155}i}{462}$ | 0                         | 0                        | 0                          | 0                          | 0                        | $-\frac{3\sqrt{385}i}{154}$ | 0                       | 0                          | 0                           |  |
|                                    |           | 0   | 0                         | 0                           | 0                           | $\frac{\sqrt{330}i}{132}$ | 0                        | 0                          | 0                          | 0                        | 0                           | $\frac{\sqrt{33}i}{22}$ | 0                          | 0                           |  |
|                                    |           | 0   | 0                         | 0                           | 0                           | 0                         | $-\frac{\sqrt{22}i}{44}$ | 0                          | 0                          | 0                        | 0                           | 0                       | $\frac{\sqrt{33}i}{22}$    | 0                           |  |
|                                    |           | 0   | 0                         | 0                           | 0                           | 0                         | 0                        | 0                          | 0                          | 0                        | 0                           | 0                       | 0                          | $-\frac{3\sqrt{385}i}{154}$ |  |
|                                    |           | 0   | 0                         | 0                           | 0                           | 0                         | 0                        | $\frac{3\sqrt{385}i}{154}$ | 0                          | 0                        | 0                           | 0                       | 0                          | 0                           |  |
|                                    |           | $-\frac{\sqrt{22}i}{44}$                      | 0                         | 0                           | 0                           | 0                         | 0                        | 0                          | $-\frac{\sqrt{33}i}{22}$   | 0                        | 0                           | 0                       | 0                          | 0                           |  |
|                                    |           | 0   | $\frac{\sqrt{330}i}{132}$ | 0                           | 0                           | 0                         | 0                        | 0                          | 0                          | $-\frac{\sqrt{33}i}{22}$ | 0                           | 0                       | 0                          | 0                           |  |
|                                    |           | 0   | 0                         | $-\frac{\sqrt{1155}i}{462}$ | 0                           | 0                         | 0                        | 0                          | 0                          | 0                        | $\frac{3\sqrt{385}i}{154}$  | 0                       | 0                          | 0                           |  |
| 878                                | symmetry  | $\frac{\sqrt{462}yz(y^2-3z^2)(3y^2-z^2)}{16}$ |                           |                             |                             |                           |                          |                            |                            |                          |                             |                         |                            |                             |  |

*continued ...*



Table 10

| No.                                   | multipole | matrix  |                          |                           |                          |                           |                         |                           |                            |                            |                            |                            |                            |                            |                           |
|---------------------------------------|-----------|---|--------------------------|---------------------------|--------------------------|---------------------------|-------------------------|---------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|
| $\mathbb{Q}_{6,0}^{(1,-1;a)}(T_2, 1)$ |           | 0   | 0                        | 0                         | 0                        | 0                         | 0                       | $\frac{\sqrt{7}i}{448}$   | 0                          | $\frac{\sqrt{3}i}{64}$     | 0                          | $\frac{\sqrt{5}i}{64}$     | 0                          | $\frac{i}{64}$             | 0                         |
|                                       |           | 0   | 0                        | 0                         | 0                        | 0                         | 0                       | $-\frac{\sqrt{5}i}{64}$   | 0                          | $-\frac{5i}{64}$           | 0                          | $-\frac{\sqrt{15}i}{64}$   | 0                          | $-\frac{\sqrt{35}i}{448}$  |                           |
|                                       |           | 0   | 0                        | 0                         | 0                        | 0                         | 0                       | $\frac{\sqrt{70}i}{448}$  | 0                          | $\frac{\sqrt{30}i}{64}$    | 0                          | $\frac{5\sqrt{2}i}{64}$    | 0                          | $\frac{\sqrt{10}i}{64}$    | 0                         |
|                                       |           | 0   | 0                        | 0                         | 0                        | 0                         | 0                       | $-\frac{\sqrt{10}i}{64}$  | 0                          | $-\frac{5\sqrt{2}i}{64}$   | 0                          | $-\frac{\sqrt{30}i}{64}$   | 0                          | $-\frac{\sqrt{70}i}{448}$  |                           |
|                                       |           | 0   | 0                        | 0                         | 0                        | 0                         | 0                       | $\frac{\sqrt{35}i}{448}$  | 0                          | $\frac{\sqrt{15}i}{64}$    | 0                          | $\frac{5i}{64}$            | 0                          | $\frac{\sqrt{5}i}{64}$     | 0                         |
|                                       |           | 0   | 0                        | 0                         | 0                        | 0                         | 0                       | $-\frac{i}{64}$           | 0                          | $-\frac{\sqrt{5}i}{64}$    | 0                          | $-\frac{\sqrt{3}i}{64}$    | 0                          | $-\frac{\sqrt{7}i}{448}$   |                           |
|                                       |           | $-\frac{\sqrt{7}i}{448}$                      | 0                        | $-\frac{\sqrt{70}i}{448}$ | 0                        | $-\frac{\sqrt{35}i}{448}$ | 0                       | 0                         | $-\frac{3\sqrt{42}i}{224}$ | 0                          | $-\frac{\sqrt{210}i}{112}$ | 0                          | $-\frac{3\sqrt{14}i}{224}$ | 0                          | 0                         |
|                                       |           | 0   | $\frac{\sqrt{5}i}{64}$   | 0                         | $\frac{\sqrt{10}i}{64}$  | 0                         | $\frac{i}{64}$          | $\frac{3\sqrt{42}i}{224}$ | 0                          | $\frac{3\sqrt{2}i}{16}$    | 0                          | $\frac{\sqrt{30}i}{32}$    | 0                          | 0                          | 0                         |
|                                       |           | $-\frac{\sqrt{3}i}{64}$                       | 0                        | $-\frac{\sqrt{30}i}{64}$  | 0                        | $-\frac{\sqrt{15}i}{64}$  | 0                       | 0                         | $-\frac{3\sqrt{2}i}{16}$   | 0                          | $-\frac{3\sqrt{10}i}{32}$  | 0                          | 0                          | 0                          | $\frac{3\sqrt{14}i}{224}$ |
|                                       |           | 0   | $\frac{5i}{64}$          | 0                         | $\frac{5\sqrt{2}i}{64}$  | 0                         | $\frac{\sqrt{5}i}{64}$  | $\frac{\sqrt{210}i}{112}$ | 0                          | $\frac{3\sqrt{10}i}{32}$   | 0                          | 0                          | 0                          | $-\frac{\sqrt{30}i}{32}$   | 0                         |
|                                       |           | $-\frac{\sqrt{5}i}{64}$                       | 0                        | $-\frac{5\sqrt{2}i}{64}$  | 0                        | $-\frac{5i}{64}$          | 0                       | 0                         | $-\frac{\sqrt{30}i}{32}$   | 0                          | 0                          | 0                          | $\frac{3\sqrt{10}i}{32}$   | 0                          | $\frac{\sqrt{210}i}{112}$ |
|                                       |           | 0   | $\frac{\sqrt{15}i}{64}$  | 0                         | $\frac{\sqrt{30}i}{64}$  | 0                         | $\frac{\sqrt{3}i}{64}$  | $\frac{3\sqrt{14}i}{224}$ | 0                          | 0                          | 0                          | $-\frac{3\sqrt{10}i}{32}$  | 0                          | $-\frac{3\sqrt{2}i}{16}$   | 0                         |
|                                       |           | $-\frac{i}{64}$                               | 0                        | $-\frac{\sqrt{10}i}{64}$  | 0                        | $-\frac{\sqrt{5}i}{64}$   | 0                       | 0                         | 0                          | 0                          | $\frac{\sqrt{30}i}{32}$    | 0                          | $\frac{3\sqrt{2}i}{16}$    | 0                          | $\frac{3\sqrt{42}i}{224}$ |
|                                       |           | 0   | $\frac{\sqrt{35}i}{448}$ | 0                         | $\frac{\sqrt{70}i}{448}$ | 0                         | $\frac{\sqrt{7}i}{448}$ | 0                         | 0                          | $-\frac{3\sqrt{14}i}{224}$ | 0                          | $-\frac{\sqrt{210}i}{112}$ | 0                          | $-\frac{3\sqrt{42}i}{224}$ | 0                         |
| 879                                   | symmetry  | $\frac{\sqrt{462}xz(x^2-3z^2)(3x^2-z^2)}{16}$ |                          |                           |                          |                           |                         |                           |                            |                            |                            |                            |                            |                            |                           |

*continued ...*

Table 10

| No.                                   | multipole | matrix  |                         |                          |                          |                         |                        |                           |                          |                           |                           |                          |                          |                           |                           |
|---------------------------------------|-----------|---|-------------------------|--------------------------|--------------------------|-------------------------|------------------------|---------------------------|--------------------------|---------------------------|---------------------------|--------------------------|--------------------------|---------------------------|---------------------------|
| $\mathbb{Q}_{6,1}^{(1,-1;a)}(T_2, 1)$ |           | 0   | 0                       | 0                        | 0                        | 0                       | 0                      | $\frac{\sqrt{7}}{448}$    | 0                        | $-\frac{\sqrt{3}}{64}$    | 0                         | $\frac{\sqrt{5}}{64}$    | 0                        | $-\frac{1}{64}$           | 0                         |
|                                       |           | 0   | 0                       | 0                        | 0                        | 0                       | 0                      | $-\frac{\sqrt{5}}{64}$    | 0                        | $\frac{5}{64}$            | 0                         | $-\frac{\sqrt{15}}{64}$  | 0                        | $\frac{\sqrt{35}}{448}$   |                           |
|                                       |           | 0   | 0                       | 0                        | 0                        | 0                       | 0                      | $-\frac{\sqrt{70}}{448}$  | 0                        | $\frac{\sqrt{30}}{64}$    | 0                         | $-\frac{5\sqrt{2}}{64}$  | 0                        | $\frac{\sqrt{10}}{64}$    | 0                         |
|                                       |           | 0   | 0                       | 0                        | 0                        | 0                       | 0                      | $\frac{\sqrt{10}}{64}$    | 0                        | $-\frac{5\sqrt{2}}{64}$   | 0                         | $\frac{\sqrt{30}}{64}$   | 0                        | $-\frac{\sqrt{70}}{448}$  |                           |
|                                       |           | 0   | 0                       | 0                        | 0                        | 0                       | 0                      | $\frac{\sqrt{35}}{448}$   | 0                        | $-\frac{\sqrt{15}}{64}$   | 0                         | $\frac{5}{64}$           | 0                        | $-\frac{\sqrt{5}}{64}$    | 0                         |
|                                       |           | 0   | 0                       | 0                        | 0                        | 0                       | 0                      | $-\frac{1}{64}$           | 0                        | $\frac{\sqrt{5}}{64}$     | 0                         | $-\frac{\sqrt{3}}{64}$   | 0                        | $\frac{\sqrt{7}}{448}$    |                           |
|                                       |           | $\frac{\sqrt{7}}{448}$                        | 0                       | $-\frac{\sqrt{70}}{448}$ | 0                        | $\frac{\sqrt{35}}{448}$ | 0                      | 0                         | $\frac{3\sqrt{42}}{224}$ | 0                         | $-\frac{\sqrt{210}}{112}$ | 0                        | $\frac{3\sqrt{14}}{224}$ | 0                         | 0                         |
|                                       |           | 0   | $-\frac{\sqrt{5}}{64}$  | 0                        | $\frac{\sqrt{10}}{64}$   | 0                       | $-\frac{1}{64}$        | $\frac{3\sqrt{42}}{224}$  | 0                        | $-\frac{3\sqrt{2}}{16}$   | 0                         | $\frac{\sqrt{30}}{32}$   | 0                        | 0                         | 0                         |
|                                       |           | $-\frac{\sqrt{3}}{64}$                        | 0                       | $\frac{\sqrt{30}}{64}$   | 0                        | $-\frac{\sqrt{15}}{64}$ | 0                      | 0                         | $-\frac{3\sqrt{2}}{16}$  | 0                         | $\frac{3\sqrt{10}}{32}$   | 0                        | 0                        | 0                         | $-\frac{3\sqrt{14}}{224}$ |
|                                       |           | 0   | $\frac{5}{64}$          | 0                        | $-\frac{5\sqrt{2}}{64}$  | 0                       | $\frac{\sqrt{5}}{64}$  | $-\frac{\sqrt{210}}{112}$ | 0                        | $\frac{3\sqrt{10}}{32}$   | 0                         | 0                        | 0                        | $-\frac{\sqrt{30}}{32}$   | 0                         |
|                                       |           | $\frac{\sqrt{5}}{64}$                         | 0                       | $-\frac{5\sqrt{2}}{64}$  | 0                        | $\frac{5}{64}$          | 0                      | 0                         | $\frac{\sqrt{30}}{32}$   | 0                         | 0                         | 0                        | $-\frac{3\sqrt{10}}{32}$ | 0                         | $\frac{\sqrt{210}}{112}$  |
|                                       |           | 0   | $-\frac{\sqrt{15}}{64}$ | 0                        | $\frac{\sqrt{30}}{64}$   | 0                       | $-\frac{\sqrt{3}}{64}$ | $\frac{3\sqrt{14}}{224}$  | 0                        | 0                         | 0                         | $-\frac{3\sqrt{10}}{32}$ | 0                        | $\frac{3\sqrt{2}}{16}$    | 0                         |
|                                       |           | $-\frac{1}{64}$                               | 0                       | $\frac{\sqrt{10}}{64}$   | 0                        | $-\frac{\sqrt{5}}{64}$  | 0                      | 0                         | 0                        | $-\frac{\sqrt{30}}{32}$   | 0                         | $\frac{3\sqrt{2}}{16}$   | 0                        | $-\frac{3\sqrt{42}}{224}$ |                           |
|                                       |           | 0   | $\frac{\sqrt{35}}{448}$ | 0                        | $-\frac{\sqrt{70}}{448}$ | 0                       | $\frac{\sqrt{7}}{448}$ | 0                         | 0                        | $-\frac{3\sqrt{14}}{224}$ | 0                         | $\frac{\sqrt{210}}{112}$ | 0                        | $-\frac{3\sqrt{42}}{224}$ | 0                         |
| 880                                   | symmetry  | $\frac{\sqrt{462}xy(x^2-3y^2)(3x^2-y^2)}{16}$ |                         |                          |                          |                         |                        |                           |                          |                           |                           |                          |                          |                           |                           |

*continued ...*

Table 10

| No.                                   | multipole | matrix   |   |   |   |   |                         |                         |                         |   |   |   |   |                          |   |
|---------------------------------------|-----------|--|---|---|---|---|-------------------------|-------------------------|-------------------------|---|---|---|---|--------------------------|---|
| $\mathbb{Q}_{6,2}^{(1,-1;a)}(T_2, 1)$ |           | 0  | 0 | 0 | 0 | 0 | 0                       | 0                       | 0                       | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{14}$   |   |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0                       | 0                       | 0                       | 0 | 0 | 0 | 0 | 0                        |   |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0                       | 0                       | 0                       | 0 | 0 | 0 | 0 | 0                        |   |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0                       | 0                       | 0                       | 0 | 0 | 0 | 0 | 0                        |   |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0                       | 0                       | 0                       | 0 | 0 | 0 | 0 | 0                        |   |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0                       | $\frac{\sqrt{7}i}{14}$  | 0                       | 0 | 0 | 0 | 0 | 0                        | 0 |
|                                       |           | 0  | 0 | 0 | 0 | 0 | $-\frac{\sqrt{7}i}{14}$ | 0                       | 0                       | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{14}$ | 0 |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0                       | 0                       | 0                       | 0 | 0 | 0 | 0 | $-\frac{\sqrt{42}i}{14}$ |   |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0                       | 0                       | 0                       | 0 | 0 | 0 | 0 | 0                        |   |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0                       | 0                       | 0                       | 0 | 0 | 0 | 0 | 0                        |   |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0                       | 0                       | 0                       | 0 | 0 | 0 | 0 | 0                        |   |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0                       | 0                       | 0                       | 0 | 0 | 0 | 0 | 0                        |   |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0                       | 0                       | 0                       | 0 | 0 | 0 | 0 | 0                        |   |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0                       | $\frac{\sqrt{42}i}{14}$ | 0                       | 0 | 0 | 0 | 0 | 0                        |   |
|                                       |           | $-\frac{\sqrt{7}i}{14}$  | 0 | 0 | 0 | 0 | 0                       | 0                       | $\frac{\sqrt{42}i}{14}$ | 0 | 0 | 0 | 0 | 0                        |   |
| 881                                   | symmetry  | $\frac{\sqrt{210}yz(16x^4-16x^2y^2-16x^2z^2+y^4+2y^2z^2+z^4)}{16}$ |   |   |   |   |                         |                         |                         |   |   |   |   |                          |   |

*continued ...*

Table 10

| No.                                   | multipole | matrix   |                            |                              |                              |                             |                             |                              |                            |                              |                            |                             |                           |                              |                              |
|---------------------------------------|-----------|--|----------------------------|------------------------------|------------------------------|-----------------------------|-----------------------------|------------------------------|----------------------------|------------------------------|----------------------------|-----------------------------|---------------------------|------------------------------|------------------------------|
| $\mathbb{Q}_{6,0}^{(1,-1;a)}(T_2, 2)$ |           | 0  | 0                          | 0                            | 0                            | 0                           | 0                           | $\frac{\sqrt{385}i}{14784}$  | 0                          | $\frac{\sqrt{165}i}{2112}$   | 0                          | $-\frac{9\sqrt{11}i}{704}$  | 0                         | $\frac{\sqrt{55}i}{64}$      | 0                            |
|                                       |           | 0  | 0                          | 0                            | 0                            | 0                           | 0                           | $-\frac{5\sqrt{11}i}{2112}$  | 0                          | $-\frac{5\sqrt{55}i}{2112}$  | 0                          | $\frac{9\sqrt{33}i}{704}$   | 0                         | $-\frac{5\sqrt{77}i}{448}$   |                              |
|                                       |           | 0  | 0                          | 0                            | 0                            | 0                           | 0                           | $-\frac{9\sqrt{154}i}{4928}$ | 0                          | $\frac{5\sqrt{66}i}{2112}$   | 0                          | $\frac{5\sqrt{110}i}{2112}$ | 0                         | $-\frac{9\sqrt{22}i}{704}$   | 0                            |
|                                       |           | 0  | 0                          | 0                            | 0                            | 0                           | 0                           | $\frac{9\sqrt{22}i}{704}$    | 0                          | $-\frac{5\sqrt{110}i}{2112}$ | 0                          | $-\frac{5\sqrt{66}i}{2112}$ | 0                         | $\frac{9\sqrt{154}i}{4928}$  |                              |
|                                       |           | 0  | 0                          | 0                            | 0                            | 0                           | 0                           | $\frac{5\sqrt{77}i}{448}$    | 0                          | $-\frac{9\sqrt{33}i}{704}$   | 0                          | $\frac{5\sqrt{55}i}{2112}$  | 0                         | $\frac{5\sqrt{11}i}{2112}$   | 0                            |
|                                       |           | 0  | 0                          | 0                            | 0                            | 0                           | 0                           | $-\frac{\sqrt{55}i}{64}$     | 0                          | $\frac{9\sqrt{11}i}{704}$    | 0                          | $-\frac{\sqrt{165}i}{2112}$ | 0                         | $-\frac{\sqrt{385}i}{14784}$ |                              |
|                                       |           | $-\frac{\sqrt{385}i}{14784}$                                       | 0                          | $\frac{9\sqrt{154}i}{4928}$  | 0                            | $-\frac{5\sqrt{77}i}{448}$  | 0                           | $-\frac{\sqrt{2310}i}{2464}$ | 0                          | $\frac{9\sqrt{462}i}{1232}$  | 0                          | $-\frac{3\sqrt{770}i}{224}$ | 0                         | 0                            |                              |
|                                       |           | 0  | $\frac{5\sqrt{11}i}{2112}$ | 0                            | $-\frac{9\sqrt{22}i}{704}$   | 0                           | $\frac{\sqrt{55}i}{64}$     | $\frac{\sqrt{2310}i}{2464}$  | 0                          | $\frac{\sqrt{110}i}{176}$    | 0                          | $-\frac{9\sqrt{66}i}{352}$  | 0                         | 0                            | 0                            |
|                                       |           | $-\frac{\sqrt{165}i}{2112}$  | 0                          | $-\frac{5\sqrt{66}i}{2112}$  | 0                            | $\frac{9\sqrt{33}i}{704}$   | 0                           | 0                            | $-\frac{\sqrt{110}i}{176}$ | 0                            | $-\frac{5\sqrt{22}i}{352}$ | 0                           | 0                         | 0                            | $\frac{3\sqrt{770}i}{224}$   |
|                                       |           | 0  | $\frac{5\sqrt{55}i}{2112}$ | 0                            | $\frac{5\sqrt{110}i}{2112}$  | 0                           | $-\frac{9\sqrt{11}i}{704}$  | $-\frac{9\sqrt{462}i}{1232}$ | 0                          | $\frac{5\sqrt{22}i}{352}$    | 0                          | 0                           | 0                         | $\frac{9\sqrt{66}i}{352}$    | 0                            |
|                                       |           | $\frac{9\sqrt{11}i}{704}$  | 0                          | $-\frac{5\sqrt{110}i}{2112}$ | 0                            | $-\frac{5\sqrt{55}i}{2112}$ | 0                           | 0                            | $\frac{9\sqrt{66}i}{352}$  | 0                            | 0                          | 0                           | $\frac{5\sqrt{22}i}{352}$ | 0                            | $-\frac{9\sqrt{462}i}{1232}$ |
|                                       |           | 0  | $-\frac{9\sqrt{33}i}{704}$ | 0                            | $\frac{5\sqrt{66}i}{2112}$   | 0                           | $\frac{\sqrt{165}i}{2112}$  | $\frac{3\sqrt{770}i}{224}$   | 0                          | 0                            | 0                          | $-\frac{5\sqrt{22}i}{352}$  | 0                         | $-\frac{\sqrt{110}i}{176}$   | 0                            |
|                                       |           | $-\frac{\sqrt{55}i}{64}$   | 0                          | $\frac{9\sqrt{22}i}{704}$    | 0                            | $-\frac{5\sqrt{11}i}{2112}$ | 0                           | 0                            | 0                          | $-\frac{9\sqrt{66}i}{352}$   | 0                          | $\frac{\sqrt{110}i}{176}$   | 0                         | $\frac{\sqrt{2310}i}{2464}$  |                              |
|                                       |           | 0  | $\frac{5\sqrt{77}i}{448}$  | 0                            | $-\frac{9\sqrt{154}i}{4928}$ | 0                           | $\frac{\sqrt{385}i}{14784}$ | 0                            | 0                          | $-\frac{3\sqrt{770}i}{224}$  | 0                          | $\frac{9\sqrt{462}i}{1232}$ | 0                         | $-\frac{\sqrt{2310}i}{2464}$ | 0                            |
| 882                                   | symmetry  | $\frac{\sqrt{210}xz(x^4-16x^2y^2+2x^2z^2+16y^4-16y^2z^2+z^4)}{16}$ |                            |                              |                              |                             |                             |                              |                            |                              |                            |                             |                           |                              |                              |

continued ...

Table 10

| No.                                   | multipole | matrix   |                            |                             |                             |                            |                            |                            |                            |                             |                            |                             |                           |                             |                             |
|---------------------------------------|-----------|--|----------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|---------------------------|-----------------------------|-----------------------------|
| $\mathbb{Q}_{6,1}^{(1,-1;a)}(T_2, 2)$ |           | 0  | 0                          | 0                           | 0                           | 0                          | 0                          | $\frac{\sqrt{385}}{14784}$ | 0                          | $-\frac{\sqrt{165}}{2112}$  | 0                          | $-\frac{9\sqrt{11}}{704}$   | 0                         | $-\frac{\sqrt{55}}{64}$     | 0                           |
|                                       |           | 0  | 0                          | 0                           | 0                           | 0                          | 0                          | $-\frac{5\sqrt{11}}{2112}$ | 0                          | $\frac{5\sqrt{55}}{2112}$   | 0                          | $\frac{9\sqrt{33}}{704}$    | 0                         | $\frac{5\sqrt{77}}{448}$    |                             |
|                                       |           | 0  | 0                          | 0                           | 0                           | 0                          | 0                          | $\frac{9\sqrt{154}}{4928}$ | 0                          | $\frac{5\sqrt{66}}{2112}$   | 0                          | $-\frac{5\sqrt{110}}{2112}$ | 0                         | $-\frac{9\sqrt{22}}{704}$   | 0                           |
|                                       |           | 0  | 0                          | 0                           | 0                           | 0                          | 0                          | $-\frac{9\sqrt{22}}{704}$  | 0                          | $-\frac{5\sqrt{110}}{2112}$ | 0                          | $\frac{5\sqrt{66}}{2112}$   | 0                         | $\frac{9\sqrt{154}}{4928}$  |                             |
|                                       |           | 0  | 0                          | 0                           | 0                           | 0                          | 0                          | $\frac{5\sqrt{77}}{448}$   | 0                          | $\frac{9\sqrt{33}}{704}$    | 0                          | $\frac{5\sqrt{55}}{2112}$   | 0                         | $-\frac{5\sqrt{11}}{2112}$  | 0                           |
|                                       |           | 0  | 0                          | 0                           | 0                           | 0                          | 0                          | $-\frac{\sqrt{55}}{64}$    | 0                          | $-\frac{9\sqrt{11}}{704}$   | 0                          | $-\frac{\sqrt{165}}{2112}$  | 0                         | $\frac{\sqrt{385}}{14784}$  |                             |
|                                       |           | $\frac{\sqrt{385}}{14784}$   | 0                          | $\frac{9\sqrt{154}}{4928}$  | 0                           | $\frac{5\sqrt{77}}{448}$   | 0                          | 0                          | $\frac{\sqrt{2310}}{2464}$ | 0                           | $\frac{9\sqrt{462}}{1232}$ | 0                           | $\frac{3\sqrt{770}}{224}$ | 0                           | 0                           |
|                                       |           | 0  | $-\frac{5\sqrt{11}}{2112}$ | 0                           | $-\frac{9\sqrt{22}}{704}$   | 0                          | $-\frac{\sqrt{55}}{64}$    | $\frac{\sqrt{2310}}{2464}$ | 0                          | $-\frac{\sqrt{110}}{176}$   | 0                          | $-\frac{9\sqrt{66}}{352}$   | 0                         | 0                           | 0                           |
|                                       |           | $-\frac{\sqrt{165}}{2112}$   | 0                          | $\frac{5\sqrt{66}}{2112}$   | 0                           | $\frac{9\sqrt{33}}{704}$   | 0                          | 0                          | $-\frac{\sqrt{110}}{176}$  | 0                           | $\frac{5\sqrt{22}}{352}$   | 0                           | 0                         | 0                           | $-\frac{3\sqrt{770}}{224}$  |
|                                       |           | 0  | $\frac{5\sqrt{55}}{2112}$  | 0                           | $-\frac{5\sqrt{110}}{2112}$ | 0                          | $-\frac{9\sqrt{11}}{704}$  | $\frac{9\sqrt{462}}{1232}$ | 0                          | $\frac{5\sqrt{22}}{352}$    | 0                          | 0                           | 0                         | $\frac{9\sqrt{66}}{352}$    | 0                           |
|                                       |           | $-\frac{9\sqrt{11}}{704}$  | 0                          | $-\frac{5\sqrt{110}}{2112}$ | 0                           | $\frac{5\sqrt{55}}{2112}$  | 0                          | 0                          | $-\frac{9\sqrt{66}}{352}$  | 0                           | 0                          | 0                           | $-\frac{5\sqrt{22}}{352}$ | 0                           | $-\frac{9\sqrt{462}}{1232}$ |
|                                       |           | 0  | $\frac{9\sqrt{33}}{704}$   | 0                           | $\frac{5\sqrt{66}}{2112}$   | 0                          | $-\frac{\sqrt{165}}{2112}$ | $\frac{3\sqrt{770}}{224}$  | 0                          | 0                           | 0                          | $-\frac{5\sqrt{22}}{352}$   | 0                         | $\frac{\sqrt{110}}{176}$    | 0                           |
|                                       |           | $-\frac{\sqrt{55}}{64}$  | 0                          | $-\frac{9\sqrt{22}}{704}$   | 0                           | $-\frac{5\sqrt{11}}{2112}$ | 0                          | 0                          | 0                          | 0                           | $\frac{9\sqrt{66}}{352}$   | 0                           | $\frac{\sqrt{110}}{176}$  | 0                           | $-\frac{\sqrt{2310}}{2464}$ |
|                                       |           | 0  | $\frac{5\sqrt{77}}{448}$   | 0                           | $\frac{9\sqrt{154}}{4928}$  | 0                          | $\frac{\sqrt{385}}{14784}$ | 0                          | 0                          | $-\frac{3\sqrt{770}}{224}$  | 0                          | $-\frac{9\sqrt{462}}{1232}$ | 0                         | $-\frac{\sqrt{2310}}{2464}$ | 0                           |
| 883                                   | symmetry  | $\frac{\sqrt{210}xy(x^4+2x^2y^2-16x^2z^2+y^4-16y^2z^2+16z^4)}{16}$ |                            |                             |                             |                            |                            |                            |                            |                             |                            |                             |                           |                             |                             |

*continued ...*

Table 10

| No.                                   | multipole | matrix                   |                           |                          |                          |                           |                          |                           |                          |                            |                          |                          |                           |                            |
|---------------------------------------|-----------|--------------------------|---------------------------|--------------------------|--------------------------|---------------------------|--------------------------|---------------------------|--------------------------|----------------------------|--------------------------|--------------------------|---------------------------|----------------------------|
| $\mathbb{Q}_{6,2}^{(1,-1;a)}(T_2, 2)$ |           | 0                        | 0                         | 0                        | 0                        | 0                         | 0                        | 0                         | 0                        | 0                          | $\frac{\sqrt{11}i}{66}$  | 0                        | 0                         | 0                          |
|                                       |           | 0                        | 0                         | 0                        | 0                        | 0                         | 0                        | $\frac{\sqrt{77}i}{462}$  | 0                        | 0                          | 0                        | $-\frac{\sqrt{55}i}{66}$ | 0                         | 0                          |
|                                       |           | 0                        | 0                         | 0                        | 0                        | 0                         | 0                        | 0                         | $-\frac{\sqrt{22}i}{66}$ | 0                          | 0                        | 0                        | $\frac{\sqrt{66}i}{66}$   | 0                          |
|                                       |           | 0                        | 0                         | 0                        | 0                        | 0                         | 0                        | 0                         | 0                        | $\frac{\sqrt{66}i}{66}$    | 0                        | 0                        | 0                         | $-\frac{\sqrt{22}i}{66}$   |
|                                       |           | 0                        | 0                         | 0                        | 0                        | 0                         | 0                        | 0                         | 0                        | 0                          | $-\frac{\sqrt{55}i}{66}$ | 0                        | 0                         | $\frac{\sqrt{77}i}{462}$   |
|                                       |           | 0                        | 0                         | 0                        | 0                        | 0                         | 0                        | 0                         | 0                        | 0                          | 0                        | $\frac{\sqrt{11}i}{66}$  | 0                         | 0                          |
|                                       |           | 0                        | $-\frac{\sqrt{77}i}{462}$ | 0                        | 0                        | 0                         | 0                        | 0                         | 0                        | $-\frac{\sqrt{770}i}{154}$ | 0                        | 0                        | 0                         | 0                          |
|                                       |           | 0                        | 0                         | $\frac{\sqrt{22}i}{66}$  | 0                        | 0                         | 0                        | 0                         | 0                        | 0                          | $\frac{\sqrt{66}i}{22}$  | 0                        | 0                         | 0                          |
|                                       |           | 0                        | 0                         | 0                        | $-\frac{\sqrt{66}i}{66}$ | 0                         | 0                        | $\frac{\sqrt{770}i}{154}$ | 0                        | 0                          | 0                        | $-\frac{\sqrt{22}i}{22}$ | 0                         | 0                          |
|                                       |           | $-\frac{\sqrt{11}i}{66}$ | 0                         | 0                        | 0                        | $\frac{\sqrt{55}i}{66}$   | 0                        | 0                         | $-\frac{\sqrt{66}i}{22}$ | 0                          | 0                        | 0                        | $-\frac{\sqrt{22}i}{22}$  | 0                          |
|                                       |           | 0                        | $\frac{\sqrt{55}i}{66}$   | 0                        | 0                        | 0                         | $-\frac{\sqrt{11}i}{66}$ | 0                         | 0                        | $\frac{\sqrt{22}i}{22}$    | 0                        | 0                        | 0                         | $\frac{\sqrt{66}i}{22}$    |
|                                       |           | 0                        | 0                         | $-\frac{\sqrt{66}i}{66}$ | 0                        | 0                         | 0                        | 0                         | 0                        | 0                          | $\frac{\sqrt{22}i}{22}$  | 0                        | 0                         | $-\frac{\sqrt{770}i}{154}$ |
|                                       |           | 0                        | 0                         | 0                        | $\frac{\sqrt{22}i}{66}$  | 0                         | 0                        | 0                         | 0                        | 0                          | 0                        | $-\frac{\sqrt{66}i}{22}$ | 0                         | 0                          |
|                                       |           | 0                        | 0                         | 0                        | 0                        | $-\frac{\sqrt{77}i}{462}$ | 0                        | 0                         | 0                        | 0                          | 0                        | 0                        | $\frac{\sqrt{770}i}{154}$ | 0                          |
| 884                                   | symmetry  | 1                        |                           |                          |                          |                           |                          |                           |                          |                            |                          |                          |                           |                            |

*continued ...*

Table 10

| No.                           | multipole | matrix                                 |                         |                         |                         |                         |                         |                        |                        |                        |                        |                        |                        |                        |                        |
|-------------------------------|-----------|--|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| $\mathbb{Q}_0^{(1,1;a)}(A_1)$ |           | $-\frac{\sqrt{42}}{21}$                | 0                       | 0                       | 0                       | 0                       | 0                       | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      |
|                               |           | 0                                      | $-\frac{\sqrt{42}}{21}$ | 0                       | 0                       | 0                       | 0                       | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      |
|                               |           | 0                                      | 0                       | $-\frac{\sqrt{42}}{21}$ | 0                       | 0                       | 0                       | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      |
|                               |           | 0                                      | 0                       | 0                       | $-\frac{\sqrt{42}}{21}$ | 0                       | 0                       | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      |
|                               |           | 0                                      | 0                       | 0                       | 0                       | $-\frac{\sqrt{42}}{21}$ | 0                       | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      |
|                               |           | 0                                      | 0                       | 0                       | 0                       | 0                       | $-\frac{\sqrt{42}}{21}$ | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      |
|                               |           | 0                                      | 0                       | 0                       | 0                       | 0                       | 0                       | $\frac{\sqrt{42}}{28}$ | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      |
|                               |           | 0                                      | 0                       | 0                       | 0                       | 0                       | 0                       | 0                      | $\frac{\sqrt{42}}{28}$ | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      |
|                               |           | 0                                      | 0                       | 0                       | 0                       | 0                       | 0                       | 0                      | 0                      | $\frac{\sqrt{42}}{28}$ | 0                      | 0                      | 0                      | 0                      | 0                      |
|                               |           | 0                                      | 0                       | 0                       | 0                       | 0                       | 0                       | 0                      | 0                      | 0                      | $\frac{\sqrt{42}}{28}$ | 0                      | 0                      | 0                      | 0                      |
|                               |           | 0                                      | 0                       | 0                       | 0                       | 0                       | 0                       | 0                      | 0                      | 0                      | 0                      | $\frac{\sqrt{42}}{28}$ | 0                      | 0                      | 0                      |
|                               |           | 0                                      | 0                       | 0                       | 0                       | 0                       | 0                       | 0                      | 0                      | 0                      | 0                      | 0                      | $\frac{\sqrt{42}}{28}$ | 0                      | 0                      |
|                               |           | 0                                      | 0                       | 0                       | 0                       | 0                       | 0                       | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | $\frac{\sqrt{42}}{28}$ | 0                      |
|                               |           | 0                                      | 0                       | 0                       | 0                       | 0                       | 0                       | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | 0                      | $\frac{\sqrt{42}}{28}$ |
| 885                           | symmetry  | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |                         |                         |                         |                         |                         |                        |                        |                        |                        |                        |                        |                        |                        |

*continued ...*

Table 10

| No.                             | multipole | matrix                         |                         |                           |                          |                         |                          |                        |                           |                         |                           |                          |                        |                          |                        |
|---------------------------------|-----------|--------------------------------|-------------------------|---------------------------|--------------------------|-------------------------|--------------------------|------------------------|---------------------------|-------------------------|---------------------------|--------------------------|------------------------|--------------------------|------------------------|
| $\mathbb{Q}_{2,0}^{(1,1;a)}(E)$ |           | $\frac{15\sqrt{7}}{98}$        | 0                       | 0                         | 0                        | 0                       | 0                        | 0                      | $-\frac{5\sqrt{42}}{147}$ | 0                       | 0                         | 0                        | 0                      | 0                        | 0                      |
|                                 |           | 0                              | $-\frac{3\sqrt{7}}{98}$ | 0                         | 0                        | 0                       | 0                        | 0                      | 0                         | $-\frac{\sqrt{70}}{49}$ | 0                         | 0                        | 0                      | 0                        | 0                      |
|                                 |           | 0                              | 0                       | $-\frac{6\sqrt{7}}{49}$   | 0                        | 0                       | 0                        | 0                      | 0                         | 0                       | $-\frac{2\sqrt{21}}{147}$ | 0                        | 0                      | 0                        | 0                      |
|                                 |           | 0                              | 0                       | 0                         | $-\frac{6\sqrt{7}}{49}$  | 0                       | 0                        | 0                      | 0                         | 0                       | 0                         | $\frac{2\sqrt{21}}{147}$ | 0                      | 0                        | 0                      |
|                                 |           | 0                              | 0                       | 0                         | 0                        | $-\frac{3\sqrt{7}}{98}$ | 0                        | 0                      | 0                         | 0                       | 0                         | 0                        | $\frac{\sqrt{70}}{49}$ | 0                        | 0                      |
|                                 |           | 0                              | 0                       | 0                         | 0                        | 0                       | $\frac{15\sqrt{7}}{98}$  | 0                      | 0                         | 0                       | 0                         | 0                        | 0                      | $\frac{5\sqrt{42}}{147}$ | 0                      |
|                                 |           | 0                              | 0                       | 0                         | 0                        | 0                       | 0                        | $-\frac{\sqrt{7}}{14}$ | 0                         | 0                       | 0                         | 0                        | 0                      | 0                        | 0                      |
|                                 |           | $-\frac{5\sqrt{42}}{147}$      | 0                       | 0                         | 0                        | 0                       | 0                        | 0                      | $-\frac{\sqrt{7}}{98}$    | 0                       | 0                         | 0                        | 0                      | 0                        | 0                      |
|                                 |           | 0                              | $-\frac{\sqrt{70}}{49}$ | 0                         | 0                        | 0                       | 0                        | 0                      | 0                         | $\frac{3\sqrt{7}}{98}$  | 0                         | 0                        | 0                      | 0                        | 0                      |
|                                 |           | 0                              | 0                       | $-\frac{2\sqrt{21}}{147}$ | 0                        | 0                       | 0                        | 0                      | 0                         | 0                       | $\frac{5\sqrt{7}}{98}$    | 0                        | 0                      | 0                        | 0                      |
|                                 |           | 0                              | 0                       | 0                         | $\frac{2\sqrt{21}}{147}$ | 0                       | 0                        | 0                      | 0                         | 0                       | 0                         | $\frac{5\sqrt{7}}{98}$   | 0                      | 0                        | 0                      |
|                                 |           | 0                              | 0                       | 0                         | 0                        | $\frac{\sqrt{70}}{49}$  | 0                        | 0                      | 0                         | 0                       | 0                         | 0                        | $\frac{3\sqrt{7}}{98}$ | 0                        | 0                      |
|                                 |           | 0                              | 0                       | 0                         | 0                        | 0                       | $\frac{5\sqrt{42}}{147}$ | 0                      | 0                         | 0                       | 0                         | 0                        | 0                      | $-\frac{\sqrt{7}}{98}$   | 0                      |
|                                 |           | 0                              | 0                       | 0                         | 0                        | 0                       | 0                        | 0                      | 0                         | 0                       | 0                         | 0                        | 0                      | 0                        | $-\frac{\sqrt{7}}{14}$ |
| 886                             | symmetry  | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ |                         |                           |                          |                         |                          |                        |                           |                         |                           |                          |                        |                          |                        |

*continued ...*



Table 10

| No.                             | multipole | matrix                    |                           |                            |                           |                          |                           |                        |                          |                           |                           |                            |                           |                         |  |
|---------------------------------|-----------|---------------------------|---------------------------|----------------------------|---------------------------|--------------------------|---------------------------|------------------------|--------------------------|---------------------------|---------------------------|----------------------------|---------------------------|-------------------------|--|
| $\mathbb{Q}_{2,1}^{(1,1;a)}(E)$ |           | 0                         | 0                         | $\frac{3\sqrt{210}}{196}$  | 0                         | 0                        | 0                         | 0                      | 0                        | $-\frac{\sqrt{70}}{147}$  | 0                         | 0                          | 0                         | 0                       |  |
|                                 |           | 0                         | 0                         | 0                          | $\frac{9\sqrt{42}}{196}$  | 0                        | 0                         | $\frac{\sqrt{10}}{21}$ | 0                        | 0                         | $-\frac{4\sqrt{14}}{147}$ | 0                          | 0                         | 0                       |  |
|                                 |           | $\frac{3\sqrt{210}}{196}$ | 0                         | 0                          | 0                         | $\frac{9\sqrt{42}}{196}$ | 0                         | 0                      | $\frac{4\sqrt{35}}{147}$ | 0                         | 0                         | $-\frac{2\sqrt{105}}{147}$ | 0                         | 0                       |  |
|                                 |           | 0                         | $\frac{9\sqrt{42}}{196}$  | 0                          | 0                         | 0                        | $\frac{3\sqrt{210}}{196}$ | 0                      | 0                        | $\frac{2\sqrt{105}}{147}$ | 0                         | 0                          | $-\frac{4\sqrt{35}}{147}$ | 0                       |  |
|                                 |           | 0                         | 0                         | $\frac{9\sqrt{42}}{196}$   | 0                         | 0                        | 0                         | 0                      | 0                        | $\frac{4\sqrt{14}}{147}$  | 0                         | 0                          | 0                         | $-\frac{\sqrt{10}}{21}$ |  |
|                                 |           | 0                         | 0                         | 0                          | $\frac{3\sqrt{210}}{196}$ | 0                        | 0                         | 0                      | 0                        | 0                         | $\frac{\sqrt{70}}{147}$   | 0                          | 0                         | 0                       |  |
|                                 |           | 0                         | $\frac{\sqrt{10}}{21}$    | 0                          | 0                         | 0                        | 0                         | 0                      | $-\frac{1}{14}$          | 0                         | 0                         | 0                          | 0                         | 0                       |  |
|                                 |           | 0                         | 0                         | $\frac{4\sqrt{35}}{147}$   | 0                         | 0                        | 0                         | 0                      | 0                        | $-\frac{\sqrt{105}}{98}$  | 0                         | 0                          | 0                         | 0                       |  |
|                                 |           | 0                         | 0                         | 0                          | $\frac{2\sqrt{105}}{147}$ | 0                        | 0                         | $-\frac{1}{14}$        | 0                        | 0                         | $-\frac{\sqrt{35}}{49}$   | 0                          | 0                         | 0                       |  |
|                                 |           | $-\frac{\sqrt{70}}{147}$  | 0                         | 0                          | 0                         | $\frac{4\sqrt{14}}{147}$ | 0                         | 0                      | $-\frac{\sqrt{105}}{98}$ | 0                         | 0                         | $-\frac{\sqrt{35}}{49}$    | 0                         | 0                       |  |
|                                 |           | 0                         | $-\frac{4\sqrt{14}}{147}$ | 0                          | 0                         | 0                        | $\frac{\sqrt{70}}{147}$   | 0                      | 0                        | $-\frac{\sqrt{35}}{49}$   | 0                         | 0                          | $-\frac{\sqrt{105}}{98}$  | 0                       |  |
|                                 |           | 0                         | 0                         | $-\frac{2\sqrt{105}}{147}$ | 0                         | 0                        | 0                         | 0                      | 0                        | $-\frac{\sqrt{35}}{49}$   | 0                         | 0                          | 0                         | $-\frac{1}{14}$         |  |
|                                 |           | 0                         | 0                         | 0                          | $-\frac{4\sqrt{35}}{147}$ | 0                        | 0                         | 0                      | 0                        | 0                         | $-\frac{\sqrt{105}}{98}$  | 0                          | 0                         | 0                       |  |
|                                 |           | 0                         | 0                         | 0                          | 0                         | $-\frac{\sqrt{10}}{21}$  | 0                         | 0                      | 0                        | 0                         | 0                         | $-\frac{1}{14}$            | 0                         | 0                       |  |
| 887                             | symmetry  | $\sqrt{3}yz$              |                           |                            |                           |                          |                           |                        |                          |                           |                           |                            |                           |                         |  |

*continued ...*

Table 10

| No.                               | multipole | matrix                     |                             |                           |                            |                            |                           |                         |                          |                            |                            |                             |                            |                           |                          |
|-----------------------------------|-----------|----------------------------|-----------------------------|---------------------------|----------------------------|----------------------------|---------------------------|-------------------------|--------------------------|----------------------------|----------------------------|-----------------------------|----------------------------|---------------------------|--------------------------|
| $\mathbb{Q}_{2,0}^{(1,1;a)}(T_2)$ |           | 0                          | $-\frac{3\sqrt{105}i}{98}$  | 0                         | 0                          | 0                          | 0                         | $\frac{5\sqrt{2}i}{42}$ | 0                        | $\frac{5\sqrt{42}i}{294}$  | 0                          | 0                           | 0                          | 0                         | 0                        |
|                                   |           | $\frac{3\sqrt{105}i}{98}$  | 0                           | $-\frac{3\sqrt{42}i}{98}$ | 0                          | 0                          | 0                         | 0                       | $\frac{\sqrt{70}i}{294}$ | 0                          | $\frac{11\sqrt{14}i}{294}$ | 0                           | 0                          | 0                         | 0                        |
|                                   |           | 0                          | $\frac{3\sqrt{42}i}{98}$    | 0                         | 0                          | 0                          | 0                         | 0                       | 0                        | $-\frac{\sqrt{105}i}{147}$ | 0                          | $\frac{\sqrt{7}i}{21}$      | 0                          | 0                         | 0                        |
|                                   |           | 0                          | 0                           | 0                         | 0                          | $\frac{3\sqrt{42}i}{98}$   | 0                         | 0                       | 0                        | 0                          | $-\frac{\sqrt{7}i}{21}$    | 0                           | $\frac{\sqrt{105}i}{147}$  | 0                         | 0                        |
|                                   |           | 0                          | 0                           | 0                         | $-\frac{3\sqrt{42}i}{98}$  | 0                          | $\frac{3\sqrt{105}i}{98}$ | 0                       | 0                        | 0                          | 0                          | $-\frac{11\sqrt{14}i}{294}$ | 0                          | $-\frac{\sqrt{70}i}{294}$ | 0                        |
|                                   |           | 0                          | 0                           | 0                         | 0                          | $-\frac{3\sqrt{105}i}{98}$ | 0                         | 0                       | 0                        | 0                          | 0                          | 0                           | $-\frac{5\sqrt{42}i}{294}$ | 0                         | $-\frac{5\sqrt{2}i}{42}$ |
|                                   |           | $-\frac{5\sqrt{2}i}{42}$   | 0                           | 0                         | 0                          | 0                          | 0                         | 0                       | $\frac{\sqrt{3}i}{14}$   | 0                          | 0                          | 0                           | 0                          | 0                         | 0                        |
|                                   |           | 0                          | $-\frac{\sqrt{70}i}{294}$   | 0                         | 0                          | 0                          | 0                         | $-\frac{\sqrt{3}i}{14}$ | 0                        | $\frac{2\sqrt{7}i}{49}$    | 0                          | 0                           | 0                          | 0                         | 0                        |
|                                   |           | $-\frac{5\sqrt{42}i}{294}$ | 0                           | $\frac{\sqrt{105}i}{147}$ | 0                          | 0                          | 0                         | 0                       | $-\frac{2\sqrt{7}i}{49}$ | 0                          | $\frac{\sqrt{35}i}{98}$    | 0                           | 0                          | 0                         | 0                        |
|                                   |           | 0                          | $-\frac{11\sqrt{14}i}{294}$ | 0                         | $\frac{\sqrt{7}i}{21}$     | 0                          | 0                         | 0                       | 0                        | $-\frac{\sqrt{35}i}{98}$   | 0                          | 0                           | 0                          | 0                         | 0                        |
|                                   |           | 0                          | 0                           | $-\frac{\sqrt{7}i}{21}$   | 0                          | $\frac{11\sqrt{14}i}{294}$ | 0                         | 0                       | 0                        | 0                          | 0                          | $-\frac{\sqrt{35}i}{98}$    | 0                          | 0                         | 0                        |
|                                   |           | 0                          | 0                           | 0                         | $-\frac{\sqrt{105}i}{147}$ | 0                          | $\frac{5\sqrt{42}i}{294}$ | 0                       | 0                        | 0                          | 0                          | $\frac{\sqrt{35}i}{98}$     | 0                          | $-\frac{2\sqrt{7}i}{49}$  | 0                        |
|                                   |           | 0                          | 0                           | 0                         | 0                          | $\frac{\sqrt{70}i}{294}$   | 0                         | 0                       | 0                        | 0                          | 0                          | 0                           | $\frac{2\sqrt{7}i}{49}$    | 0                         | $-\frac{\sqrt{3}i}{14}$  |
|                                   |           | 0                          | 0                           | 0                         | 0                          | 0                          | $\frac{5\sqrt{2}i}{42}$   | 0                       | 0                        | 0                          | 0                          | 0                           | 0                          | $\frac{\sqrt{3}i}{14}$    | 0                        |
| 888                               | symmetry  | $\sqrt{3}xz$               |                             |                           |                            |                            |                           |                         |                          |                            |                            |                             |                            |                           |                          |

*continued ...*

Table 10

| No.                               | multipole | matrix                    |                            |                           |                           |                            |                           |                        |                         |                           |                            |                            |                           |                         |                        |
|-----------------------------------|-----------|---------------------------|----------------------------|---------------------------|---------------------------|----------------------------|---------------------------|------------------------|-------------------------|---------------------------|----------------------------|----------------------------|---------------------------|-------------------------|------------------------|
| $\mathbb{Q}_{2,1}^{(1,1;a)}(T_2)$ |           | 0                         | $\frac{3\sqrt{105}}{98}$   | 0                         | 0                         | 0                          | 0                         | $\frac{5\sqrt{2}}{42}$ | 0                       | $-\frac{5\sqrt{42}}{294}$ | 0                          | 0                          | 0                         | 0                       | 0                      |
|                                   |           | $\frac{3\sqrt{105}}{98}$  | 0                          | $\frac{3\sqrt{42}}{98}$   | 0                         | 0                          | 0                         | 0                      | $\frac{\sqrt{70}}{294}$ | 0                         | $-\frac{11\sqrt{14}}{294}$ | 0                          | 0                         | 0                       | 0                      |
|                                   |           | 0                         | $\frac{3\sqrt{42}}{98}$    | 0                         | 0                         | 0                          | 0                         | 0                      | 0                       | $-\frac{\sqrt{105}}{147}$ | 0                          | $-\frac{\sqrt{7}}{21}$     | 0                         | 0                       | 0                      |
|                                   |           | 0                         | 0                          | 0                         | 0                         | $-\frac{3\sqrt{42}}{98}$   | 0                         | 0                      | 0                       | 0                         | $-\frac{\sqrt{7}}{21}$     | 0                          | $-\frac{\sqrt{105}}{147}$ | 0                       | 0                      |
|                                   |           | 0                         | 0                          | 0                         | $-\frac{3\sqrt{42}}{98}$  | 0                          | $-\frac{3\sqrt{105}}{98}$ | 0                      | 0                       | 0                         | 0                          | $-\frac{11\sqrt{14}}{294}$ | 0                         | $\frac{\sqrt{70}}{294}$ | 0                      |
|                                   |           | 0                         | 0                          | 0                         | 0                         | $-\frac{3\sqrt{105}}{98}$  | 0                         | 0                      | 0                       | 0                         | 0                          | 0                          | $-\frac{5\sqrt{42}}{294}$ | 0                       | $\frac{5\sqrt{2}}{42}$ |
|                                   |           | $\frac{5\sqrt{2}}{42}$    | 0                          | 0                         | 0                         | 0                          | 0                         | 0                      | $-\frac{\sqrt{3}}{14}$  | 0                         | 0                          | 0                          | 0                         | 0                       | 0                      |
|                                   |           | 0                         | $\frac{\sqrt{70}}{294}$    | 0                         | 0                         | 0                          | 0                         | $-\frac{\sqrt{3}}{14}$ | 0                       | $-\frac{2\sqrt{7}}{49}$   | 0                          | 0                          | 0                         | 0                       | 0                      |
|                                   |           | $-\frac{5\sqrt{42}}{294}$ | 0                          | $-\frac{\sqrt{105}}{147}$ | 0                         | 0                          | 0                         | 0                      | $-\frac{2\sqrt{7}}{49}$ | 0                         | $-\frac{\sqrt{35}}{98}$    | 0                          | 0                         | 0                       | 0                      |
|                                   |           | 0                         | $-\frac{11\sqrt{14}}{294}$ | 0                         | $-\frac{\sqrt{7}}{21}$    | 0                          | 0                         | 0                      | 0                       | $-\frac{\sqrt{35}}{98}$   | 0                          | 0                          | 0                         | 0                       | 0                      |
|                                   |           | 0                         | 0                          | $-\frac{\sqrt{7}}{21}$    | 0                         | $-\frac{11\sqrt{14}}{294}$ | 0                         | 0                      | 0                       | 0                         | 0                          | $\frac{\sqrt{35}}{98}$     | 0                         | 0                       | 0                      |
|                                   |           | 0                         | 0                          | 0                         | $-\frac{\sqrt{105}}{147}$ | 0                          | $-\frac{5\sqrt{42}}{294}$ | 0                      | 0                       | 0                         | 0                          | $\frac{\sqrt{35}}{98}$     | 0                         | $\frac{2\sqrt{7}}{49}$  | 0                      |
|                                   |           | 0                         | 0                          | 0                         | 0                         | $\frac{\sqrt{70}}{294}$    | 0                         | 0                      | 0                       | 0                         | 0                          | 0                          | $\frac{2\sqrt{7}}{49}$    | 0                       | $\frac{\sqrt{3}}{14}$  |
|                                   |           | 0                         | 0                          | 0                         | 0                         | 0                          | $\frac{5\sqrt{2}}{42}$    | 0                      | 0                       | 0                         | 0                          | 0                          | 0                         | $\frac{\sqrt{3}}{14}$   | 0                      |
| 889                               | symmetry  | $\sqrt{3}xy$              |                            |                           |                           |                            |                           |                        |                         |                           |                            |                            |                           |                         |                        |

*continued ...*

Table 10

| No.                               | multipole                  | matrix   |                             |                             |                            |                             |                         |                           |                            |                           |                           |                            |                           |                         |  |
|-----------------------------------|----------------------------|--|-----------------------------|-----------------------------|----------------------------|-----------------------------|-------------------------|---------------------------|----------------------------|---------------------------|---------------------------|----------------------------|---------------------------|-------------------------|--|
| $\mathbb{Q}_{2,2}^{(1,1;a)}(T_2)$ | 0                          | 0  | $-\frac{3\sqrt{210}i}{196}$ | 0                           | 0                          | 0                           | 0                       | 0                         | 0                          | $\frac{\sqrt{70}i}{147}$  | 0                         | 0                          | 0                         | 0                       |  |
|                                   | 0                          | 0  | 0                           | $-\frac{9\sqrt{42}i}{196}$  | 0                          | 0                           | $\frac{\sqrt{10}i}{21}$ | 0                         | 0                          | 0                         | $\frac{4\sqrt{14}i}{147}$ | 0                          | 0                         | 0                       |  |
|                                   | $\frac{3\sqrt{210}i}{196}$ | 0  | 0                           | 0                           | $-\frac{9\sqrt{42}i}{196}$ | 0                           | 0                       | $\frac{4\sqrt{35}i}{147}$ | 0                          | 0                         | 0                         | $\frac{2\sqrt{105}i}{147}$ | 0                         | 0                       |  |
|                                   | 0                          | $\frac{9\sqrt{42}i}{196}$                                  | 0                           | 0                           | 0                          | $-\frac{3\sqrt{210}i}{196}$ | 0                       | 0                         | $\frac{2\sqrt{105}i}{147}$ | 0                         | 0                         | 0                          | $\frac{4\sqrt{35}i}{147}$ | 0                       |  |
|                                   | 0                          | 0  | $\frac{9\sqrt{42}i}{196}$   | 0                           | 0                          | 0                           | 0                       | 0                         | 0                          | $\frac{4\sqrt{14}i}{147}$ | 0                         | 0                          | 0                         | $\frac{\sqrt{10}i}{21}$ |  |
|                                   | 0                          | 0  | 0                           | $\frac{3\sqrt{210}i}{196}$  | 0                          | 0                           | 0                       | 0                         | 0                          | 0                         | $\frac{\sqrt{70}i}{147}$  | 0                          | 0                         | 0                       |  |
|                                   | 0                          | $-\frac{\sqrt{10}i}{21}$                                   | 0                           | 0                           | 0                          | 0                           | 0                       | 0                         | $\frac{i}{14}$             | 0                         | 0                         | 0                          | 0                         | 0                       |  |
|                                   | 0                          | 0  | $-\frac{4\sqrt{35}i}{147}$  | 0                           | 0                          | 0                           | 0                       | 0                         | 0                          | $\frac{\sqrt{105}i}{98}$  | 0                         | 0                          | 0                         | 0                       |  |
|                                   | 0                          | 0  | 0                           | $-\frac{2\sqrt{105}i}{147}$ | 0                          | 0                           | $-\frac{i}{14}$         | 0                         | 0                          | 0                         | $\frac{\sqrt{35}i}{49}$   | 0                          | 0                         | 0                       |  |
|                                   | $-\frac{\sqrt{70}i}{147}$  | 0  | 0                           | 0                           | $-\frac{4\sqrt{14}i}{147}$ | 0                           | 0                       | $-\frac{\sqrt{105}i}{98}$ | 0                          | 0                         | 0                         | $\frac{\sqrt{35}i}{49}$    | 0                         | 0                       |  |
|                                   | 0                          | $-\frac{4\sqrt{14}i}{147}$                                 | 0                           | 0                           | 0                          | $-\frac{\sqrt{70}i}{147}$   | 0                       | 0                         | $-\frac{\sqrt{35}i}{49}$   | 0                         | 0                         | 0                          | $\frac{\sqrt{105}i}{98}$  | 0                       |  |
|                                   | 0                          | 0  | $-\frac{2\sqrt{105}i}{147}$ | 0                           | 0                          | 0                           | 0                       | 0                         | 0                          | $-\frac{\sqrt{35}i}{49}$  | 0                         | 0                          | 0                         | $\frac{i}{14}$          |  |
|                                   | 0                          | 0  | 0                           | $-\frac{4\sqrt{35}i}{147}$  | 0                          | 0                           | 0                       | 0                         | 0                          | 0                         | $-\frac{\sqrt{105}i}{98}$ | 0                          | 0                         | 0                       |  |
|                                   | 0                          | 0  | 0                           | 0                           | $-\frac{\sqrt{10}i}{21}$   | 0                           | 0                       | 0                         | 0                          | 0                         | 0                         | $-\frac{i}{14}$            | 0                         | 0                       |  |
| 890                               | symmetry                   | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$ |                             |                             |                            |                             |                         |                           |                            |                           |                           |                            |                           |                         |  |

*continued ...*

Table 10

| No.                           | multipole | matrix   |                           |                           |                           |                           |                            |                            |                              |                            |                            |                            |                            |                              |                            |
|-------------------------------|-----------|--|---------------------------|---------------------------|---------------------------|---------------------------|----------------------------|----------------------------|------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|------------------------------|----------------------------|
| $\mathbb{Q}_4^{(1,1;a)}(A_1)$ |           | $-\frac{\sqrt{110}}{84}$                                       | 0                         | 0                         | 0                         | $-\frac{5\sqrt{22}}{84}$  | 0                          | 0                          | $\frac{2\sqrt{165}}{231}$    | 0                          | 0                          | 0                          | $\frac{2\sqrt{55}}{231}$   | 0                            | 0                          |
|                               |           | 0  | $\frac{\sqrt{110}}{28}$   | 0                         | 0                         | 0                         | $-\frac{5\sqrt{22}}{84}$   | 0                          | 0                            | $-\frac{8\sqrt{11}}{231}$  | 0                          | 0                          | 0                          | $\frac{4\sqrt{33}}{231}$     | 0                          |
|                               |           | 0  | 0                         | $-\frac{\sqrt{110}}{42}$  | 0                         | 0                         | 0                          | 0                          | 0                            | 0                          | $-\frac{\sqrt{330}}{231}$  | 0                          | 0                          | 0                            | $\frac{\sqrt{462}}{231}$   |
|                               |           | 0  | 0                         | 0                         | $-\frac{\sqrt{110}}{42}$  | 0                         | 0                          | $-\frac{\sqrt{462}}{231}$  | 0                            | 0                          | 0                          | $\frac{\sqrt{330}}{231}$   | 0                          | 0                            | 0                          |
|                               |           | $-\frac{5\sqrt{22}}{84}$                                       | 0                         | 0                         | 0                         | $\frac{\sqrt{110}}{28}$   | 0                          | 0                          | $-\frac{4\sqrt{33}}{231}$    | 0                          | 0                          | 0                          | $\frac{8\sqrt{11}}{231}$   | 0                            | 0                          |
|                               |           | 0  | $-\frac{5\sqrt{22}}{84}$  | 0                         | 0                         | 0                         | $-\frac{\sqrt{110}}{84}$   | 0                          | 0                            | $-\frac{2\sqrt{55}}{231}$  | 0                          | 0                          | 0                          | $-\frac{2\sqrt{165}}{231}$   | 0                          |
|                               |           | 0  | 0                         | 0                         | $-\frac{\sqrt{462}}{231}$ | 0                         | 0                          | $\frac{\sqrt{110}}{264}$   | 0                            | 0                          | 0                          | $\frac{5\sqrt{154}}{1848}$ | 0                          | 0                            | 0                          |
|                               |           | $\frac{2\sqrt{165}}{231}$                                      | 0                         | 0                         | 0                         | $-\frac{4\sqrt{33}}{231}$ | 0                          | 0                          | $-\frac{13\sqrt{110}}{1848}$ | 0                          | 0                          | 0                          | $\frac{5\sqrt{330}}{1848}$ | 0                            | 0                          |
|                               |           | 0  | $-\frac{8\sqrt{11}}{231}$ | 0                         | 0                         | 0                         | $-\frac{2\sqrt{55}}{231}$  | 0                          | 0                            | $-\frac{\sqrt{110}}{616}$  | 0                          | 0                          | 0                          | $\frac{5\sqrt{330}}{1848}$   | 0                          |
|                               |           | 0  | 0                         | $-\frac{\sqrt{330}}{231}$ | 0                         | 0                         | 0                          | 0                          | 0                            | 0                          | $\frac{3\sqrt{110}}{616}$  | 0                          | 0                          | 0                            | $\frac{5\sqrt{154}}{1848}$ |
|                               |           | 0  | 0                         | 0                         | $\frac{\sqrt{330}}{231}$  | 0                         | 0                          | $\frac{5\sqrt{154}}{1848}$ | 0                            | 0                          | 0                          | $\frac{3\sqrt{110}}{616}$  | 0                          | 0                            | 0                          |
|                               |           | $\frac{2\sqrt{55}}{231}$                                       | 0                         | 0                         | 0                         | $\frac{8\sqrt{11}}{231}$  | 0                          | 0                          | $\frac{5\sqrt{330}}{1848}$   | 0                          | 0                          | 0                          | $-\frac{\sqrt{110}}{616}$  | 0                            | 0                          |
|                               |           | 0  | $\frac{4\sqrt{33}}{231}$  | 0                         | 0                         | 0                         | $-\frac{2\sqrt{165}}{231}$ | 0                          | 0                            | $\frac{5\sqrt{330}}{1848}$ | 0                          | 0                          | 0                          | $-\frac{13\sqrt{110}}{1848}$ | 0                          |
|                               |           | 0  | 0                         | $\frac{\sqrt{462}}{231}$  | 0                         | 0                         | 0                          | 0                          | 0                            | 0                          | $\frac{5\sqrt{154}}{1848}$ | 0                          | 0                          | 0                            | $\frac{\sqrt{110}}{264}$   |
| 891                           | symmetry  | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ |                           |                           |                           |                           |                            |                            |                              |                            |                            |                            |                            |                              |                            |

continued ...

Table 10

| No.                             | multipole                   | matrix                                       |                             |                            |                             |                              |                            |                               |                             |                             |                             |                             |                               |                            |  |
|---------------------------------|-----------------------------|--|-----------------------------|----------------------------|-----------------------------|------------------------------|----------------------------|-------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-------------------------------|----------------------------|--|
| $\mathbb{Q}_{4,0}^{(1,1;a)}(E)$ | $-\frac{5\sqrt{154}}{588}$  | 0  | 0                           | 0                          | $\frac{\sqrt{770}}{84}$     | 0                            | 0                          | $\frac{10\sqrt{231}}{1617}$   | 0                           | 0                           | 0                           | $-\frac{2\sqrt{77}}{231}$   | 0                             | 0                          |  |
|                                 | 0                           | $\frac{5\sqrt{154}}{196}$                    | 0                           | 0                          | 0                           | $\frac{\sqrt{770}}{84}$      | 0                          | 0                             | $-\frac{8\sqrt{385}}{1617}$ | 0                           | 0                           | 0                           | $-\frac{4\sqrt{1155}}{1155}$  | 0                          |  |
|                                 | 0                           | 0  | $-\frac{5\sqrt{154}}{294}$  | 0                          | 0                           | 0                            | 0                          | 0                             | 0                           | $-\frac{5\sqrt{462}}{1617}$ | 0                           | 0                           | 0                             | $-\frac{\sqrt{330}}{165}$  |  |
|                                 | 0                           | 0  | 0                           | $-\frac{5\sqrt{154}}{294}$ | 0                           | 0                            | $\frac{\sqrt{330}}{165}$   | 0                             | 0                           | 0                           | $\frac{5\sqrt{462}}{1617}$  | 0                           | 0                             | 0                          |  |
|                                 | $\frac{\sqrt{770}}{84}$     | 0  | 0                           | 0                          | $\frac{5\sqrt{154}}{196}$   | 0                            | 0                          | $\frac{4\sqrt{1155}}{1155}$   | 0                           | 0                           | 0                           | $\frac{8\sqrt{385}}{1617}$  | 0                             | 0                          |  |
|                                 | 0                           | $\frac{\sqrt{770}}{84}$                      | 0                           | 0                          | 0                           | $-\frac{5\sqrt{154}}{588}$   | 0                          | 0                             | $\frac{2\sqrt{77}}{231}$    | 0                           | 0                           | 0                           | $-\frac{10\sqrt{231}}{1617}$  | 0                          |  |
|                                 | 0                           | 0  | 0                           | $\frac{\sqrt{330}}{165}$   | 0                           | 0                            | $\frac{5\sqrt{154}}{1848}$ | 0                             | 0                           | 0                           | $-\frac{\sqrt{110}}{264}$   | 0                           | 0                             | 0                          |  |
|                                 | $\frac{10\sqrt{231}}{1617}$ | 0  | 0                           | 0                          | $\frac{4\sqrt{1155}}{1155}$ | 0                            | 0                          | $-\frac{65\sqrt{154}}{12936}$ | 0                           | 0                           | 0                           | $-\frac{5\sqrt{462}}{1848}$ | 0                             | 0                          |  |
|                                 | 0                           | $-\frac{8\sqrt{385}}{1617}$                  | 0                           | 0                          | 0                           | $\frac{2\sqrt{77}}{231}$     | 0                          | 0                             | $-\frac{5\sqrt{154}}{4312}$ | 0                           | 0                           | 0                           | $-\frac{5\sqrt{462}}{1848}$   | 0                          |  |
|                                 | 0                           | 0  | $-\frac{5\sqrt{462}}{1617}$ | 0                          | 0                           | 0                            | 0                          | 0                             | $\frac{15\sqrt{154}}{4312}$ | 0                           | 0                           | 0                           | 0                             | $-\frac{\sqrt{110}}{264}$  |  |
|                                 | 0                           | 0  | 0                           | $\frac{5\sqrt{462}}{1617}$ | 0                           | 0                            | $-\frac{\sqrt{110}}{264}$  | 0                             | 0                           | 0                           | $\frac{15\sqrt{154}}{4312}$ | 0                           | 0                             | 0                          |  |
|                                 | $-\frac{2\sqrt{77}}{231}$   | 0  | 0                           | 0                          | $\frac{8\sqrt{385}}{1617}$  | 0                            | 0                          | $-\frac{5\sqrt{462}}{1848}$   | 0                           | 0                           | 0                           | $-\frac{5\sqrt{154}}{4312}$ | 0                             | 0                          |  |
|                                 | 0                           | $-\frac{4\sqrt{1155}}{1155}$                 | 0                           | 0                          | 0                           | $-\frac{10\sqrt{231}}{1617}$ | 0                          | 0                             | $-\frac{5\sqrt{462}}{1848}$ | 0                           | 0                           | 0                           | $-\frac{65\sqrt{154}}{12936}$ | 0                          |  |
|                                 | 0                           | 0  | $-\frac{\sqrt{330}}{165}$   | 0                          | 0                           | 0                            | 0                          | 0                             | 0                           | $-\frac{\sqrt{110}}{264}$   | 0                           | 0                           | 0                             | $\frac{5\sqrt{154}}{1848}$ |  |
| 892                             | symmetry                    | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ |                             |                            |                             |                              |                            |                               |                             |                             |                             |                             |                               |                            |  |

continued ...

Table 10

| No.                             | multipole | matrix                            |                            |                              |                               |                            |                           |                           |                             |                               |                             |                           |                              |                             |                           |
|---------------------------------|-----------|-----------------------------------|----------------------------|------------------------------|-------------------------------|----------------------------|---------------------------|---------------------------|-----------------------------|-------------------------------|-----------------------------|---------------------------|------------------------------|-----------------------------|---------------------------|
| $\mathbb{Q}_{4,1}^{(1,1;a)}(E)$ |           | 0                                 | 0                          | $\frac{\sqrt{1155}}{98}$     | 0                             | 0                          | 0                         | 0                         | 0                           | 0                             | $-\frac{4\sqrt{385}}{539}$  | 0                         | 0                            | 0                           | 0                         |
|                                 |           | 0                                 | 0                          | 0                            | $-\frac{5\sqrt{231}}{294}$    | 0                          | 0                         | $\frac{6\sqrt{55}}{385}$  | 0                           | 0                             | 0                           | $-\frac{2\sqrt{77}}{539}$ | 0                            | 0                           | 0                         |
|                                 |           | $\frac{\sqrt{1155}}{98}$          | 0                          | 0                            | 0                             | $-\frac{5\sqrt{231}}{294}$ | 0                         | 0                         | $-\frac{9\sqrt{770}}{2695}$ | 0                             | 0                           | 0                         | $\frac{17\sqrt{2310}}{8085}$ | 0                           | 0                         |
|                                 |           | 0                                 | $-\frac{5\sqrt{231}}{294}$ | 0                            | 0                             | 0                          | $\frac{\sqrt{1155}}{98}$  | 0                         | 0                           | $-\frac{17\sqrt{2310}}{8085}$ | 0                           | 0                         | 0                            | $\frac{9\sqrt{770}}{2695}$  | 0                         |
|                                 |           | 0                                 | 0                          | $-\frac{5\sqrt{231}}{294}$   | 0                             | 0                          | 0                         | 0                         | 0                           | 0                             | $\frac{2\sqrt{77}}{539}$    | 0                         | 0                            | 0                           | $-\frac{6\sqrt{55}}{385}$ |
|                                 |           | 0                                 | 0                          | 0                            | $\frac{\sqrt{1155}}{98}$      | 0                          | 0                         | 0                         | 0                           | 0                             | 0                           | $\frac{4\sqrt{385}}{539}$ | 0                            | 0                           | 0                         |
|                                 |           | 0                                 | $\frac{6\sqrt{55}}{385}$   | 0                            | 0                             | 0                          | 0                         | 0                         | 0                           | $-\frac{5\sqrt{22}}{308}$     | 0                           | 0                         | 0                            | 0                           | 0                         |
|                                 |           | 0                                 | 0                          | $-\frac{9\sqrt{770}}{2695}$  | 0                             | 0                          | 0                         | 0                         | 0                           | 0                             | $-\frac{\sqrt{2310}}{6468}$ | 0                         | 0                            | 0                           | 0                         |
|                                 |           | 0                                 | 0                          | 0                            | $-\frac{17\sqrt{2310}}{8085}$ | 0                          | 0                         | $-\frac{5\sqrt{22}}{308}$ | 0                           | 0                             | 0                           | $\frac{\sqrt{770}}{539}$  | 0                            | 0                           | 0                         |
|                                 |           | $-\frac{4\sqrt{385}}{539}$        | 0                          | 0                            | 0                             | $\frac{2\sqrt{77}}{539}$   | 0                         | 0                         | $-\frac{\sqrt{2310}}{6468}$ | 0                             | 0                           | 0                         | $\frac{\sqrt{770}}{539}$     | 0                           | 0                         |
|                                 |           | 0                                 | $-\frac{2\sqrt{77}}{539}$  | 0                            | 0                             | 0                          | $\frac{4\sqrt{385}}{539}$ | 0                         | 0                           | $\frac{\sqrt{770}}{539}$      | 0                           | 0                         | 0                            | $-\frac{\sqrt{2310}}{6468}$ | 0                         |
|                                 |           | 0                                 | 0                          | $\frac{17\sqrt{2310}}{8085}$ | 0                             | 0                          | 0                         | 0                         | 0                           | 0                             | $\frac{\sqrt{770}}{539}$    | 0                         | 0                            | 0                           | $-\frac{5\sqrt{22}}{308}$ |
|                                 |           | 0                                 | 0                          | 0                            | $\frac{9\sqrt{770}}{2695}$    | 0                          | 0                         | 0                         | 0                           | 0                             | $-\frac{\sqrt{2310}}{6468}$ | 0                         | 0                            | 0                           | 0                         |
|                                 |           | 0                                 | 0                          | 0                            | 0                             | $-\frac{6\sqrt{55}}{385}$  | 0                         | 0                         | 0                           | 0                             | 0                           | 0                         | $-\frac{5\sqrt{22}}{308}$    | 0                           | 0                         |
| 893                             | symmetry  | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$ |                            |                              |                               |                            |                           |                           |                             |                               |                             |                           |                              |                             |                           |

*continued ...*

Table 10

| No.                               | multipole | matrix                             |                            |                              |                             |                             |                           |                              |                             |                            |                             |                             |                             |                             |                              |
|-----------------------------------|-----------|------------------------------------|----------------------------|------------------------------|-----------------------------|-----------------------------|---------------------------|------------------------------|-----------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|------------------------------|
| $\mathbb{Q}_{4,0}^{(1,1;a)}(T_1)$ |           | 0                                  | $-\frac{\sqrt{330}i}{84}$  | 0                            | $-\frac{\sqrt{165}i}{84}$   | 0                           | 0                         | $\frac{\sqrt{77}i}{154}$     | 0                           | $\frac{5\sqrt{33}i}{231}$  | 0                           | $\frac{\sqrt{55}i}{154}$    | 0                           | 0                           | 0                            |
|                                   |           | $\frac{\sqrt{330}i}{84}$           | 0                          | $\frac{5\sqrt{33}i}{84}$     | 0                           | 0                           | 0                         | 0                            | $-\frac{13\sqrt{55}i}{770}$ | 0                          | $-\frac{\sqrt{11}i}{77}$    | 0                           | $\frac{\sqrt{165}i}{330}$   | 0                           | 0                            |
|                                   |           | 0                                  | $-\frac{5\sqrt{33}i}{84}$  | 0                            | 0                           | 0                           | $\frac{\sqrt{165}i}{84}$  | $\frac{3\sqrt{770}i}{1540}$  | 0                           | $\frac{\sqrt{330}i}{4620}$ | 0                           | $-\frac{\sqrt{22}i}{44}$    | 0                           | $-\frac{\sqrt{110}i}{1540}$ | 0                            |
|                                   |           | $\frac{\sqrt{165}i}{84}$           | 0                          | 0                            | 0                           | $-\frac{5\sqrt{33}i}{84}$   | 0                         | 0                            | $\frac{\sqrt{110}i}{1540}$  | 0                          | $\frac{\sqrt{22}i}{44}$     | 0                           | $-\frac{\sqrt{330}i}{4620}$ | 0                           | $-\frac{3\sqrt{770}i}{1540}$ |
|                                   |           | 0                                  | 0                          | 0                            | $\frac{5\sqrt{33}i}{84}$    | 0                           | $\frac{\sqrt{330}i}{84}$  | 0                            | 0                           | $-\frac{\sqrt{165}i}{330}$ | 0                           | $\frac{\sqrt{11}i}{77}$     | 0                           | $\frac{13\sqrt{55}i}{770}$  | 0                            |
|                                   |           | 0                                  | 0                          | $-\frac{\sqrt{165}i}{84}$    | 0                           | $-\frac{\sqrt{330}i}{84}$   | 0                         | 0                            | 0                           | 0                          | $-\frac{\sqrt{55}i}{154}$   | 0                           | $-\frac{5\sqrt{33}i}{231}$  | 0                           | $-\frac{\sqrt{77}i}{154}$    |
|                                   |           | $-\frac{\sqrt{77}i}{154}$          | 0                          | $-\frac{3\sqrt{770}i}{1540}$ | 0                           | 0                           | 0                         | 0                            | $\frac{5\sqrt{462}i}{1848}$ | 0                          | $\frac{\sqrt{2310}i}{1848}$ | 0                           | 0                           | 0                           | 0                            |
|                                   |           | 0                                  | $\frac{13\sqrt{55}i}{770}$ | 0                            | $-\frac{\sqrt{110}i}{1540}$ | 0                           | 0                         | $-\frac{5\sqrt{462}i}{1848}$ | 0                           | $-\frac{5\sqrt{22}i}{616}$ | 0                           | $\frac{\sqrt{330}i}{924}$   | 0                           | 0                           | 0                            |
|                                   |           | $-\frac{5\sqrt{33}i}{231}$         | 0                          | $-\frac{\sqrt{330}i}{4620}$  | 0                           | $\frac{\sqrt{165}i}{330}$   | 0                         | 0                            | $\frac{5\sqrt{22}i}{616}$   | 0                          | $-\frac{3\sqrt{110}i}{616}$ | 0                           | 0                           | 0                           | 0                            |
|                                   |           | 0                                  | $\frac{\sqrt{11}i}{77}$    | 0                            | $-\frac{\sqrt{22}i}{44}$    | 0                           | $\frac{\sqrt{55}i}{154}$  | $-\frac{\sqrt{2310}i}{1848}$ | 0                           | $\frac{3\sqrt{110}i}{616}$ | 0                           | 0                           | 0                           | $-\frac{\sqrt{330}i}{924}$  | 0                            |
|                                   |           | $-\frac{\sqrt{55}i}{154}$          | 0                          | $\frac{\sqrt{22}i}{44}$      | 0                           | $-\frac{\sqrt{11}i}{77}$    | 0                         | 0                            | $-\frac{\sqrt{330}i}{924}$  | 0                          | 0                           | 0                           | $\frac{3\sqrt{110}i}{616}$  | 0                           | $-\frac{\sqrt{2310}i}{1848}$ |
|                                   |           | 0                                  | $-\frac{\sqrt{165}i}{330}$ | 0                            | $\frac{\sqrt{330}i}{4620}$  | 0                           | $\frac{5\sqrt{33}i}{231}$ | 0                            | 0                           | 0                          | 0                           | $-\frac{3\sqrt{110}i}{616}$ | 0                           | $\frac{5\sqrt{22}i}{616}$   | 0                            |
|                                   |           | 0                                  | 0                          | $\frac{\sqrt{110}i}{1540}$   | 0                           | $-\frac{13\sqrt{55}i}{770}$ | 0                         | 0                            | 0                           | 0                          | $\frac{\sqrt{330}i}{924}$   | 0                           | $-\frac{5\sqrt{22}i}{616}$  | 0                           | $-\frac{5\sqrt{462}i}{1848}$ |
|                                   |           | 0                                  | 0                          | 0                            | $\frac{3\sqrt{770}i}{1540}$ | 0                           | $\frac{\sqrt{77}i}{154}$  | 0                            | 0                           | 0                          | 0                           | $\frac{\sqrt{2310}i}{1848}$ | 0                           | $\frac{5\sqrt{462}i}{1848}$ | 0                            |
| 894                               | symmetry  | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ |                            |                              |                             |                             |                           |                              |                             |                            |                             |                             |                             |                             |                              |

continued ...



Table 10

| No.                               | multipole | matrix                            |                           |                            |                            |                           |                          |                             |                            |                            |                             |                            |                            |                             |                             |
|-----------------------------------|-----------|-----------------------------------|---------------------------|----------------------------|----------------------------|---------------------------|--------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|
| $\mathbb{Q}_{4,1}^{(1,1;a)}(T_1)$ |           | 0                                 | $-\frac{\sqrt{330}}{84}$  | 0                          | $\frac{\sqrt{165}}{84}$    | 0                         | 0                        | $-\frac{\sqrt{77}}{154}$    | 0                          | $\frac{5\sqrt{33}}{231}$   | 0                           | $-\frac{\sqrt{55}}{154}$   | 0                          | 0                           | 0                           |
|                                   |           | $-\frac{\sqrt{330}}{84}$          | 0                         | $\frac{5\sqrt{33}}{84}$    | 0                          | 0                         | 0                        | 0                           | $\frac{13\sqrt{55}}{770}$  | 0                          | $-\frac{\sqrt{11}}{77}$     | 0                          | $-\frac{\sqrt{165}}{330}$  | 0                           | 0                           |
|                                   |           | 0                                 | $\frac{5\sqrt{33}}{84}$   | 0                          | 0                          | 0                         | $-\frac{\sqrt{165}}{84}$ | $\frac{3\sqrt{770}}{1540}$  | 0                          | $-\frac{\sqrt{330}}{4620}$ | 0                           | $-\frac{\sqrt{22}}{44}$    | 0                          | $\frac{\sqrt{110}}{1540}$   | 0                           |
|                                   |           | $\frac{\sqrt{165}}{84}$           | 0                         | 0                          | 0                          | $-\frac{5\sqrt{33}}{84}$  | 0                        | 0                           | $\frac{\sqrt{110}}{1540}$  | 0                          | $-\frac{\sqrt{22}}{44}$     | 0                          | $-\frac{\sqrt{330}}{4620}$ | 0                           | $\frac{3\sqrt{770}}{1540}$  |
|                                   |           | 0                                 | 0                         | 0                          | $-\frac{5\sqrt{33}}{84}$   | 0                         | $\frac{\sqrt{330}}{84}$  | 0                           | 0                          | $-\frac{\sqrt{165}}{330}$  | 0                           | $-\frac{\sqrt{11}}{77}$    | 0                          | $\frac{13\sqrt{55}}{770}$   | 0                           |
|                                   |           | 0                                 | 0                         | $-\frac{\sqrt{165}}{84}$   | 0                          | $\frac{\sqrt{330}}{84}$   | 0                        | 0                           | 0                          | $-\frac{\sqrt{55}}{154}$   | 0                           | $\frac{5\sqrt{33}}{231}$   | 0                          | $-\frac{\sqrt{77}}{154}$    | 0                           |
|                                   |           | $-\frac{\sqrt{77}}{154}$          | 0                         | $\frac{3\sqrt{770}}{1540}$ | 0                          | 0                         | 0                        | 0                           | $\frac{5\sqrt{462}}{1848}$ | 0                          | $-\frac{\sqrt{2310}}{1848}$ | 0                          | 0                          | 0                           | 0                           |
|                                   |           | 0                                 | $\frac{13\sqrt{55}}{770}$ | 0                          | $\frac{\sqrt{110}}{1540}$  | 0                         | 0                        | 0                           | $\frac{5\sqrt{462}}{1848}$ | 0                          | $-\frac{5\sqrt{22}}{616}$   | 0                          | $-\frac{\sqrt{330}}{924}$  | 0                           | 0                           |
|                                   |           | $\frac{5\sqrt{33}}{231}$          | 0                         | $-\frac{\sqrt{330}}{4620}$ | 0                          | $-\frac{\sqrt{165}}{330}$ | 0                        | 0                           | $-\frac{5\sqrt{22}}{616}$  | 0                          | $-\frac{3\sqrt{110}}{616}$  | 0                          | 0                          | 0                           | 0                           |
|                                   |           | 0                                 | $-\frac{\sqrt{11}}{77}$   | 0                          | $-\frac{\sqrt{22}}{44}$    | 0                         | $-\frac{\sqrt{55}}{154}$ | $-\frac{\sqrt{2310}}{1848}$ | 0                          | $-\frac{3\sqrt{110}}{616}$ | 0                           | 0                          | 0                          | $\frac{\sqrt{330}}{924}$    | 0                           |
|                                   |           | $-\frac{\sqrt{55}}{154}$          | 0                         | $-\frac{\sqrt{22}}{44}$    | 0                          | $-\frac{\sqrt{11}}{77}$   | 0                        | 0                           | $-\frac{\sqrt{330}}{924}$  | 0                          | 0                           | 0                          | $\frac{3\sqrt{110}}{616}$  | 0                           | $\frac{\sqrt{2310}}{1848}$  |
|                                   |           | 0                                 | $-\frac{\sqrt{165}}{330}$ | 0                          | $-\frac{\sqrt{330}}{4620}$ | 0                         | $\frac{5\sqrt{33}}{231}$ | 0                           | 0                          | 0                          | 0                           | $\frac{3\sqrt{110}}{616}$  | 0                          | $\frac{5\sqrt{22}}{616}$    | 0                           |
|                                   |           | 0                                 | 0                         | $\frac{\sqrt{110}}{1540}$  | 0                          | $\frac{13\sqrt{55}}{770}$ | 0                        | 0                           | 0                          | 0                          | $\frac{\sqrt{330}}{924}$    | 0                          | $\frac{5\sqrt{22}}{616}$   | 0                           | $-\frac{5\sqrt{462}}{1848}$ |
|                                   |           | 0                                 | 0                         | 0                          | $\frac{3\sqrt{770}}{1540}$ | 0                         | $-\frac{\sqrt{77}}{154}$ | 0                           | 0                          | 0                          | 0                           | $\frac{\sqrt{2310}}{1848}$ | 0                          | $-\frac{5\sqrt{462}}{1848}$ | 0                           |
| 895                               | symmetry  | $\frac{\sqrt{35xy(x-y)}(x+y)}{2}$ |                           |                            |                            |                           |                          |                             |                            |                            |                             |                            |                            |                             |                             |

*continued ...*

Table 10

| No.                               | multipole                 | matrix                               |                            |                            |                           |                           |                             |                            |                            |                             |                            |                            |                             |                             |  |
|-----------------------------------|---------------------------|--------------------------------------|----------------------------|----------------------------|---------------------------|---------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|--|
| $\mathbb{Q}_{4,2}^{(1,1;a)}(T_1)$ | 0                         | 0                                    | 0                          | 0                          | $\frac{\sqrt{330i}}{42}$  | 0                         | 0                           | 0                          | 0                          | 0                           | 0                          | $-\frac{4\sqrt{33i}}{231}$ | 0                           | 0                           |  |
|                                   | 0                         | 0                                    | 0                          | 0                          | 0                         | $\frac{\sqrt{330i}}{42}$  | 0                           | 0                          | 0                          | 0                           | 0                          | 0                          | $-\frac{8\sqrt{55i}}{385}$  | 0                           |  |
|                                   | 0                         | 0                                    | 0                          | 0                          | 0                         | 0                         | 0                           | 0                          | 0                          | 0                           | 0                          | 0                          | 0                           | $-\frac{2\sqrt{770i}}{385}$ |  |
|                                   | 0                         | 0                                    | 0                          | 0                          | 0                         | 0                         | $-\frac{2\sqrt{770i}}{385}$ | 0                          | 0                          | 0                           | 0                          | 0                          | 0                           | 0                           |  |
|                                   | $-\frac{\sqrt{330i}}{42}$ | 0                                    | 0                          | 0                          | 0                         | 0                         | 0                           | $-\frac{8\sqrt{55i}}{385}$ | 0                          | 0                           | 0                          | 0                          | 0                           | 0                           |  |
|                                   | 0                         | $-\frac{\sqrt{330i}}{42}$            | 0                          | 0                          | 0                         | 0                         | 0                           | 0                          | $-\frac{4\sqrt{33i}}{231}$ | 0                           | 0                          | 0                          | 0                           | 0                           |  |
|                                   | 0                         | 0                                    | 0                          | $\frac{2\sqrt{770i}}{385}$ | 0                         | 0                         | 0                           | 0                          | 0                          | $-\frac{\sqrt{2310i}}{924}$ | 0                          | 0                          | 0                           | 0                           |  |
|                                   | 0                         | 0                                    | 0                          | 0                          | $\frac{8\sqrt{55i}}{385}$ | 0                         | 0                           | 0                          | 0                          | 0                           | $-\frac{5\sqrt{22i}}{308}$ | 0                          | 0                           | 0                           |  |
|                                   | 0                         | 0                                    | 0                          | 0                          | 0                         | $\frac{4\sqrt{33i}}{231}$ | 0                           | 0                          | 0                          | 0                           | 0                          | $-\frac{5\sqrt{22i}}{308}$ | 0                           | 0                           |  |
|                                   | 0                         | 0                                    | 0                          | 0                          | 0                         | 0                         | 0                           | 0                          | 0                          | 0                           | 0                          | 0                          | $-\frac{\sqrt{2310i}}{924}$ | 0                           |  |
|                                   | 0                         | 0                                    | 0                          | 0                          | 0                         | 0                         | $\frac{\sqrt{2310i}}{924}$  | 0                          | 0                          | 0                           | 0                          | 0                          | 0                           | 0                           |  |
|                                   | $\frac{4\sqrt{33i}}{231}$ | 0                                    | 0                          | 0                          | 0                         | 0                         | 0                           | $\frac{5\sqrt{22i}}{308}$  | 0                          | 0                           | 0                          | 0                          | 0                           | 0                           |  |
|                                   | 0                         | $\frac{8\sqrt{55i}}{385}$            | 0                          | 0                          | 0                         | 0                         | 0                           | 0                          | $\frac{5\sqrt{22i}}{308}$  | 0                           | 0                          | 0                          | 0                           | 0                           |  |
|                                   | 0                         | 0                                    | $\frac{2\sqrt{770i}}{385}$ | 0                          | 0                         | 0                         | 0                           | 0                          | 0                          | $\frac{\sqrt{2310i}}{924}$  | 0                          | 0                          | 0                           | 0                           |  |
| 896                               | symmetry                  | $\frac{\sqrt{5}yz(6x^2-y^2-z^2)}{2}$ |                            |                            |                           |                           |                             |                            |                            |                             |                            |                            |                             |                             |  |

*continued ...*

Table 10

| No.                               | multipole | matrix                                |                              |                               |                              |                               |                             |                             |                               |                              |                              |                              |                               |                              |                             |
|-----------------------------------|-----------|---------------------------------------|------------------------------|-------------------------------|------------------------------|-------------------------------|-----------------------------|-----------------------------|-------------------------------|------------------------------|------------------------------|------------------------------|-------------------------------|------------------------------|-----------------------------|
| $\mathbb{Q}_{4,0}^{(1,1;a)}(T_2)$ |           | 0                                     | $-\frac{\sqrt{2310}i}{588}$  | 0                             | $\frac{\sqrt{1155}i}{84}$    | 0                             | 0                           | $\frac{\sqrt{11}i}{154}$    | 0                             | $\frac{5\sqrt{231}i}{1617}$  | 0                            | $-\frac{\sqrt{385}i}{154}$   | 0                             | 0                            | 0                           |
|                                   |           | $\frac{\sqrt{2310}i}{588}$            | 0                            | $\frac{5\sqrt{231}i}{588}$    | 0                            | 0                             | 0                           | 0                           | $-\frac{13\sqrt{385}i}{5390}$ | 0                            | $-\frac{\sqrt{77}i}{539}$    | 0                            | $-\frac{\sqrt{1155}i}{330}$   | 0                            | 0                           |
|                                   |           | 0                                     | $-\frac{5\sqrt{231}i}{588}$  | 0                             | 0                            | 0                             | $-\frac{\sqrt{1155}i}{84}$  | $-\frac{3\sqrt{110}i}{220}$ | 0                             | $\frac{\sqrt{2310}i}{32340}$ | 0                            | $-\frac{\sqrt{154}i}{308}$   | 0                             | $\frac{\sqrt{770}i}{1540}$   | 0                           |
|                                   |           | $-\frac{\sqrt{1155}i}{84}$            | 0                            | 0                             | 0                            | $-\frac{5\sqrt{231}i}{588}$   | 0                           | 0                           | $-\frac{\sqrt{770}i}{1540}$   | 0                            | $\frac{\sqrt{154}i}{308}$    | 0                            | $-\frac{\sqrt{2310}i}{32340}$ | 0                            | $\frac{3\sqrt{110}i}{220}$  |
|                                   |           | 0                                     | 0                            | 0                             | $\frac{5\sqrt{231}i}{588}$   | 0                             | $\frac{\sqrt{2310}i}{588}$  | 0                           | 0                             | $\frac{\sqrt{1155}i}{330}$   | 0                            | $\frac{\sqrt{77}i}{539}$     | 0                             | $\frac{13\sqrt{385}i}{5390}$ | 0                           |
|                                   |           | 0                                     | 0                            | $\frac{\sqrt{1155}i}{84}$     | 0                            | $-\frac{\sqrt{2310}i}{588}$   | 0                           | 0                           | 0                             | 0                            | $\frac{\sqrt{385}i}{154}$    | 0                            | $-\frac{5\sqrt{231}i}{1617}$  | 0                            | $-\frac{\sqrt{11}i}{154}$   |
|                                   |           | $-\frac{\sqrt{11}i}{154}$             | 0                            | $\frac{3\sqrt{110}i}{220}$    | 0                            | 0                             | 0                           | 0                           | $\frac{5\sqrt{66}i}{1848}$    | 0                            | $-\frac{\sqrt{330}i}{264}$   | 0                            | 0                             | 0                            | 0                           |
|                                   |           | 0                                     | $\frac{13\sqrt{385}i}{5390}$ | 0                             | $\frac{\sqrt{770}i}{1540}$   | 0                             | 0                           | $-\frac{5\sqrt{66}i}{1848}$ | 0                             | $-\frac{5\sqrt{154}i}{4312}$ | 0                            | $-\frac{\sqrt{2310}i}{924}$  | 0                             | 0                            | 0                           |
|                                   |           | $-\frac{5\sqrt{231}i}{1617}$          | 0                            | $-\frac{\sqrt{2310}i}{32340}$ | 0                            | $-\frac{\sqrt{1155}i}{330}$   | 0                           | 0                           | $\frac{5\sqrt{154}i}{4312}$   | 0                            | $-\frac{3\sqrt{770}i}{4312}$ | 0                            | 0                             | 0                            | 0                           |
|                                   |           | 0                                     | $\frac{\sqrt{77}i}{539}$     | 0                             | $-\frac{\sqrt{154}i}{308}$   | 0                             | $-\frac{\sqrt{385}i}{154}$  | $\frac{\sqrt{330}i}{264}$   | 0                             | $\frac{3\sqrt{770}i}{4312}$  | 0                            | 0                            | 0                             | $\frac{\sqrt{2310}i}{924}$   | 0                           |
|                                   |           | $\frac{\sqrt{385}i}{154}$             | 0                            | $\frac{\sqrt{154}i}{308}$     | 0                            | $-\frac{\sqrt{77}i}{539}$     | 0                           | 0                           | $\frac{\sqrt{2310}i}{924}$    | 0                            | 0                            | 0                            | $\frac{3\sqrt{770}i}{4312}$   | 0                            | $\frac{\sqrt{330}i}{264}$   |
|                                   |           | 0                                     | $\frac{\sqrt{1155}i}{330}$   | 0                             | $\frac{\sqrt{2310}i}{32340}$ | 0                             | $\frac{5\sqrt{231}i}{1617}$ | 0                           | 0                             | 0                            | 0                            | $-\frac{3\sqrt{770}i}{4312}$ | 0                             | $\frac{5\sqrt{154}i}{4312}$  | 0                           |
|                                   |           | 0                                     | 0                            | $-\frac{\sqrt{770}i}{1540}$   | 0                            | $-\frac{13\sqrt{385}i}{5390}$ | 0                           | 0                           | 0                             | 0                            | $-\frac{\sqrt{2310}i}{924}$  | 0                            | $-\frac{5\sqrt{154}i}{4312}$  | 0                            | $-\frac{5\sqrt{66}i}{1848}$ |
|                                   |           | 0                                     | 0                            | 0                             | $-\frac{3\sqrt{110}i}{220}$  | 0                             | $\frac{\sqrt{11}i}{154}$    | 0                           | 0                             | 0                            | 0                            | $-\frac{\sqrt{330}i}{264}$   | 0                             | $\frac{5\sqrt{66}i}{1848}$   | 0                           |
| 897                               | symmetry  | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ |                              |                               |                              |                               |                             |                             |                               |                              |                              |                              |                               |                              |                             |

continued ...

Table 10

| No.                               | multipole | matrix                                |                              |                             |                             |                              |                             |                            |                              |                             |                            |                             |                             |                              |                           |
|-----------------------------------|-----------|---------------------------------------|------------------------------|-----------------------------|-----------------------------|------------------------------|-----------------------------|----------------------------|------------------------------|-----------------------------|----------------------------|-----------------------------|-----------------------------|------------------------------|---------------------------|
| $\mathbb{Q}_{4,1}^{(1,1;a)}(T_2)$ |           | 0                                     | $\frac{\sqrt{2310}}{588}$    | 0                           | $\frac{\sqrt{1155}}{84}$    | 0                            | 0                           | $\frac{\sqrt{11}}{154}$    | 0                            | $-\frac{5\sqrt{231}}{1617}$ | 0                          | $-\frac{\sqrt{385}}{154}$   | 0                           | 0                            | 0                         |
|                                   |           | $\frac{\sqrt{2310}}{588}$             | 0                            | $-\frac{5\sqrt{231}}{588}$  | 0                           | 0                            | 0                           | 0                          | $-\frac{13\sqrt{385}}{5390}$ | 0                           | $\frac{\sqrt{77}}{539}$    | 0                           | $-\frac{\sqrt{1155}}{330}$  | 0                            | 0                         |
|                                   |           | 0                                     | $-\frac{5\sqrt{231}}{588}$   | 0                           | 0                           | 0                            | $-\frac{\sqrt{1155}}{84}$   | $\frac{3\sqrt{110}}{220}$  | 0                            | $\frac{\sqrt{2310}}{32340}$ | 0                          | $\frac{\sqrt{154}}{308}$    | 0                           | $\frac{\sqrt{770}}{1540}$    | 0                         |
|                                   |           | $\frac{\sqrt{1155}}{84}$              | 0                            | 0                           | 0                           | $\frac{5\sqrt{231}}{588}$    | 0                           | 0                          | $\frac{\sqrt{770}}{1540}$    | 0                           | $\frac{\sqrt{154}}{308}$   | 0                           | $\frac{\sqrt{2310}}{32340}$ | 0                            | $\frac{3\sqrt{110}}{220}$ |
|                                   |           | 0                                     | 0                            | 0                           | $\frac{5\sqrt{231}}{588}$   | 0                            | $-\frac{\sqrt{2310}}{588}$  | 0                          | 0                            | $-\frac{\sqrt{1155}}{330}$  | 0                          | $\frac{\sqrt{77}}{539}$     | 0                           | $-\frac{13\sqrt{385}}{5390}$ | 0                         |
|                                   |           | 0                                     | 0                            | $-\frac{\sqrt{1155}}{84}$   | 0                           | $-\frac{\sqrt{2310}}{588}$   | 0                           | 0                          | 0                            | $-\frac{\sqrt{385}}{154}$   | 0                          | $-\frac{5\sqrt{231}}{1617}$ | 0                           | $\frac{\sqrt{11}}{154}$      | 0                         |
|                                   |           | $\frac{\sqrt{11}}{154}$               | 0                            | $\frac{3\sqrt{110}}{220}$   | 0                           | 0                            | 0                           | 0                          | $-\frac{5\sqrt{66}}{1848}$   | 0                           | $-\frac{\sqrt{330}}{264}$  | 0                           | 0                           | 0                            | 0                         |
|                                   |           | 0                                     | $-\frac{13\sqrt{385}}{5390}$ | 0                           | $\frac{\sqrt{770}}{1540}$   | 0                            | 0                           | $-\frac{5\sqrt{66}}{1848}$ | 0                            | $\frac{5\sqrt{154}}{4312}$  | 0                          | $-\frac{\sqrt{2310}}{924}$  | 0                           | 0                            | 0                         |
|                                   |           | $-\frac{5\sqrt{231}}{1617}$           | 0                            | $\frac{\sqrt{2310}}{32340}$ | 0                           | $-\frac{\sqrt{1155}}{330}$   | 0                           | 0                          | $\frac{5\sqrt{154}}{4312}$   | 0                           | $\frac{3\sqrt{770}}{4312}$ | 0                           | 0                           | 0                            | 0                         |
|                                   |           | 0                                     | $\frac{\sqrt{77}}{539}$      | 0                           | $\frac{\sqrt{154}}{308}$    | 0                            | $-\frac{\sqrt{385}}{154}$   | $-\frac{\sqrt{330}}{264}$  | 0                            | $\frac{3\sqrt{770}}{4312}$  | 0                          | 0                           | 0                           | $\frac{\sqrt{2310}}{924}$    | 0                         |
|                                   |           | $-\frac{\sqrt{385}}{154}$             | 0                            | $\frac{\sqrt{154}}{308}$    | 0                           | $\frac{\sqrt{77}}{539}$      | 0                           | 0                          | $-\frac{\sqrt{2310}}{924}$   | 0                           | 0                          | 0                           | $-\frac{3\sqrt{770}}{4312}$ | 0                            | $\frac{\sqrt{330}}{264}$  |
|                                   |           | 0                                     | $-\frac{\sqrt{1155}}{330}$   | 0                           | $\frac{\sqrt{2310}}{32340}$ | 0                            | $-\frac{5\sqrt{231}}{1617}$ | 0                          | 0                            | 0                           | 0                          | $-\frac{3\sqrt{770}}{4312}$ | 0                           | $-\frac{5\sqrt{154}}{4312}$  | 0                         |
|                                   |           | 0                                     | 0                            | $\frac{\sqrt{770}}{1540}$   | 0                           | $-\frac{13\sqrt{385}}{5390}$ | 0                           | 0                          | 0                            | 0                           | $\frac{\sqrt{2310}}{924}$  | 0                           | $-\frac{5\sqrt{154}}{4312}$ | 0                            | $\frac{5\sqrt{66}}{1848}$ |
|                                   |           | 0                                     | 0                            | 0                           | $\frac{3\sqrt{110}}{220}$   | 0                            | $\frac{\sqrt{11}}{154}$     | 0                          | 0                            | 0                           | 0                          | $\frac{\sqrt{330}}{264}$    | 0                           | $\frac{5\sqrt{66}}{1848}$    | 0                         |
| 898                               | symmetry  | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ |                              |                             |                             |                              |                             |                            |                              |                             |                            |                             |                             |                              |                           |

continued ...

Table 10

| No.                               | multipole                  | matrix                     |                                |                                |                             |                           |                            |                             |                               |                              |                             |                               |                             |                              |  |
|-----------------------------------|----------------------------|----------------------------|--------------------------------|--------------------------------|-----------------------------|---------------------------|----------------------------|-----------------------------|-------------------------------|------------------------------|-----------------------------|-------------------------------|-----------------------------|------------------------------|--|
| $\mathbb{Q}_{4,2}^{(1,1;a)}(T_2)$ | 0                          | 0                          | $\frac{\sqrt{1155}i}{98}$      | 0                              | 0                           | 0                         | 0                          | 0                           | 0                             | $-\frac{4\sqrt{385}i}{539}$  | 0                           | 0                             | 0                           | 0                            |  |
|                                   | 0                          | 0                          | 0                              | $-\frac{5\sqrt{231}i}{294}$    | 0                           | 0                         | $-\frac{6\sqrt{55}i}{385}$ | 0                           | 0                             | 0                            | $-\frac{2\sqrt{77}i}{539}$  | 0                             | 0                           | 0                            |  |
|                                   | $-\frac{\sqrt{1155}i}{98}$ | 0                          | 0                              | 0                              | $-\frac{5\sqrt{231}i}{294}$ | 0                         | 0                          | $\frac{9\sqrt{770}i}{2695}$ | 0                             | 0                            | 0                           | $\frac{17\sqrt{2310}i}{8085}$ | 0                           | 0                            |  |
|                                   | 0                          | $\frac{5\sqrt{231}i}{294}$ | 0                              | 0                              | 0                           | $\frac{\sqrt{1155}i}{98}$ | 0                          | 0                           | $\frac{17\sqrt{2310}i}{8085}$ | 0                            | 0                           | 0                             | $\frac{9\sqrt{770}i}{2695}$ | 0                            |  |
|                                   | 0                          | 0                          | $\frac{5\sqrt{231}i}{294}$     | 0                              | 0                           | 0                         | 0                          | 0                           | 0                             | $-\frac{2\sqrt{77}i}{539}$   | 0                           | 0                             | 0                           | $-\frac{6\sqrt{55}i}{385}$   |  |
|                                   | 0                          | 0                          | 0                              | $-\frac{\sqrt{1155}i}{98}$     | 0                           | 0                         | 0                          | 0                           | 0                             | 0                            | $-\frac{4\sqrt{385}i}{539}$ | 0                             | 0                           | 0                            |  |
|                                   | 0                          | $\frac{6\sqrt{55}i}{385}$  | 0                              | 0                              | 0                           | 0                         | 0                          | 0                           | $-\frac{5\sqrt{22}i}{308}$    | 0                            | 0                           | 0                             | 0                           | 0                            |  |
|                                   | 0                          | 0                          | $-\frac{9\sqrt{770}i}{2695}$   | 0                              | 0                           | 0                         | 0                          | 0                           | 0                             | $-\frac{\sqrt{2310}i}{6468}$ | 0                           | 0                             | 0                           | 0                            |  |
|                                   | 0                          | 0                          | 0                              | $-\frac{17\sqrt{2310}i}{8085}$ | 0                           | 0                         | $\frac{5\sqrt{22}i}{308}$  | 0                           | 0                             | 0                            | $\frac{\sqrt{770}i}{539}$   | 0                             | 0                           | 0                            |  |
|                                   | $\frac{4\sqrt{385}i}{539}$ | 0                          | 0                              | 0                              | 0                           | $\frac{2\sqrt{77}i}{539}$ | 0                          | 0                           | $\frac{\sqrt{2310}i}{6468}$   | 0                            | 0                           | 0                             | $\frac{\sqrt{770}i}{539}$   | 0                            |  |
|                                   | 0                          | $\frac{2\sqrt{77}i}{539}$  | 0                              | 0                              | 0                           | 0                         | $\frac{4\sqrt{385}i}{539}$ | 0                           | 0                             | $-\frac{\sqrt{770}i}{539}$   | 0                           | 0                             | 0                           | $-\frac{\sqrt{2310}i}{6468}$ |  |
|                                   | 0                          | 0                          | $-\frac{17\sqrt{2310}i}{8085}$ | 0                              | 0                           | 0                         | 0                          | 0                           | 0                             | $-\frac{\sqrt{770}i}{539}$   | 0                           | 0                             | 0                           | $-\frac{5\sqrt{22}i}{308}$   |  |
|                                   | 0                          | 0                          | 0                              | $-\frac{9\sqrt{770}i}{2695}$   | 0                           | 0                         | 0                          | 0                           | 0                             | 0                            | $\frac{\sqrt{2310}i}{6468}$ | 0                             | 0                           | 0                            |  |
|                                   | 0                          | 0                          | 0                              | 0                              | 0                           | $\frac{6\sqrt{55}i}{385}$ | 0                          | 0                           | 0                             | 0                            | 0                           | $\frac{5\sqrt{22}i}{308}$     | 0                           | 0                            |  |
| 899                               | symmetry                   | $x$                        |                                |                                |                             |                           |                            |                             |                               |                              |                             |                               |                             |                              |  |

*continued ...*

Table 10

| No.                               | multipole | matrix                  |                           |                          |                          |                          |                          |                       |                          |                          |                          |                          |                          |                           |                        |
|-----------------------------------|-----------|-------------------------|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-----------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------|------------------------|
| $\mathbb{G}_{1,0}^{(1,0;a)}(T_1)$ |           | 0                       | 0                         | 0                        | 0                        | 0                        | 0                        | $\frac{\sqrt{6}i}{8}$ | 0                        | $-\frac{\sqrt{14}i}{56}$ | 0                        | 0                        | 0                        | 0                         | 0                      |
|                                   |           | 0                       | 0                         | 0                        | 0                        | 0                        | 0                        | 0                     | $\frac{\sqrt{210}i}{56}$ | 0                        | $-\frac{\sqrt{42}i}{56}$ | 0                        | 0                        | 0                         | 0                      |
|                                   |           | 0                       | 0                         | 0                        | 0                        | 0                        | 0                        | 0                     | 0                        | $\frac{\sqrt{35}i}{28}$  | 0                        | $-\frac{\sqrt{21}i}{28}$ | 0                        | 0                         | 0                      |
|                                   |           | 0                       | 0                         | 0                        | 0                        | 0                        | 0                        | 0                     | 0                        | 0                        | $\frac{\sqrt{21}i}{28}$  | 0                        | $-\frac{\sqrt{35}i}{28}$ | 0                         | 0                      |
|                                   |           | 0                       | 0                         | 0                        | 0                        | 0                        | 0                        | 0                     | 0                        | 0                        | 0                        | $\frac{\sqrt{42}i}{56}$  | 0                        | $-\frac{\sqrt{210}i}{56}$ | 0                      |
|                                   |           | 0                       | 0                         | 0                        | 0                        | 0                        | 0                        | 0                     | 0                        | 0                        | 0                        | 0                        | $\frac{\sqrt{14}i}{56}$  | 0                         | $-\frac{\sqrt{6}i}{8}$ |
|                                   |           | $-\frac{\sqrt{6}i}{8}$  | 0                         | 0                        | 0                        | 0                        | 0                        | 0                     | 0                        | 0                        | 0                        | 0                        | 0                        | 0                         | 0                      |
|                                   |           | 0                       | $-\frac{\sqrt{210}i}{56}$ | 0                        | 0                        | 0                        | 0                        | 0                     | 0                        | 0                        | 0                        | 0                        | 0                        | 0                         | 0                      |
|                                   |           | $\frac{\sqrt{14}i}{56}$ | 0                         | $-\frac{\sqrt{35}i}{28}$ | 0                        | 0                        | 0                        | 0                     | 0                        | 0                        | 0                        | 0                        | 0                        | 0                         | 0                      |
|                                   |           | 0                       | $\frac{\sqrt{42}i}{56}$   | 0                        | $-\frac{\sqrt{21}i}{28}$ | 0                        | 0                        | 0                     | 0                        | 0                        | 0                        | 0                        | 0                        | 0                         | 0                      |
|                                   |           | 0                       | 0                         | $\frac{\sqrt{21}i}{28}$  | 0                        | $-\frac{\sqrt{42}i}{56}$ | 0                        | 0                     | 0                        | 0                        | 0                        | 0                        | 0                        | 0                         | 0                      |
|                                   |           | 0                       | 0                         | 0                        | $\frac{\sqrt{35}i}{28}$  | 0                        | $-\frac{\sqrt{14}i}{56}$ | 0                     | 0                        | 0                        | 0                        | 0                        | 0                        | 0                         | 0                      |
|                                   |           | 0                       | 0                         | 0                        | 0                        | $\frac{\sqrt{210}i}{56}$ | 0                        | 0                     | 0                        | 0                        | 0                        | 0                        | 0                        | 0                         | 0                      |
|                                   |           | 0                       | 0                         | 0                        | 0                        | 0                        | $\frac{\sqrt{6}i}{8}$    | 0                     | 0                        | 0                        | 0                        | 0                        | 0                        | 0                         | 0                      |
| 900                               | symmetry  | $y$                     |                           |                          |                          |                          |                          |                       |                          |                          |                          |                          |                          |                           |                        |

*continued ...*

Table 10

| No.                               | multipole | matrix                  |                          |                         |                         |                          |                         |                          |                         |                         |                         |                         |                          |                       |   |
|-----------------------------------|-----------|-------------------------|--------------------------|-------------------------|-------------------------|--------------------------|-------------------------|--------------------------|-------------------------|-------------------------|-------------------------|-------------------------|--------------------------|-----------------------|---|
| $\mathbb{G}_{1,1}^{(1,0;a)}(T_1)$ |           | 0                       | 0                        | 0                       | 0                       | 0                        | 0                       | $-\frac{\sqrt{6}}{8}$    | 0                       | $-\frac{\sqrt{14}}{56}$ | 0                       | 0                       | 0                        | 0                     | 0 |
|                                   |           | 0                       | 0                        | 0                       | 0                       | 0                        | 0                       | $-\frac{\sqrt{210}}{56}$ | 0                       | $-\frac{\sqrt{42}}{56}$ | 0                       | 0                       | 0                        | 0                     | 0 |
|                                   |           | 0                       | 0                        | 0                       | 0                       | 0                        | 0                       | 0                        | $-\frac{\sqrt{35}}{28}$ | 0                       | $-\frac{\sqrt{21}}{28}$ | 0                       | 0                        | 0                     | 0 |
|                                   |           | 0                       | 0                        | 0                       | 0                       | 0                        | 0                       | 0                        | 0                       | $-\frac{\sqrt{21}}{28}$ | 0                       | $-\frac{\sqrt{35}}{28}$ | 0                        | 0                     | 0 |
|                                   |           | 0                       | 0                        | 0                       | 0                       | 0                        | 0                       | 0                        | 0                       | 0                       | $-\frac{\sqrt{42}}{56}$ | 0                       | $-\frac{\sqrt{210}}{56}$ | 0                     | 0 |
|                                   |           | 0                       | 0                        | 0                       | 0                       | 0                        | 0                       | 0                        | 0                       | 0                       | 0                       | $-\frac{\sqrt{14}}{56}$ | 0                        | $-\frac{\sqrt{6}}{8}$ | 0 |
|                                   |           | $-\frac{\sqrt{6}}{8}$   | 0                        | 0                       | 0                       | 0                        | 0                       | 0                        | 0                       | 0                       | 0                       | 0                       | 0                        | 0                     | 0 |
|                                   |           | 0                       | $-\frac{\sqrt{210}}{56}$ | 0                       | 0                       | 0                        | 0                       | 0                        | 0                       | 0                       | 0                       | 0                       | 0                        | 0                     | 0 |
|                                   |           | $-\frac{\sqrt{14}}{56}$ | 0                        | $-\frac{\sqrt{35}}{28}$ | 0                       | 0                        | 0                       | 0                        | 0                       | 0                       | 0                       | 0                       | 0                        | 0                     | 0 |
|                                   |           | 0                       | $-\frac{\sqrt{42}}{56}$  | 0                       | $-\frac{\sqrt{21}}{28}$ | 0                        | 0                       | 0                        | 0                       | 0                       | 0                       | 0                       | 0                        | 0                     | 0 |
|                                   |           | 0                       | 0                        | $-\frac{\sqrt{21}}{28}$ | 0                       | $-\frac{\sqrt{42}}{56}$  | 0                       | 0                        | 0                       | 0                       | 0                       | 0                       | 0                        | 0                     | 0 |
|                                   |           | 0                       | 0                        | 0                       | $-\frac{\sqrt{35}}{28}$ | 0                        | $-\frac{\sqrt{14}}{56}$ | 0                        | 0                       | 0                       | 0                       | 0                       | 0                        | 0                     | 0 |
|                                   |           | 0                       | 0                        | 0                       | 0                       | $-\frac{\sqrt{210}}{56}$ | 0                       | 0                        | 0                       | 0                       | 0                       | 0                       | 0                        | 0                     | 0 |
|                                   |           | 0                       | 0                        | 0                       | 0                       | 0                        | $-\frac{\sqrt{6}}{8}$   | 0                        | 0                       | 0                       | 0                       | 0                       | 0                        | 0                     | 0 |
| 901                               | symmetry  | $z$                     |                          |                         |                         |                          |                         |                          |                         |                         |                         |                         |                          |                       |   |

*continued ...*

Table 10

| No.                               | multipole | matrix                  |                         |                         |                         |                         |                         |   |                          |                          |                          |                          |                          |                          |   |
|-----------------------------------|-----------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---|
| $\mathbb{G}_{1,2}^{(1,0;a)}(T_1)$ |           | 0                       | 0                       | 0                       | 0                       | 0                       | 0                       | 0 | $-\frac{\sqrt{42}i}{28}$ | 0                        | 0                        | 0                        | 0                        | 0                        | 0 |
|                                   |           | 0                       | 0                       | 0                       | 0                       | 0                       | 0                       | 0 | 0                        | $-\frac{\sqrt{70}i}{28}$ | 0                        | 0                        | 0                        | 0                        | 0 |
|                                   |           | 0                       | 0                       | 0                       | 0                       | 0                       | 0                       | 0 | 0                        | 0                        | $-\frac{\sqrt{21}i}{14}$ | 0                        | 0                        | 0                        | 0 |
|                                   |           | 0                       | 0                       | 0                       | 0                       | 0                       | 0                       | 0 | 0                        | 0                        | 0                        | $-\frac{\sqrt{21}i}{14}$ | 0                        | 0                        | 0 |
|                                   |           | 0                       | 0                       | 0                       | 0                       | 0                       | 0                       | 0 | 0                        | 0                        | 0                        | 0                        | $-\frac{\sqrt{70}i}{28}$ | 0                        | 0 |
|                                   |           | 0                       | 0                       | 0                       | 0                       | 0                       | 0                       | 0 | 0                        | 0                        | 0                        | 0                        | 0                        | $-\frac{\sqrt{42}i}{28}$ | 0 |
|                                   |           | 0                       | 0                       | 0                       | 0                       | 0                       | 0                       | 0 | 0                        | 0                        | 0                        | 0                        | 0                        | 0                        | 0 |
|                                   |           | $\frac{\sqrt{42}i}{28}$ | 0                       | 0                       | 0                       | 0                       | 0                       | 0 | 0                        | 0                        | 0                        | 0                        | 0                        | 0                        | 0 |
|                                   |           | 0                       | $\frac{\sqrt{70}i}{28}$ | 0                       | 0                       | 0                       | 0                       | 0 | 0                        | 0                        | 0                        | 0                        | 0                        | 0                        | 0 |
|                                   |           | 0                       | 0                       | $\frac{\sqrt{21}i}{14}$ | 0                       | 0                       | 0                       | 0 | 0                        | 0                        | 0                        | 0                        | 0                        | 0                        | 0 |
|                                   |           | 0                       | 0                       | 0                       | $\frac{\sqrt{21}i}{14}$ | 0                       | 0                       | 0 | 0                        | 0                        | 0                        | 0                        | 0                        | 0                        | 0 |
|                                   |           | 0                       | 0                       | 0                       | 0                       | $\frac{\sqrt{70}i}{28}$ | 0                       | 0 | 0                        | 0                        | 0                        | 0                        | 0                        | 0                        | 0 |
|                                   |           | 0                       | 0                       | 0                       | 0                       | 0                       | $\frac{\sqrt{42}i}{28}$ | 0 | 0                        | 0                        | 0                        | 0                        | 0                        | 0                        | 0 |
|                                   |           | 0                       | 0                       | 0                       | 0                       | 0                       | 0                       | 0 | 0                        | 0                        | 0                        | 0                        | 0                        | 0                        | 0 |
| 902                               | symmetry  | $\sqrt{15}xyz$          |                         |                         |                         |                         |                         |   |                          |                          |                          |                          |                          |                          |   |

*continued ...*



Table 10

| No.                           | multipole | matrix                        |                        |                       |                         |                         |                       |                        |                |                        |                         |                         |   |                 |  |
|-------------------------------|-----------|-------------------------------|------------------------|-----------------------|-------------------------|-------------------------|-----------------------|------------------------|----------------|------------------------|-------------------------|-------------------------|---|-----------------|--|
| $\mathbb{G}_3^{(1,0;a)}(A_2)$ |           | 0                             | 0                      | 0                     | 0                       | 0                       | 0                     | 0                      | 0              | $\frac{\sqrt{2}}{6}$   | 0                       | 0                       | 0 | 0               |  |
|                               |           | 0                             | 0                      | 0                     | 0                       | 0                       | 0                     | $\frac{\sqrt{14}}{12}$ | 0              | 0                      | $\frac{\sqrt{10}}{12}$  | 0                       | 0 | 0               |  |
|                               |           | 0                             | 0                      | 0                     | 0                       | 0                       | 0                     | 0                      | $\frac{1}{12}$ | 0                      | 0                       | $\frac{\sqrt{3}}{12}$   | 0 | 0               |  |
|                               |           | 0                             | 0                      | 0                     | 0                       | 0                       | 0                     | 0                      | 0              | $-\frac{\sqrt{3}}{12}$ | 0                       | 0                       | 0 | $-\frac{1}{12}$ |  |
|                               |           | 0                             | 0                      | 0                     | 0                       | 0                       | 0                     | 0                      | 0              | 0                      | $-\frac{\sqrt{10}}{12}$ | 0                       | 0 | 0               |  |
|                               |           | 0                             | 0                      | 0                     | 0                       | 0                       | 0                     | 0                      | 0              | 0                      | 0                       | $-\frac{\sqrt{14}}{12}$ | 0 | 0               |  |
|                               |           | 0                             | 0                      | 0                     | 0                       | 0                       | 0                     | 0                      | 0              | 0                      | $-\frac{\sqrt{2}}{6}$   | 0                       | 0 | 0               |  |
|                               |           | 0                             | $\frac{\sqrt{14}}{12}$ | 0                     | 0                       | 0                       | 0                     | 0                      | 0              | 0                      | 0                       | 0                       | 0 | 0               |  |
|                               |           | 0                             | 0                      | $\frac{1}{12}$        | 0                       | 0                       | 0                     | 0                      | 0              | 0                      | 0                       | 0                       | 0 | 0               |  |
|                               |           | 0                             | 0                      | 0                     | $-\frac{\sqrt{3}}{12}$  | 0                       | 0                     | 0                      | 0              | 0                      | 0                       | 0                       | 0 | 0               |  |
|                               |           | $\frac{\sqrt{2}}{6}$          | 0                      | 0                     | 0                       | $-\frac{\sqrt{10}}{12}$ | 0                     | 0                      | 0              | 0                      | 0                       | 0                       | 0 | 0               |  |
|                               |           | 0                             | $\frac{\sqrt{10}}{12}$ | 0                     | 0                       | 0                       | $-\frac{\sqrt{2}}{6}$ | 0                      | 0              | 0                      | 0                       | 0                       | 0 | 0               |  |
|                               |           | 0                             | 0                      | $\frac{\sqrt{3}}{12}$ | 0                       | 0                       | 0                     | 0                      | 0              | 0                      | 0                       | 0                       | 0 | 0               |  |
|                               |           | 0                             | 0                      | 0                     | $-\frac{1}{12}$         | 0                       | 0                     | 0                      | 0              | 0                      | 0                       | 0                       | 0 | 0               |  |
|                               | 0         | 0                             | 0                      | 0                     | $-\frac{\sqrt{14}}{12}$ | 0                       | 0                     | 0                      | 0              | 0                      | 0                       | 0                       | 0 |                 |  |
| 903                           | symmetry  | $\frac{x(2x^2-3y^2-3z^2)}{2}$ |                        |                       |                         |                         |                       |                        |                |                        |                         |                         |   |                 |  |

*continued ...*

Table 10

| No.                               | multipole | matrix                         |                          |                          |                           |                          |                         |                           |                          |                          |                        |                         |                         |                          |   |
|-----------------------------------|-----------|--------------------------------|--------------------------|--------------------------|---------------------------|--------------------------|-------------------------|---------------------------|--------------------------|--------------------------|------------------------|-------------------------|-------------------------|--------------------------|---|
| $\mathbb{G}_{3,0}^{(1,0;a)}(T_1)$ |           | 0                              | 0                        | 0                        | 0                         | 0                        | 0                       | $\frac{\sqrt{42}i}{48}$   | 0                        | $-\frac{\sqrt{2}i}{8}$   | 0                      | $\frac{\sqrt{30}i}{48}$ | 0                       | 0                        | 0 |
|                                   |           | 0                              | 0                        | 0                        | 0                         | 0                        | 0                       | $-\frac{\sqrt{30}i}{48}$  | 0                        | $-\frac{\sqrt{6}i}{24}$  | 0                      | $\frac{\sqrt{10}i}{16}$ | 0                       | 0                        | 0 |
|                                   |           | 0                              | 0                        | 0                        | 0                         | 0                        | 0                       | $-\frac{\sqrt{105}i}{48}$ | 0                        | $-\frac{\sqrt{5}i}{16}$  | 0                      | $\frac{\sqrt{3}i}{48}$  | 0                       | $\frac{\sqrt{15}i}{16}$  | 0 |
|                                   |           | 0                              | 0                        | 0                        | 0                         | 0                        | 0                       | $-\frac{\sqrt{15}i}{16}$  | 0                        | $-\frac{\sqrt{3}i}{48}$  | 0                      | $\frac{\sqrt{5}i}{16}$  | 0                       | $\frac{\sqrt{105}i}{48}$ | 0 |
|                                   |           | 0                              | 0                        | 0                        | 0                         | 0                        | 0                       | 0                         | $-\frac{\sqrt{10}i}{16}$ | 0                        | $\frac{\sqrt{6}i}{24}$ | 0                       | $\frac{\sqrt{30}i}{48}$ | 0                        | 0 |
|                                   |           | 0                              | 0                        | 0                        | 0                         | 0                        | 0                       | 0                         | 0                        | $-\frac{\sqrt{30}i}{48}$ | 0                      | $\frac{\sqrt{2}i}{8}$   | 0                       | $-\frac{\sqrt{42}i}{48}$ | 0 |
|                                   |           | $-\frac{\sqrt{42}i}{48}$       | 0                        | $\frac{\sqrt{105}i}{48}$ | 0                         | 0                        | 0                       | 0                         | 0                        | 0                        | 0                      | 0                       | 0                       | 0                        | 0 |
|                                   |           | 0                              | $\frac{\sqrt{30}i}{48}$  | 0                        | $\frac{\sqrt{15}i}{16}$   | 0                        | 0                       | 0                         | 0                        | 0                        | 0                      | 0                       | 0                       | 0                        | 0 |
|                                   |           | $\frac{\sqrt{2}i}{8}$          | 0                        | $\frac{\sqrt{5}i}{16}$   | 0                         | $\frac{\sqrt{10}i}{16}$  | 0                       | 0                         | 0                        | 0                        | 0                      | 0                       | 0                       | 0                        | 0 |
|                                   |           | 0                              | $\frac{\sqrt{6}i}{24}$   | 0                        | $\frac{\sqrt{3}i}{48}$    | 0                        | $\frac{\sqrt{30}i}{48}$ | 0                         | 0                        | 0                        | 0                      | 0                       | 0                       | 0                        | 0 |
|                                   |           | $-\frac{\sqrt{30}i}{48}$       | 0                        | $-\frac{\sqrt{3}i}{48}$  | 0                         | $-\frac{\sqrt{6}i}{24}$  | 0                       | 0                         | 0                        | 0                        | 0                      | 0                       | 0                       | 0                        | 0 |
|                                   |           | 0                              | $-\frac{\sqrt{10}i}{16}$ | 0                        | $-\frac{\sqrt{5}i}{16}$   | 0                        | $-\frac{\sqrt{2}i}{8}$  | 0                         | 0                        | 0                        | 0                      | 0                       | 0                       | 0                        | 0 |
|                                   |           | 0                              | 0                        | $-\frac{\sqrt{15}i}{16}$ | 0                         | $-\frac{\sqrt{30}i}{48}$ | 0                       | 0                         | 0                        | 0                        | 0                      | 0                       | 0                       | 0                        | 0 |
|                                   |           | 0                              | 0                        | 0                        | $-\frac{\sqrt{105}i}{48}$ | 0                        | $\frac{\sqrt{42}i}{48}$ | 0                         | 0                        | 0                        | 0                      | 0                       | 0                       | 0                        | 0 |
| 904                               | symmetry  | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ |                          |                          |                           |                          |                         |                           |                          |                          |                        |                         |                         |                          |   |

*continued ...*

Table 10

| No.                               | multipole | matrix                         |                         |                          |                          |                         |                         |                          |                         |                         |                        |                         |                        |                          |   |  |
|-----------------------------------|-----------|--------------------------------|-------------------------|--------------------------|--------------------------|-------------------------|-------------------------|--------------------------|-------------------------|-------------------------|------------------------|-------------------------|------------------------|--------------------------|---|--|
| $\mathbb{G}_{3,1}^{(1,0;a)}(T_1)$ |           | 0                              | 0                       | 0                        | 0                        | 0                       | 0                       | $-\frac{\sqrt{42}}{48}$  | 0                       | $-\frac{\sqrt{2}}{8}$   | 0                      | $-\frac{\sqrt{30}}{48}$ | 0                      | 0                        | 0 |  |
|                                   |           | 0                              | 0                       | 0                        | 0                        | 0                       | 0                       | $\frac{\sqrt{30}}{48}$   | 0                       | $-\frac{\sqrt{6}}{24}$  | 0                      | $-\frac{\sqrt{10}}{16}$ | 0                      | 0                        | 0 |  |
|                                   |           | 0                              | 0                       | 0                        | 0                        | 0                       | 0                       | $-\frac{\sqrt{105}}{48}$ | 0                       | $\frac{\sqrt{5}}{16}$   | 0                      | $\frac{\sqrt{3}}{48}$   | 0                      | $-\frac{\sqrt{15}}{16}$  | 0 |  |
|                                   |           | 0                              | 0                       | 0                        | 0                        | 0                       | 0                       | $-\frac{\sqrt{15}}{16}$  | 0                       | $\frac{\sqrt{3}}{48}$   | 0                      | $\frac{\sqrt{5}}{16}$   | 0                      | $-\frac{\sqrt{105}}{48}$ | 0 |  |
|                                   |           | 0                              | 0                       | 0                        | 0                        | 0                       | 0                       | 0                        | $-\frac{\sqrt{10}}{16}$ | 0                       | $-\frac{\sqrt{6}}{24}$ | 0                       | $\frac{\sqrt{30}}{48}$ | 0                        | 0 |  |
|                                   |           | 0                              | 0                       | 0                        | 0                        | 0                       | 0                       | 0                        | 0                       | $-\frac{\sqrt{30}}{48}$ | 0                      | $-\frac{\sqrt{2}}{8}$   | 0                      | $-\frac{\sqrt{42}}{48}$  | 0 |  |
|                                   |           | $-\frac{\sqrt{42}}{48}$        | 0                       | $-\frac{\sqrt{105}}{48}$ | 0                        | 0                       | 0                       | 0                        | 0                       | 0                       | 0                      | 0                       | 0                      | 0                        | 0 |  |
|                                   |           | 0                              | $\frac{\sqrt{30}}{48}$  | 0                        | $-\frac{\sqrt{15}}{16}$  | 0                       | 0                       | 0                        | 0                       | 0                       | 0                      | 0                       | 0                      | 0                        | 0 |  |
|                                   |           | $-\frac{\sqrt{2}}{8}$          | 0                       | $\frac{\sqrt{5}}{16}$    | 0                        | $-\frac{\sqrt{10}}{16}$ | 0                       | 0                        | 0                       | 0                       | 0                      | 0                       | 0                      | 0                        | 0 |  |
|                                   |           | 0                              | $-\frac{\sqrt{6}}{24}$  | 0                        | $\frac{\sqrt{3}}{48}$    | 0                       | $-\frac{\sqrt{30}}{48}$ | 0                        | 0                       | 0                       | 0                      | 0                       | 0                      | 0                        | 0 |  |
|                                   |           | $-\frac{\sqrt{30}}{48}$        | 0                       | $\frac{\sqrt{3}}{48}$    | 0                        | $-\frac{\sqrt{6}}{24}$  | 0                       | 0                        | 0                       | 0                       | 0                      | 0                       | 0                      | 0                        | 0 |  |
|                                   |           | 0                              | $-\frac{\sqrt{10}}{16}$ | 0                        | $\frac{\sqrt{5}}{16}$    | 0                       | $-\frac{\sqrt{2}}{8}$   | 0                        | 0                       | 0                       | 0                      | 0                       | 0                      | 0                        | 0 |  |
|                                   |           | 0                              | 0                       | $-\frac{\sqrt{15}}{16}$  | 0                        | $\frac{\sqrt{30}}{48}$  | 0                       | 0                        | 0                       | 0                       | 0                      | 0                       | 0                      | 0                        | 0 |  |
|                                   |           | 0                              | 0                       | 0                        | $-\frac{\sqrt{105}}{48}$ | 0                       | $-\frac{\sqrt{42}}{48}$ | 0                        | 0                       | 0                       | 0                      | 0                       | 0                      | 0                        | 0 |  |
| 905                               | symmetry  | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ |                         |                          |                          |                         |                         |                          |                         |                         |                        |                         |                        |                          |   |  |

*continued ...*

Table 10

| No.                               | multipole | matrix                           |   |                       |                       |   |                        |   |                       |   |                        |                        |   |                       |   |   |
|-----------------------------------|-----------|----------------------------------|---|-----------------------|-----------------------|---|------------------------|---|-----------------------|---|------------------------|------------------------|---|-----------------------|---|---|
| $\mathbb{G}_{3,2}^{(1,0;a)}(T_1)$ |           | 0                                | 0 | 0                     | 0                     | 0 | 0                      | 0 | $\frac{\sqrt{6}i}{6}$ | 0 | 0                      | 0                      | 0 | 0                     | 0 | 0 |
|                                   |           | 0                                | 0 | 0                     | 0                     | 0 | 0                      | 0 | 0                     | 0 | 0                      | 0                      | 0 | 0                     | 0 | 0 |
|                                   |           | 0                                | 0 | 0                     | 0                     | 0 | 0                      | 0 | 0                     | 0 | $-\frac{\sqrt{3}i}{6}$ | 0                      | 0 | 0                     | 0 | 0 |
|                                   |           | 0                                | 0 | 0                     | 0                     | 0 | 0                      | 0 | 0                     | 0 | 0                      | $-\frac{\sqrt{3}i}{6}$ | 0 | 0                     | 0 | 0 |
|                                   |           | 0                                | 0 | 0                     | 0                     | 0 | 0                      | 0 | 0                     | 0 | 0                      | 0                      | 0 | 0                     | 0 | 0 |
|                                   |           | 0                                | 0 | 0                     | 0                     | 0 | 0                      | 0 | 0                     | 0 | 0                      | 0                      | 0 | $\frac{\sqrt{6}i}{6}$ | 0 | 0 |
|                                   |           | 0                                | 0 | 0                     | 0                     | 0 | 0                      | 0 | 0                     | 0 | 0                      | 0                      | 0 | 0                     | 0 | 0 |
|                                   |           | $-\frac{\sqrt{6}i}{6}$           | 0 | 0                     | 0                     | 0 | 0                      | 0 | 0                     | 0 | 0                      | 0                      | 0 | 0                     | 0 | 0 |
|                                   |           | 0                                | 0 | 0                     | 0                     | 0 | 0                      | 0 | 0                     | 0 | 0                      | 0                      | 0 | 0                     | 0 | 0 |
|                                   |           | 0                                | 0 | $\frac{\sqrt{3}i}{6}$ | 0                     | 0 | 0                      | 0 | 0                     | 0 | 0                      | 0                      | 0 | 0                     | 0 | 0 |
|                                   |           | 0                                | 0 | 0                     | $\frac{\sqrt{3}i}{6}$ | 0 | 0                      | 0 | 0                     | 0 | 0                      | 0                      | 0 | 0                     | 0 | 0 |
|                                   |           | 0                                | 0 | 0                     | 0                     | 0 | 0                      | 0 | 0                     | 0 | 0                      | 0                      | 0 | 0                     | 0 | 0 |
|                                   |           | 0                                | 0 | 0                     | 0                     | 0 | $-\frac{\sqrt{6}i}{6}$ | 0 | 0                     | 0 | 0                      | 0                      | 0 | 0                     | 0 | 0 |
|                                   |           | 0                                | 0 | 0                     | 0                     | 0 | 0                      | 0 | 0                     | 0 | 0                      | 0                      | 0 | 0                     | 0 | 0 |
| 906                               | symmetry  | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ |   |                       |                       |   |                        |   |                       |   |                        |                        |   |                       |   |   |

*continued ...*

Table 10

| No.                               | multipole | matrix                            |                         |                         |                          |                          |                          |                          |                        |                          |                         |                         |                         |                          |   |
|-----------------------------------|-----------|-----------------------------------|-------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|------------------------|--------------------------|-------------------------|-------------------------|-------------------------|--------------------------|---|
| $\mathbb{G}_{3,0}^{(1,0;a)}(T_2)$ |           | 0                                 | 0                       | 0                       | 0                        | 0                        | 0                        | $\frac{\sqrt{70}i}{48}$  | 0                      | $-\frac{\sqrt{30}i}{24}$ | 0                       | $-\frac{\sqrt{2}i}{16}$ | 0                       | 0                        | 0 |
|                                   |           | 0                                 | 0                       | 0                       | 0                        | 0                        | 0                        | $-\frac{5\sqrt{2}i}{48}$ | 0                      | $-\frac{\sqrt{10}i}{24}$ | 0                       | $-\frac{\sqrt{6}i}{16}$ | 0                       | 0                        | 0 |
|                                   |           | 0                                 | 0                       | 0                       | 0                        | 0                        | 0                        | $\frac{\sqrt{7}i}{16}$   | 0                      | $-\frac{5\sqrt{3}i}{48}$ | 0                       | $\frac{\sqrt{5}i}{48}$  | 0                       | $-\frac{3i}{16}$         | 0 |
|                                   |           | 0                                 | 0                       | 0                       | 0                        | 0                        | 0                        | $\frac{3i}{16}$          | 0                      | $-\frac{\sqrt{5}i}{48}$  | 0                       | $\frac{5\sqrt{3}i}{48}$ | 0                       | $-\frac{\sqrt{7}i}{16}$  | 0 |
|                                   |           | 0                                 | 0                       | 0                       | 0                        | 0                        | 0                        | 0                        | $\frac{\sqrt{6}i}{16}$ | 0                        | $\frac{\sqrt{10}i}{24}$ | 0                       | $\frac{5\sqrt{2}i}{48}$ | 0                        | 0 |
|                                   |           | 0                                 | 0                       | 0                       | 0                        | 0                        | 0                        | 0                        | 0                      | $\frac{\sqrt{2}i}{16}$   | 0                       | $\frac{\sqrt{30}i}{24}$ | 0                       | $-\frac{\sqrt{70}i}{48}$ | 0 |
|                                   |           | $-\frac{\sqrt{70}i}{48}$          | 0                       | $-\frac{\sqrt{7}i}{16}$ | 0                        | 0                        | 0                        | 0                        | 0                      | 0                        | 0                       | 0                       | 0                       | 0                        | 0 |
|                                   |           | 0                                 | $\frac{5\sqrt{2}i}{48}$ | 0                       | $-\frac{3i}{16}$         | 0                        | 0                        | 0                        | 0                      | 0                        | 0                       | 0                       | 0                       | 0                        | 0 |
|                                   |           | $\frac{\sqrt{30}i}{24}$           | 0                       | $\frac{5\sqrt{3}i}{48}$ | 0                        | $-\frac{\sqrt{6}i}{16}$  | 0                        | 0                        | 0                      | 0                        | 0                       | 0                       | 0                       | 0                        | 0 |
|                                   |           | 0                                 | $\frac{\sqrt{10}i}{24}$ | 0                       | $\frac{\sqrt{5}i}{48}$   | 0                        | $-\frac{\sqrt{2}i}{16}$  | 0                        | 0                      | 0                        | 0                       | 0                       | 0                       | 0                        | 0 |
|                                   |           | $\frac{\sqrt{2}i}{16}$            | 0                       | $-\frac{\sqrt{5}i}{48}$ | 0                        | $-\frac{\sqrt{10}i}{24}$ | 0                        | 0                        | 0                      | 0                        | 0                       | 0                       | 0                       | 0                        | 0 |
|                                   |           | 0                                 | $\frac{\sqrt{6}i}{16}$  | 0                       | $-\frac{5\sqrt{3}i}{48}$ | 0                        | $-\frac{\sqrt{30}i}{24}$ | 0                        | 0                      | 0                        | 0                       | 0                       | 0                       | 0                        | 0 |
|                                   |           | 0                                 | 0                       | $\frac{3i}{16}$         | 0                        | $-\frac{5\sqrt{2}i}{48}$ | 0                        | 0                        | 0                      | 0                        | 0                       | 0                       | 0                       | 0                        | 0 |
|                                   |           | 0                                 | 0                       | 0                       | $\frac{\sqrt{7}i}{16}$   | 0                        | $\frac{\sqrt{70}i}{48}$  | 0                        | 0                      | 0                        | 0                       | 0                       | 0                       | 0                        | 0 |
| 907                               | symmetry  | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |                         |                         |                          |                          |                          |                          |                        |                          |                         |                         |                         |                          |   |

continued ...

Table 10

| No.                               | multipole | matrix                           |                         |                         |                         |                         |                        |                         |                        |                         |                        |                         |                         |                        |   |  |
|-----------------------------------|-----------|----------------------------------|-------------------------|-------------------------|-------------------------|-------------------------|------------------------|-------------------------|------------------------|-------------------------|------------------------|-------------------------|-------------------------|------------------------|---|--|
| $\mathbb{G}_{3,1}^{(1,0;a)}(T_2)$ |           | 0                                | 0                       | 0                       | 0                       | 0                       | 0                      | $\frac{\sqrt{70}}{48}$  | 0                      | $\frac{\sqrt{30}}{24}$  | 0                      | $-\frac{\sqrt{2}}{16}$  | 0                       | 0                      | 0 |  |
|                                   |           | 0                                | 0                       | 0                       | 0                       | 0                       | 0                      | $-\frac{5\sqrt{2}}{48}$ | 0                      | $\frac{\sqrt{10}}{24}$  | 0                      | $-\frac{\sqrt{6}}{16}$  | 0                       | 0                      | 0 |  |
|                                   |           | 0                                | 0                       | 0                       | 0                       | 0                       | 0                      | $-\frac{\sqrt{7}}{16}$  | 0                      | $-\frac{5\sqrt{3}}{48}$ | 0                      | $-\frac{\sqrt{5}}{48}$  | 0                       | $-\frac{3}{16}$        | 0 |  |
|                                   |           | 0                                | 0                       | 0                       | 0                       | 0                       | 0                      | $-\frac{3}{16}$         | 0                      | $-\frac{\sqrt{5}}{48}$  | 0                      | $-\frac{5\sqrt{3}}{48}$ | 0                       | $-\frac{\sqrt{7}}{16}$ | 0 |  |
|                                   |           | 0                                | 0                       | 0                       | 0                       | 0                       | 0                      | 0                       | $-\frac{\sqrt{6}}{16}$ | 0                       | $\frac{\sqrt{10}}{24}$ | 0                       | $-\frac{5\sqrt{2}}{48}$ | 0                      | 0 |  |
|                                   |           | 0                                | 0                       | 0                       | 0                       | 0                       | 0                      | 0                       | 0                      | $-\frac{\sqrt{2}}{16}$  | 0                      | $\frac{\sqrt{30}}{24}$  | 0                       | $\frac{\sqrt{70}}{48}$ | 0 |  |
|                                   |           | $\frac{\sqrt{70}}{48}$           | 0                       | $-\frac{\sqrt{7}}{16}$  | 0                       | 0                       | 0                      | 0                       | 0                      | 0                       | 0                      | 0                       | 0                       | 0                      | 0 |  |
|                                   |           | 0                                | $-\frac{5\sqrt{2}}{48}$ | 0                       | $-\frac{3}{16}$         | 0                       | 0                      | 0                       | 0                      | 0                       | 0                      | 0                       | 0                       | 0                      | 0 |  |
|                                   |           | $\frac{\sqrt{30}}{24}$           | 0                       | $-\frac{5\sqrt{3}}{48}$ | 0                       | $-\frac{\sqrt{6}}{16}$  | 0                      | 0                       | 0                      | 0                       | 0                      | 0                       | 0                       | 0                      | 0 |  |
|                                   |           | 0                                | $\frac{\sqrt{10}}{24}$  | 0                       | $-\frac{\sqrt{5}}{48}$  | 0                       | $-\frac{\sqrt{2}}{16}$ | 0                       | 0                      | 0                       | 0                      | 0                       | 0                       | 0                      | 0 |  |
|                                   |           | $-\frac{\sqrt{2}}{16}$           | 0                       | $-\frac{\sqrt{5}}{48}$  | 0                       | $\frac{\sqrt{10}}{24}$  | 0                      | 0                       | 0                      | 0                       | 0                      | 0                       | 0                       | 0                      | 0 |  |
|                                   |           | 0                                | $-\frac{\sqrt{6}}{16}$  | 0                       | $-\frac{5\sqrt{3}}{48}$ | 0                       | $\frac{\sqrt{30}}{24}$ | 0                       | 0                      | 0                       | 0                      | 0                       | 0                       | 0                      | 0 |  |
|                                   |           | 0                                | 0                       | $-\frac{3}{16}$         | 0                       | $-\frac{5\sqrt{2}}{48}$ | 0                      | 0                       | 0                      | 0                       | 0                      | 0                       | 0                       | 0                      | 0 |  |
|                                   |           | 0                                | 0                       | 0                       | $-\frac{\sqrt{7}}{16}$  | 0                       | $\frac{\sqrt{70}}{48}$ | 0                       | 0                      | 0                       | 0                      | 0                       | 0                       | 0                      | 0 |  |
| 908                               | symmetry  | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ |                         |                         |                         |                         |                        |                         |                        |                         |                        |                         |                         |                        |   |  |

*continued ...*

Table 10

| No.                               | multipole | matrix                              |                          |                         |                         |                          |                        |                          |                 |                        |                         |                         |                        |                 |                          |
|-----------------------------------|-----------|-------------------------------------|--------------------------|-------------------------|-------------------------|--------------------------|------------------------|--------------------------|-----------------|------------------------|-------------------------|-------------------------|------------------------|-----------------|--------------------------|
| $\mathbb{G}_{3,2}^{(1,0;a)}(T_2)$ |           | 0                                   | 0                        | 0                       | 0                       | 0                        | 0                      | 0                        | 0               | 0                      | $\frac{\sqrt{2}i}{6}$   | 0                       | 0                      | 0               | 0                        |
|                                   |           | 0                                   | 0                        | 0                       | 0                       | 0                        | 0                      | $-\frac{\sqrt{14}i}{12}$ | 0               | 0                      | 0                       | $\frac{\sqrt{10}i}{12}$ | 0                      | 0               | 0                        |
|                                   |           | 0                                   | 0                        | 0                       | 0                       | 0                        | 0                      | 0                        | $-\frac{i}{12}$ | 0                      | 0                       | 0                       | $\frac{\sqrt{3}i}{12}$ | 0               | 0                        |
|                                   |           | 0                                   | 0                        | 0                       | 0                       | 0                        | 0                      | 0                        | 0               | $\frac{\sqrt{3}i}{12}$ | 0                       | 0                       | 0                      | $-\frac{i}{12}$ | 0                        |
|                                   |           | 0                                   | 0                        | 0                       | 0                       | 0                        | 0                      | 0                        | 0               | 0                      | $\frac{\sqrt{10}i}{12}$ | 0                       | 0                      | 0               | $-\frac{\sqrt{14}i}{12}$ |
|                                   |           | 0                                   | 0                        | 0                       | 0                       | 0                        | 0                      | 0                        | 0               | 0                      | 0                       | $\frac{\sqrt{2}i}{6}$   | 0                      | 0               | 0                        |
|                                   |           | 0                                   | $\frac{\sqrt{14}i}{12}$  | 0                       | 0                       | 0                        | 0                      | 0                        | 0               | 0                      | 0                       | 0                       | 0                      | 0               | 0                        |
|                                   |           | 0                                   | 0                        | $\frac{i}{12}$          | 0                       | 0                        | 0                      | 0                        | 0               | 0                      | 0                       | 0                       | 0                      | 0               | 0                        |
|                                   |           | 0                                   | 0                        | 0                       | $-\frac{\sqrt{3}i}{12}$ | 0                        | 0                      | 0                        | 0               | 0                      | 0                       | 0                       | 0                      | 0               | 0                        |
|                                   |           | $-\frac{\sqrt{2}i}{6}$              | 0                        | 0                       | 0                       | $-\frac{\sqrt{10}i}{12}$ | 0                      | 0                        | 0               | 0                      | 0                       | 0                       | 0                      | 0               | 0                        |
|                                   |           | 0                                   | $-\frac{\sqrt{10}i}{12}$ | 0                       | 0                       | 0                        | $-\frac{\sqrt{2}i}{6}$ | 0                        | 0               | 0                      | 0                       | 0                       | 0                      | 0               | 0                        |
|                                   |           | 0                                   | 0                        | $-\frac{\sqrt{3}i}{12}$ | 0                       | 0                        | 0                      | 0                        | 0               | 0                      | 0                       | 0                       | 0                      | 0               | 0                        |
|                                   |           | 0                                   | 0                        | 0                       | $\frac{i}{12}$          | 0                        | 0                      | 0                        | 0               | 0                      | 0                       | 0                       | 0                      | 0               | 0                        |
|                                   |           | 0                                   | 0                        | 0                       | 0                       | $\frac{\sqrt{14}i}{12}$  | 0                      | 0                        | 0               | 0                      | 0                       | 0                       | 0                      | 0               | 0                        |
| 909                               | symmetry  | $\frac{3\sqrt{35}xyz(x-y)(x+y)}{2}$ |                          |                         |                         |                          |                        |                          |                 |                        |                         |                         |                        |                 |                          |

*continued ...*

Table 10

| No.                             | multipole | matrix                                  |                         |                         |                          |                        |                      |                          |                        |                      |   |   |                         |                         |   |
|---------------------------------|-----------|---|-------------------------|-------------------------|--------------------------|------------------------|----------------------|--------------------------|------------------------|----------------------|---|---|-------------------------|-------------------------|---|
| $\mathbb{G}_{5,0}^{(1,0;a)}(E)$ |           | 0                                       | 0                       | 0                       | 0                        | 0                      | 0                    | 0                        | 0                      | 0                    | 0 | 0 | $-\frac{\sqrt{2}}{4}$   | 0                       | 0 |
|                                 |           | 0                                       | 0                       | 0                       | 0                        | 0                      | 0                    | 0                        | 0                      | 0                    | 0 | 0 | $-\frac{\sqrt{30}}{60}$ | 0                       |   |
|                                 |           | 0                                       | 0                       | 0                       | 0                        | 0                      | 0                    | 0                        | 0                      | 0                    | 0 | 0 | 0                       | $\frac{\sqrt{105}}{30}$ |   |
|                                 |           | 0                                       | 0                       | 0                       | 0                        | 0                      | 0                    | $-\frac{\sqrt{105}}{30}$ | 0                      | 0                    | 0 | 0 | 0                       | 0                       | 0 |
|                                 |           | 0                                       | 0                       | 0                       | 0                        | 0                      | 0                    | 0                        | $\frac{\sqrt{30}}{60}$ | 0                    | 0 | 0 | 0                       | 0                       | 0 |
|                                 |           | 0                                       | 0                       | 0                       | 0                        | 0                      | 0                    | 0                        | 0                      | $\frac{\sqrt{2}}{4}$ | 0 | 0 | 0                       | 0                       | 0 |
|                                 |           | 0                                       | 0                       | 0                       | $-\frac{\sqrt{105}}{30}$ | 0                      | 0                    | 0                        | 0                      | 0                    | 0 | 0 | 0                       | 0                       | 0 |
|                                 |           | 0                                       | 0                       | 0                       | 0                        | $\frac{\sqrt{30}}{60}$ | 0                    | 0                        | 0                      | 0                    | 0 | 0 | 0                       | 0                       | 0 |
|                                 |           | 0                                       | 0                       | 0                       | 0                        | 0                      | $\frac{\sqrt{2}}{4}$ | 0                        | 0                      | 0                    | 0 | 0 | 0                       | 0                       | 0 |
|                                 |           | 0                                       | 0                       | 0                       | 0                        | 0                      | 0                    | 0                        | 0                      | 0                    | 0 | 0 | 0                       | 0                       | 0 |
|                                 |           | 0                                       | 0                       | 0                       | 0                        | 0                      | 0                    | 0                        | 0                      | 0                    | 0 | 0 | 0                       | 0                       | 0 |
|                                 |           | $-\frac{\sqrt{2}}{4}$                   | 0                       | 0                       | 0                        | 0                      | 0                    | 0                        | 0                      | 0                    | 0 | 0 | 0                       | 0                       | 0 |
|                                 |           | 0                                       | $-\frac{\sqrt{30}}{60}$ | 0                       | 0                        | 0                      | 0                    | 0                        | 0                      | 0                    | 0 | 0 | 0                       | 0                       | 0 |
|                                 |           | 0                                       | 0                       | $\frac{\sqrt{105}}{30}$ | 0                        | 0                      | 0                    | 0                        | 0                      | 0                    | 0 | 0 | 0                       | 0                       | 0 |
| 910                             | symmetry  | $\frac{\sqrt{105}xyz(x^2+y^2-2z^2)}{2}$ |                         |                         |                          |                        |                      |                          |                        |                      |   |   |                         |                         |   |

*continued ...*



Table 10

| No.                             | multipole | matrix                 |   |                         |                        |                         |                         |                         |                        |                        |                         |                         |                        |                         |   |
|---------------------------------|-----------|------------------------|---|-------------------------|------------------------|-------------------------|-------------------------|-------------------------|------------------------|------------------------|-------------------------|-------------------------|------------------------|-------------------------|---|
| $\mathbb{G}_{5,1}^{(1,0;a)}(E)$ |           | 0                      | 0   | 0                       | 0                      | 0                       | 0                       | 0                       | 0                      | $\frac{\sqrt{10}}{12}$ | 0                       | 0                       | 0                      | 0                       |   |
|                                 |           | 0                      | 0   | 0                       | 0                      | 0                       | $\frac{\sqrt{70}}{60}$  | 0                       | 0                      | 0                      | $-\frac{\sqrt{2}}{6}$   | 0                       | 0                      | 0                       |   |
|                                 |           | 0                      | 0   | 0                       | 0                      | 0                       | 0                       | $-\frac{2\sqrt{5}}{15}$ | 0                      | 0                      | 0                       | $-\frac{\sqrt{15}}{30}$ | 0                      | 0                       |   |
|                                 |           | 0                      | 0   | 0                       | 0                      | 0                       | 0                       | 0                       | $\frac{\sqrt{15}}{30}$ | 0                      | 0                       | 0                       | $\frac{2\sqrt{5}}{15}$ | 0                       |   |
|                                 |           | 0                      | 0   | 0                       | 0                      | 0                       | 0                       | 0                       | 0                      | $\frac{\sqrt{2}}{6}$   | 0                       | 0                       | 0                      | $-\frac{\sqrt{70}}{60}$ |   |
|                                 |           | 0                      | 0   | 0                       | 0                      | 0                       | 0                       | 0                       | 0                      | 0                      | $-\frac{\sqrt{10}}{12}$ | 0                       | 0                      | 0                       |   |
|                                 |           | 0                      | $\frac{\sqrt{70}}{60}$  | 0                       | 0                      | 0                       | 0                       | 0                       | 0                      | 0                      | 0                       | 0                       | 0                      | 0                       |   |
|                                 |           | 0                      | 0   | $-\frac{2\sqrt{5}}{15}$ | 0                      | 0                       | 0                       | 0                       | 0                      | 0                      | 0                       | 0                       | 0                      | 0                       | 0 |
|                                 |           | 0                      | 0   | 0                       | $\frac{\sqrt{15}}{30}$ | 0                       | 0                       | 0                       | 0                      | 0                      | 0                       | 0                       | 0                      | 0                       | 0 |
|                                 |           | $\frac{\sqrt{10}}{12}$ | 0   | 0                       | 0                      | $\frac{\sqrt{2}}{6}$    | 0                       | 0                       | 0                      | 0                      | 0                       | 0                       | 0                      | 0                       | 0 |
|                                 |           | 0                      | $-\frac{\sqrt{2}}{6}$   | 0                       | 0                      | 0                       | $-\frac{\sqrt{10}}{12}$ | 0                       | 0                      | 0                      | 0                       | 0                       | 0                      | 0                       | 0 |
|                                 |           | 0                      | 0   | $-\frac{\sqrt{15}}{30}$ | 0                      | 0                       | 0                       | 0                       | 0                      | 0                      | 0                       | 0                       | 0                      | 0                       | 0 |
|                                 |           | 0                      | 0   | 0                       | $\frac{2\sqrt{5}}{15}$ | 0                       | 0                       | 0                       | 0                      | 0                      | 0                       | 0                       | 0                      | 0                       | 0 |
|                                 |           | 0                      | 0   | 0                       | 0                      | $-\frac{\sqrt{70}}{60}$ | 0                       | 0                       | 0                      | 0                      | 0                       | 0                       | 0                      | 0                       | 0 |
|                                 | 911       | symmetry               | $\frac{x\left(8x^4-40x^2y^2-40x^2z^2+15y^4+30y^2z^2+15z^4\right)}{8}$ |                         |                        |                         |                         |                         |                        |                        |                         |                         |                        |                         |   |

*continued ...*

Table 10

| No.                                  | multipole | matrix   |                               |                            |                            |                              |                            |                          |                              |                            |                              |                               |                            |                             |                           |
|--------------------------------------|-----------|--|-------------------------------|----------------------------|----------------------------|------------------------------|----------------------------|--------------------------|------------------------------|----------------------------|------------------------------|-------------------------------|----------------------------|-----------------------------|---------------------------|
| $\mathbb{G}_{5,0}^{(1,0;a)}(T_1, 1)$ |           | 0  | 0                             | 0                          | 0                          | 0                            | 0                          | $\frac{\sqrt{30}i}{192}$ | 0                            | $-\frac{5\sqrt{70}i}{448}$ | 0                            | $\frac{5\sqrt{42}i}{192}$     | 0                          | $-\frac{\sqrt{210}i}{64}$   | 0                         |
|                                      |           | 0  | 0                             | 0                          | 0                          | 0                            | 0                          | 0                        | $-\frac{23\sqrt{42}i}{1344}$ | 0                          | $\frac{13\sqrt{210}i}{1344}$ | 0                             | $-\frac{\sqrt{14}i}{64}$   | 0                           | $-\frac{7\sqrt{6}i}{64}$  |
|                                      |           | 0  | 0                             | 0                          | 0                          | 0                            | 0                          | $-\frac{7\sqrt{3}i}{96}$ | 0                            | $\frac{11\sqrt{7}i}{224}$  | 0                            | $-\frac{\sqrt{105}i}{672}$    | 0                          | $-\frac{\sqrt{21}i}{32}$    | 0                         |
|                                      |           | 0  | 0                             | 0                          | 0                          | 0                            | 0                          | 0                        | $\frac{\sqrt{21}i}{32}$      | 0                          | $\frac{\sqrt{105}i}{672}$    | 0                             | $-\frac{11\sqrt{7}i}{224}$ | 0                           | $\frac{7\sqrt{3}i}{96}$   |
|                                      |           | 0  | 0                             | 0                          | 0                          | 0                            | 0                          | $\frac{7\sqrt{6}i}{64}$  | 0                            | $\frac{\sqrt{14}i}{64}$    | 0                            | $-\frac{13\sqrt{210}i}{1344}$ | 0                          | $\frac{23\sqrt{42}i}{1344}$ | 0                         |
|                                      |           | 0  | 0                             | 0                          | 0                          | 0                            | 0                          | 0                        | $\frac{\sqrt{210}i}{64}$     | 0                          | $-\frac{5\sqrt{42}i}{192}$   | 0                             | $\frac{5\sqrt{70}i}{448}$  | 0                           | $-\frac{\sqrt{30}i}{192}$ |
|                                      |           | $-\frac{\sqrt{30}i}{192}$  | 0                             | $\frac{7\sqrt{3}i}{96}$    | 0                          | $-\frac{7\sqrt{6}i}{64}$     | 0                          | 0                        | 0                            | 0                          | 0                            | 0                             | 0                          | 0                           | 0                         |
|                                      |           | 0  | $\frac{23\sqrt{42}i}{1344}$   | 0                          | $-\frac{\sqrt{21}i}{32}$   | 0                            | $-\frac{\sqrt{210}i}{64}$  | 0                        | 0                            | 0                          | 0                            | 0                             | 0                          | 0                           | 0                         |
|                                      |           | $\frac{5\sqrt{70}i}{448}$  | 0                             | $-\frac{11\sqrt{7}i}{224}$ | 0                          | $-\frac{\sqrt{14}i}{64}$     | 0                          | 0                        | 0                            | 0                          | 0                            | 0                             | 0                          | 0                           | 0                         |
|                                      |           | 0  | $-\frac{13\sqrt{210}i}{1344}$ | 0                          | $-\frac{\sqrt{105}i}{672}$ | 0                            | $\frac{5\sqrt{42}i}{192}$  | 0                        | 0                            | 0                          | 0                            | 0                             | 0                          | 0                           | 0                         |
|                                      |           | $-\frac{5\sqrt{42}i}{192}$   | 0                             | $\frac{\sqrt{105}i}{672}$  | 0                          | $\frac{13\sqrt{210}i}{1344}$ | 0                          | 0                        | 0                            | 0                          | 0                            | 0                             | 0                          | 0                           | 0                         |
|                                      |           | 0  | $\frac{\sqrt{14}i}{64}$       | 0                          | $\frac{11\sqrt{7}i}{224}$  | 0                            | $-\frac{5\sqrt{70}i}{448}$ | 0                        | 0                            | 0                          | 0                            | 0                             | 0                          | 0                           | 0                         |
|                                      |           | $\frac{\sqrt{210}i}{64}$   | 0                             | $\frac{\sqrt{21}i}{32}$    | 0                          | $-\frac{23\sqrt{42}i}{1344}$ | 0                          | 0                        | 0                            | 0                          | 0                            | 0                             | 0                          | 0                           | 0                         |
|                                      |           | 0  | $\frac{7\sqrt{6}i}{64}$       | 0                          | $-\frac{7\sqrt{3}i}{96}$   | 0                            | $\frac{\sqrt{30}i}{192}$   | 0                        | 0                            | 0                          | 0                            | 0                             | 0                          | 0                           | 0                         |
| 912                                  | symmetry  | $\frac{y(15x^4 - 40x^2y^2 + 30x^2z^2 + 8y^4 - 40y^2z^2 + 15z^4)}{8}$ |                               |                            |                            |                              |                            |                          |                              |                            |                              |                               |                            |                             |                           |

*continued ...*

Table 10

| No.                                  | multipole | matrix   |                             |                           |                           |                             |                           |                            |   |                             |   |                             |   |                            |   |
|--------------------------------------|-----------|--|-----------------------------|---------------------------|---------------------------|-----------------------------|---------------------------|----------------------------|---|-----------------------------|---|-----------------------------|---|----------------------------|---|
| $\mathbb{G}_{5,1}^{(1,0;a)}(T_1, 1)$ |           | 0  | 0                           | 0                         | 0                         | 0                           | 0                         | $-\frac{\sqrt{30}}{192}$   | 0 | $-\frac{5\sqrt{70}}{448}$   | 0 | $-\frac{5\sqrt{42}}{192}$   | 0 | $-\frac{\sqrt{210}}{64}$   | 0 |
|                                      |           | 0  | 0                           | 0                         | 0                         | 0                           | 0                         | $\frac{23\sqrt{42}}{1344}$ | 0 | $\frac{13\sqrt{210}}{1344}$ | 0 | $\frac{\sqrt{14}}{64}$      | 0 | $-\frac{7\sqrt{6}}{64}$    | 0 |
|                                      |           | 0  | 0                           | 0                         | 0                         | 0                           | 0                         | $-\frac{7\sqrt{3}}{96}$    | 0 | $-\frac{11\sqrt{7}}{224}$   | 0 | $-\frac{\sqrt{105}}{672}$   | 0 | $\frac{\sqrt{21}}{32}$     | 0 |
|                                      |           | 0  | 0                           | 0                         | 0                         | 0                           | 0                         | $\frac{\sqrt{21}}{32}$     | 0 | $-\frac{\sqrt{105}}{672}$   | 0 | $-\frac{11\sqrt{7}}{224}$   | 0 | $-\frac{7\sqrt{3}}{96}$    | 0 |
|                                      |           | 0  | 0                           | 0                         | 0                         | 0                           | 0                         | $-\frac{7\sqrt{6}}{64}$    | 0 | $\frac{\sqrt{14}}{64}$      | 0 | $\frac{13\sqrt{210}}{1344}$ | 0 | $\frac{23\sqrt{42}}{1344}$ | 0 |
|                                      |           | 0  | 0                           | 0                         | 0                         | 0                           | 0                         | $-\frac{\sqrt{210}}{64}$   | 0 | $-\frac{5\sqrt{42}}{192}$   | 0 | $-\frac{5\sqrt{70}}{448}$   | 0 | $-\frac{\sqrt{30}}{192}$   | 0 |
|                                      |           | $-\frac{\sqrt{30}}{192}$                                   | 0                           | $-\frac{7\sqrt{3}}{96}$   | 0                         | $-\frac{7\sqrt{6}}{64}$     | 0                         | 0                          | 0 | 0                           | 0 | 0                           | 0 | 0                          | 0 |
|                                      |           | 0  | $\frac{23\sqrt{42}}{1344}$  | 0                         | $\frac{\sqrt{21}}{32}$    | 0                           | $-\frac{\sqrt{210}}{64}$  | 0                          | 0 | 0                           | 0 | 0                           | 0 | 0                          | 0 |
|                                      |           | $-\frac{5\sqrt{70}}{448}$                                  | 0                           | $-\frac{11\sqrt{7}}{224}$ | 0                         | $\frac{\sqrt{14}}{64}$      | 0                         | 0                          | 0 | 0                           | 0 | 0                           | 0 | 0                          | 0 |
|                                      |           | 0  | $\frac{13\sqrt{210}}{1344}$ | 0                         | $-\frac{\sqrt{105}}{672}$ | 0                           | $-\frac{5\sqrt{42}}{192}$ | 0                          | 0 | 0                           | 0 | 0                           | 0 | 0                          | 0 |
|                                      |           | $-\frac{5\sqrt{42}}{192}$                                  | 0                           | $-\frac{\sqrt{105}}{672}$ | 0                         | $\frac{13\sqrt{210}}{1344}$ | 0                         | 0                          | 0 | 0                           | 0 | 0                           | 0 | 0                          | 0 |
|                                      |           | 0  | $\frac{\sqrt{14}}{64}$      | 0                         | $-\frac{11\sqrt{7}}{224}$ | 0                           | $-\frac{5\sqrt{70}}{448}$ | 0                          | 0 | 0                           | 0 | 0                           | 0 | 0                          | 0 |
|                                      |           | $-\frac{\sqrt{210}}{64}$                                   | 0                           | $\frac{\sqrt{21}}{32}$    | 0                         | $\frac{23\sqrt{42}}{1344}$  | 0                         | 0                          | 0 | 0                           | 0 | 0                           | 0 | 0                          | 0 |
|                                      |           | 0  | $-\frac{7\sqrt{6}}{64}$     | 0                         | $-\frac{7\sqrt{3}}{96}$   | 0                           | $-\frac{\sqrt{30}}{192}$  | 0                          | 0 | 0                           | 0 | 0                           | 0 | 0                          | 0 |
| 913                                  | symmetry  | $\frac{z(15x^4+30x^2y^2-40x^2z^2+15y^4-40y^2z^2+8z^4)}{8}$ |                             |                           |                           |                             |                           |                            |   |                             |   |                             |   |                            |   |

*continued ...*

Table 10

| No.                                  | multipole | matrix  |                           |                          |                          |                           |                          |   |                           |                          |                           |                           |                          |                           |   |
|--------------------------------------|-----------|---|---------------------------|--------------------------|--------------------------|---------------------------|--------------------------|---|---------------------------|--------------------------|---------------------------|---------------------------|--------------------------|---------------------------|---|
| $\mathbb{G}_{5,2}^{(1,0;a)}(T_1, 1)$ |           | 0   | 0                         | 0                        | 0                        | 0                         | 0                        | 0 | $-\frac{\sqrt{210}i}{84}$ | 0                        | 0                         | 0                         | 0                        | 0                         | 0 |
|                                      |           | 0   | 0                         | 0                        | 0                        | 0                         | 0                        | 0 | 0                         | $\frac{3\sqrt{14}i}{28}$ | 0                         | 0                         | 0                        | 0                         | 0 |
|                                      |           | 0   | 0                         | 0                        | 0                        | 0                         | 0                        | 0 | 0                         | 0                        | $-\frac{\sqrt{105}i}{42}$ | 0                         | 0                        | 0                         | 0 |
|                                      |           | 0   | 0                         | 0                        | 0                        | 0                         | 0                        | 0 | 0                         | 0                        | 0                         | $-\frac{\sqrt{105}i}{42}$ | 0                        | 0                         | 0 |
|                                      |           | 0   | 0                         | 0                        | 0                        | 0                         | 0                        | 0 | 0                         | 0                        | 0                         | 0                         | $\frac{3\sqrt{14}i}{28}$ | 0                         | 0 |
|                                      |           | 0   | 0                         | 0                        | 0                        | 0                         | 0                        | 0 | 0                         | 0                        | 0                         | 0                         | 0                        | $-\frac{\sqrt{210}i}{84}$ | 0 |
|                                      |           | 0   | 0                         | 0                        | 0                        | 0                         | 0                        | 0 | 0                         | 0                        | 0                         | 0                         | 0                        | 0                         | 0 |
|                                      |           | $\frac{\sqrt{210}i}{84}$                          | 0                         | 0                        | 0                        | 0                         | 0                        | 0 | 0                         | 0                        | 0                         | 0                         | 0                        | 0                         | 0 |
|                                      |           | 0   | $-\frac{3\sqrt{14}i}{28}$ | 0                        | 0                        | 0                         | 0                        | 0 | 0                         | 0                        | 0                         | 0                         | 0                        | 0                         | 0 |
|                                      |           | 0   | 0                         | $\frac{\sqrt{105}i}{42}$ | 0                        | 0                         | 0                        | 0 | 0                         | 0                        | 0                         | 0                         | 0                        | 0                         | 0 |
|                                      |           | 0   | 0                         | 0                        | $\frac{\sqrt{105}i}{42}$ | 0                         | 0                        | 0 | 0                         | 0                        | 0                         | 0                         | 0                        | 0                         | 0 |
|                                      |           | 0   | 0                         | 0                        | 0                        | $-\frac{3\sqrt{14}i}{28}$ | 0                        | 0 | 0                         | 0                        | 0                         | 0                         | 0                        | 0                         | 0 |
|                                      |           | 0   | 0                         | 0                        | 0                        | 0                         | $\frac{\sqrt{210}i}{84}$ | 0 | 0                         | 0                        | 0                         | 0                         | 0                        | 0                         | 0 |
|                                      |           | 0   | 0                         | 0                        | 0                        | 0                         | 0                        | 0 | 0                         | 0                        | 0                         | 0                         | 0                        | 0                         | 0 |
| 914                                  | symmetry  | $\frac{3\sqrt{35}x(y^2-2yz-z^2)(y^2+2yz-z^2)}{8}$ |                           |                          |                          |                           |                          |   |                           |                          |                           |                           |                          |                           |   |

*continued ...*

Table 10

| No.                                  | multipole | matrix  |                            |                             |                            |                             |                           |                             |   |                            |   |                            |   |                             |   |
|--------------------------------------|-----------|---|----------------------------|-----------------------------|----------------------------|-----------------------------|---------------------------|-----------------------------|---|----------------------------|---|----------------------------|---|-----------------------------|---|
| $\mathbb{G}_{5,0}^{(1,0;a)}(T_1, 2)$ |           | 0   | 0                          | 0                           | 0                          | 0                           | 0                         | $\frac{\sqrt{42}i}{192}$    | 0 | $-\frac{5\sqrt{2}i}{64}$   | 0 | $-\frac{3\sqrt{30}i}{64}$  | 0 | $-\frac{5\sqrt{6}i}{192}$   | 0 |
|                                      |           | 0   | 0                          | 0                           | 0                          | 0                           | 0                         | $-\frac{23\sqrt{30}i}{960}$ | 0 | $\frac{13\sqrt{6}i}{192}$  | 0 | $\frac{9\sqrt{10}i}{320}$  | 0 | $-\frac{\sqrt{210}i}{192}$  |   |
|                                      |           | 0   | 0                          | 0                           | 0                          | 0                           | 0                         | $\frac{3\sqrt{105}i}{160}$  | 0 | $\frac{11\sqrt{5}i}{160}$  | 0 | $-\frac{\sqrt{3}i}{96}$    | 0 | $\frac{9\sqrt{15}i}{160}$   | 0 |
|                                      |           | 0   | 0                          | 0                           | 0                          | 0                           | 0                         | $-\frac{9\sqrt{15}i}{160}$  | 0 | $\frac{\sqrt{5}i}{96}$     | 0 | $-\frac{11\sqrt{5}i}{160}$ | 0 | $-\frac{3\sqrt{105}i}{160}$ |   |
|                                      |           | 0   | 0                          | 0                           | 0                          | 0                           | 0                         | $\frac{\sqrt{210}i}{192}$   | 0 | $-\frac{9\sqrt{10}i}{320}$ | 0 | $-\frac{13\sqrt{6}i}{192}$ | 0 | $\frac{23\sqrt{30}i}{960}$  | 0 |
|                                      |           | 0   | 0                          | 0                           | 0                          | 0                           | 0                         | $\frac{5\sqrt{6}i}{192}$    | 0 | $\frac{3\sqrt{30}i}{64}$   | 0 | $\frac{5\sqrt{2}i}{64}$    | 0 | $-\frac{\sqrt{42}i}{192}$   |   |
|                                      |           | $-\frac{\sqrt{42}i}{192}$                         | 0                          | $-\frac{3\sqrt{105}i}{160}$ | 0                          | $-\frac{\sqrt{210}i}{192}$  | 0                         | 0                           | 0 | 0                          | 0 | 0                          | 0 | 0                           | 0 |
|                                      |           | 0   | $\frac{23\sqrt{30}i}{960}$ | 0                           | $\frac{9\sqrt{15}i}{160}$  | 0                           | $-\frac{5\sqrt{6}i}{192}$ | 0                           | 0 | 0                          | 0 | 0                          | 0 | 0                           | 0 |
|                                      |           | $\frac{5\sqrt{2}i}{64}$                           | 0                          | $-\frac{11\sqrt{5}i}{160}$  | 0                          | $\frac{9\sqrt{10}i}{320}$   | 0                         | 0                           | 0 | 0                          | 0 | 0                          | 0 | 0                           | 0 |
|                                      |           | 0   | $-\frac{13\sqrt{6}i}{192}$ | 0                           | $-\frac{\sqrt{3}i}{96}$    | 0                           | $-\frac{3\sqrt{30}i}{64}$ | 0                           | 0 | 0                          | 0 | 0                          | 0 | 0                           | 0 |
|                                      |           | $\frac{3\sqrt{30}i}{64}$                          | 0                          | $\frac{\sqrt{3}i}{96}$      | 0                          | $\frac{13\sqrt{6}i}{192}$   | 0                         | 0                           | 0 | 0                          | 0 | 0                          | 0 | 0                           | 0 |
|                                      |           | 0   | $-\frac{9\sqrt{10}i}{320}$ | 0                           | $\frac{11\sqrt{5}i}{160}$  | 0                           | $-\frac{5\sqrt{2}i}{64}$  | 0                           | 0 | 0                          | 0 | 0                          | 0 | 0                           | 0 |
|                                      |           | $\frac{5\sqrt{6}i}{192}$                          | 0                          | $-\frac{9\sqrt{15}i}{160}$  | 0                          | $-\frac{23\sqrt{30}i}{960}$ | 0                         | 0                           | 0 | 0                          | 0 | 0                          | 0 | 0                           | 0 |
|                                      |           | 0   | $\frac{\sqrt{210}i}{192}$  | 0                           | $\frac{3\sqrt{105}i}{160}$ | 0                           | $\frac{\sqrt{42}i}{192}$  | 0                           | 0 | 0                          | 0 | 0                          | 0 | 0                           | 0 |
| 915                                  | symmetry  | $\frac{3\sqrt{35}y(x^2-2xz-z^2)(x^2+2xz-z^2)}{8}$ |                            |                             |                            |                             |                           |                             |   |                            |   |                            |   |                             |   |

*continued ...*

Table 10

| No.                                  | multipole | matrix  |                           |                           |                           |                           |                          |                           |   |                           |   |                           |   |                           |   |
|--------------------------------------|-----------|---|---------------------------|---------------------------|---------------------------|---------------------------|--------------------------|---------------------------|---|---------------------------|---|---------------------------|---|---------------------------|---|
| $\mathbb{G}_{5,1}^{(1,0;a)}(T_1, 2)$ |           | 0   | 0                         | 0                         | 0                         | 0                         | 0                        | $-\frac{\sqrt{42}}{192}$  | 0 | $-\frac{5\sqrt{2}}{64}$   | 0 | $\frac{3\sqrt{30}}{64}$   | 0 | $-\frac{5\sqrt{6}}{192}$  | 0 |
|                                      |           | 0   | 0                         | 0                         | 0                         | 0                         | 0                        | $\frac{23\sqrt{30}}{960}$ | 0 | $\frac{13\sqrt{6}}{192}$  | 0 | $-\frac{9\sqrt{10}}{320}$ | 0 | $-\frac{\sqrt{210}}{192}$ | 0 |
|                                      |           | 0   | 0                         | 0                         | 0                         | 0                         | 0                        | $\frac{3\sqrt{105}}{160}$ | 0 | $-\frac{11\sqrt{5}}{160}$ | 0 | $-\frac{\sqrt{3}}{96}$    | 0 | $-\frac{9\sqrt{15}}{160}$ | 0 |
|                                      |           | 0   | 0                         | 0                         | 0                         | 0                         | 0                        | $-\frac{9\sqrt{15}}{160}$ | 0 | $-\frac{\sqrt{3}}{96}$    | 0 | $-\frac{11\sqrt{5}}{160}$ | 0 | $\frac{3\sqrt{105}}{160}$ | 0 |
|                                      |           | 0   | 0                         | 0                         | 0                         | 0                         | 0                        | $-\frac{\sqrt{210}}{192}$ | 0 | $-\frac{9\sqrt{10}}{320}$ | 0 | $\frac{13\sqrt{6}}{192}$  | 0 | $\frac{23\sqrt{30}}{960}$ | 0 |
|                                      |           | 0   | 0                         | 0                         | 0                         | 0                         | 0                        | $-\frac{5\sqrt{6}}{192}$  | 0 | $\frac{3\sqrt{30}}{64}$   | 0 | $-\frac{5\sqrt{2}}{64}$   | 0 | $-\frac{\sqrt{42}}{192}$  | 0 |
|                                      |           | $-\frac{\sqrt{42}}{192}$                          | 0                         | $\frac{3\sqrt{105}}{160}$ | 0                         | $-\frac{\sqrt{210}}{192}$ | 0                        | 0                         | 0 | 0                         | 0 | 0                         | 0 | 0                         | 0 |
|                                      |           | 0   | $\frac{23\sqrt{30}}{960}$ | 0                         | $-\frac{9\sqrt{15}}{160}$ | 0                         | $-\frac{5\sqrt{6}}{192}$ | 0                         | 0 | 0                         | 0 | 0                         | 0 | 0                         | 0 |
|                                      |           | $-\frac{5\sqrt{2}}{64}$                           | 0                         | $-\frac{11\sqrt{5}}{160}$ | 0                         | $-\frac{9\sqrt{10}}{320}$ | 0                        | 0                         | 0 | 0                         | 0 | 0                         | 0 | 0                         | 0 |
|                                      |           | 0   | $\frac{13\sqrt{6}}{192}$  | 0                         | $-\frac{\sqrt{3}}{96}$    | 0                         | $\frac{3\sqrt{30}}{64}$  | 0                         | 0 | 0                         | 0 | 0                         | 0 | 0                         | 0 |
|                                      |           | $\frac{3\sqrt{30}}{64}$                           | 0                         | $-\frac{\sqrt{3}}{96}$    | 0                         | $\frac{13\sqrt{6}}{192}$  | 0                        | 0                         | 0 | 0                         | 0 | 0                         | 0 | 0                         | 0 |
|                                      |           | 0   | $-\frac{9\sqrt{10}}{320}$ | 0                         | $-\frac{11\sqrt{5}}{160}$ | 0                         | $-\frac{5\sqrt{2}}{64}$  | 0                         | 0 | 0                         | 0 | 0                         | 0 | 0                         | 0 |
|                                      |           | $-\frac{5\sqrt{6}}{192}$                          | 0                         | $-\frac{9\sqrt{15}}{160}$ | 0                         | $\frac{23\sqrt{30}}{960}$ | 0                        | 0                         | 0 | 0                         | 0 | 0                         | 0 | 0                         | 0 |
|                                      |           | 0   | $-\frac{\sqrt{210}}{192}$ | 0                         | $\frac{3\sqrt{105}}{160}$ | 0                         | $-\frac{\sqrt{42}}{192}$ | 0                         | 0 | 0                         | 0 | 0                         | 0 | 0                         | 0 |
| 916                                  | symmetry  | $\frac{3\sqrt{35}z(x^2-2xy-y^2)(x^2+2xy-y^2)}{8}$ |                           |                           |                           |                           |                          |                           |   |                           |   |                           |   |                           |   |

*continued ...*

Table 10

| No.                                  | multipole | matrix  |                         |                           |                           |                         |                       |                          |                          |                        |   |                        |                          |                          |  |
|--------------------------------------|-----------|---|-------------------------|---------------------------|---------------------------|-------------------------|-----------------------|--------------------------|--------------------------|------------------------|---|------------------------|--------------------------|--------------------------|--|
| $\mathbb{G}_{5,2}^{(1,0;a)}(T_1, 2)$ |           | 0   | 0                       | 0                         | 0                         | 0                       | 0                     | 0                        | 0                        | 0                      | 0 | $-\frac{\sqrt{2}i}{4}$ | 0                        | 0                        |  |
|                                      |           | 0   | 0                       | 0                         | 0                         | 0                       | 0                     | 0                        | 0                        | 0                      | 0 | 0                      | $-\frac{\sqrt{30}i}{60}$ | 0                        |  |
|                                      |           | 0   | 0                       | 0                         | 0                         | 0                       | 0                     | 0                        | 0                        | 0                      | 0 | 0                      | 0                        | $\frac{\sqrt{105}i}{30}$ |  |
|                                      |           | 0   | 0                       | 0                         | 0                         | 0                       | 0                     | $\frac{\sqrt{105}i}{30}$ | 0                        | 0                      | 0 | 0                      | 0                        | 0                        |  |
|                                      |           | 0   | 0                       | 0                         | 0                         | 0                       | 0                     | 0                        | $-\frac{\sqrt{30}i}{60}$ | 0                      | 0 | 0                      | 0                        | 0                        |  |
|                                      |           | 0   | 0                       | 0                         | 0                         | 0                       | 0                     | 0                        | 0                        | $-\frac{\sqrt{2}i}{4}$ | 0 | 0                      | 0                        | 0                        |  |
|                                      |           | 0   | 0                       | 0                         | $-\frac{\sqrt{105}i}{30}$ | 0                       | 0                     | 0                        | 0                        | 0                      | 0 | 0                      | 0                        | 0                        |  |
|                                      |           | 0   | 0                       | 0                         | 0                         | $\frac{\sqrt{30}i}{60}$ | 0                     | 0                        | 0                        | 0                      | 0 | 0                      | 0                        | 0                        |  |
|                                      |           | 0   | 0                       | 0                         | 0                         | 0                       | $\frac{\sqrt{2}i}{4}$ | 0                        | 0                        | 0                      | 0 | 0                      | 0                        | 0                        |  |
|                                      |           | 0   | 0                       | 0                         | 0                         | 0                       | 0                     | 0                        | 0                        | 0                      | 0 | 0                      | 0                        | 0                        |  |
|                                      |           | 0   | 0                       | 0                         | 0                         | 0                       | 0                     | 0                        | 0                        | 0                      | 0 | 0                      | 0                        | 0                        |  |
|                                      |           | $\frac{\sqrt{2}i}{4}$                           | 0                       | 0                         | 0                         | 0                       | 0                     | 0                        | 0                        | 0                      | 0 | 0                      | 0                        | 0                        |  |
|                                      |           | 0   | $\frac{\sqrt{30}i}{60}$ | 0                         | 0                         | 0                       | 0                     | 0                        | 0                        | 0                      | 0 | 0                      | 0                        | 0                        |  |
|                                      |           | 0   | 0                       | $-\frac{\sqrt{105}i}{30}$ | 0                         | 0                       | 0                     | 0                        | 0                        | 0                      | 0 | 0                      | 0                        | 0                        |  |
| 917                                  | symmetry  | $\frac{\sqrt{105}x(y-z)(y+z)(2x^2-y^2-z^2)}{4}$ |                         |                           |                           |                         |                       |                          |                          |                        |   |                        |                          |                          |  |

*continued ...*

Table 10

| No.                               | multipole | matrix  |                            |                             |                            |                             |                          |                             |   |                            |   |                             |   |                            |   |
|-----------------------------------|-----------|---|----------------------------|-----------------------------|----------------------------|-----------------------------|--------------------------|-----------------------------|---|----------------------------|---|-----------------------------|---|----------------------------|---|
| $\mathbb{G}_{5,0}^{(1,0;a)}(T_2)$ |           | 0   | 0                          | 0                           | 0                          | 0                           | 0                        | $\frac{\sqrt{14}i}{96}$     | 0 | $-\frac{5\sqrt{6}i}{96}$   | 0 | $\frac{\sqrt{10}i}{32}$     | 0 | $\frac{5\sqrt{2}i}{32}$    | 0 |
|                                   |           | 0   | 0                          | 0                           | 0                          | 0                           | 0                        | $-\frac{23\sqrt{10}i}{480}$ | 0 | $\frac{13\sqrt{2}i}{96}$   | 0 | $-\frac{\sqrt{30}i}{160}$   | 0 | $\frac{\sqrt{70}i}{32}$    | 0 |
|                                   |           | 0   | 0                          | 0                           | 0                          | 0                           | 0                        | $-\frac{\sqrt{35}i}{80}$    | 0 | $\frac{11\sqrt{15}i}{240}$ | 0 | $-\frac{i}{48}$             | 0 | $-\frac{3\sqrt{5}i}{80}$   | 0 |
|                                   |           | 0   | 0                          | 0                           | 0                          | 0                           | 0                        | $\frac{3\sqrt{5}i}{80}$     | 0 | $\frac{i}{48}$             | 0 | $-\frac{11\sqrt{15}i}{240}$ | 0 | $\frac{\sqrt{35}i}{80}$    | 0 |
|                                   |           | 0   | 0                          | 0                           | 0                          | 0                           | 0                        | $-\frac{\sqrt{70}i}{32}$    | 0 | $\frac{\sqrt{30}i}{160}$   | 0 | $-\frac{13\sqrt{2}i}{96}$   | 0 | $\frac{23\sqrt{10}i}{480}$ | 0 |
|                                   |           | 0   | 0                          | 0                           | 0                          | 0                           | 0                        | $-\frac{5\sqrt{2}i}{32}$    | 0 | $-\frac{\sqrt{10}i}{32}$   | 0 | $\frac{5\sqrt{6}i}{96}$     | 0 | $-\frac{\sqrt{14}i}{96}$   | 0 |
|                                   |           | $-\frac{\sqrt{14}i}{96}$                        | 0                          | $\frac{\sqrt{35}i}{80}$     | 0                          | $\frac{\sqrt{70}i}{32}$     | 0                        | 0                           | 0 | 0                          | 0 | 0                           | 0 | 0                          | 0 |
|                                   |           | 0   | $\frac{23\sqrt{10}i}{480}$ | 0                           | $-\frac{3\sqrt{5}i}{80}$   | 0                           | $\frac{5\sqrt{2}i}{32}$  | 0                           | 0 | 0                          | 0 | 0                           | 0 | 0                          | 0 |
|                                   |           | $\frac{5\sqrt{6}i}{96}$                         | 0                          | $-\frac{11\sqrt{15}i}{240}$ | 0                          | $-\frac{\sqrt{30}i}{160}$   | 0                        | 0                           | 0 | 0                          | 0 | 0                           | 0 | 0                          | 0 |
|                                   |           | 0   | $-\frac{13\sqrt{2}i}{96}$  | 0                           | $-\frac{i}{48}$            | 0                           | $\frac{\sqrt{10}i}{32}$  | 0                           | 0 | 0                          | 0 | 0                           | 0 | 0                          | 0 |
|                                   |           | $-\frac{\sqrt{10}i}{32}$                        | 0                          | $\frac{i}{48}$              | 0                          | $\frac{13\sqrt{2}i}{96}$    | 0                        | 0                           | 0 | 0                          | 0 | 0                           | 0 | 0                          | 0 |
|                                   |           | 0   | $\frac{\sqrt{30}i}{160}$   | 0                           | $\frac{11\sqrt{15}i}{240}$ | 0                           | $-\frac{5\sqrt{6}i}{96}$ | 0                           | 0 | 0                          | 0 | 0                           | 0 | 0                          | 0 |
|                                   |           | $-\frac{5\sqrt{2}i}{32}$                        | 0                          | $\frac{3\sqrt{5}i}{80}$     | 0                          | $-\frac{23\sqrt{10}i}{480}$ | 0                        | 0                           | 0 | 0                          | 0 | 0                           | 0 | 0                          | 0 |
|                                   |           | 0   | $-\frac{\sqrt{70}i}{32}$   | 0                           | $-\frac{\sqrt{35}i}{80}$   | 0                           | $\frac{\sqrt{14}i}{96}$  | 0                           | 0 | 0                          | 0 | 0                           | 0 | 0                          | 0 |
| 918                               | symmetry  | $\frac{\sqrt{105}y(x-z)(x+z)(x^2-2y^2+z^2)}{4}$ |                            |                             |                            |                             |                          |                             |   |                            |   |                             |   |                            |   |

*continued ...*



Table 10

| No. | multipole                         | matrix   |                            |                           |                           |                            |                         |                            |                         |                           |                        |                           |                        |                            |                        |
|-----|-----------------------------------|--|----------------------------|---------------------------|---------------------------|----------------------------|-------------------------|----------------------------|-------------------------|---------------------------|------------------------|---------------------------|------------------------|----------------------------|------------------------|
| 919 | $\mathbb{G}_{5,1}^{(1,0;a)}(T_2)$ | 0  | 0                          | 0                         | 0                         | 0                          | 0                       | $\frac{\sqrt{14}}{96}$     | 0                       | $\frac{5\sqrt{6}}{96}$    | 0                      | $\frac{\sqrt{10}}{32}$    | 0                      | $-\frac{5\sqrt{2}}{32}$    | 0                      |
|     |                                   | 0  | 0                          | 0                         | 0                         | 0                          | 0                       | $-\frac{23\sqrt{10}}{480}$ | 0                       | $-\frac{13\sqrt{2}}{96}$  | 0                      | $-\frac{\sqrt{30}}{160}$  | 0                      | $-\frac{\sqrt{70}}{32}$    | 0                      |
|     |                                   | 0  | 0                          | 0                         | 0                         | 0                          | 0                       | $\frac{\sqrt{35}}{80}$     | 0                       | $\frac{11\sqrt{15}}{240}$ | 0                      | $\frac{1}{48}$            | 0                      | $-\frac{3\sqrt{5}}{80}$    | 0                      |
|     |                                   | 0  | 0                          | 0                         | 0                         | 0                          | 0                       | $-\frac{3\sqrt{5}}{80}$    | 0                       | $\frac{1}{48}$            | 0                      | $\frac{11\sqrt{15}}{240}$ | 0                      | $\frac{\sqrt{35}}{80}$     | 0                      |
|     |                                   | 0  | 0                          | 0                         | 0                         | 0                          | 0                       | $-\frac{\sqrt{70}}{32}$    | 0                       | $-\frac{\sqrt{30}}{160}$  | 0                      | $-\frac{13\sqrt{2}}{96}$  | 0                      | $-\frac{23\sqrt{10}}{480}$ | 0                      |
|     |                                   | 0  | 0                          | 0                         | 0                         | 0                          | 0                       | 0                          | $-\frac{5\sqrt{2}}{32}$ | 0                         | $\frac{\sqrt{10}}{32}$ | 0                         | $\frac{5\sqrt{6}}{96}$ | 0                          | $\frac{\sqrt{14}}{96}$ |
|     |                                   | $\frac{\sqrt{14}}{96}$                           | 0                          | $\frac{\sqrt{35}}{80}$    | 0                         | $-\frac{\sqrt{70}}{32}$    | 0                       | 0                          | 0                       | 0                         | 0                      | 0                         | 0                      | 0                          | 0                      |
|     |                                   | 0  | $-\frac{23\sqrt{10}}{480}$ | 0                         | $-\frac{3\sqrt{5}}{80}$   | 0                          | $-\frac{5\sqrt{2}}{32}$ | 0                          | 0                       | 0                         | 0                      | 0                         | 0                      | 0                          | 0                      |
|     |                                   | $\frac{5\sqrt{6}}{96}$                           | 0                          | $\frac{11\sqrt{15}}{240}$ | 0                         | $-\frac{\sqrt{30}}{160}$   | 0                       | 0                          | 0                       | 0                         | 0                      | 0                         | 0                      | 0                          | 0                      |
|     |                                   | 0  | $-\frac{13\sqrt{2}}{96}$   | 0                         | $\frac{1}{48}$            | 0                          | $\frac{\sqrt{10}}{32}$  | 0                          | 0                       | 0                         | 0                      | 0                         | 0                      | 0                          | 0                      |
|     |                                   | $\frac{\sqrt{10}}{32}$                           | 0                          | $\frac{1}{48}$            | 0                         | $-\frac{13\sqrt{2}}{96}$   | 0                       | 0                          | 0                       | 0                         | 0                      | 0                         | 0                      | 0                          | 0                      |
|     |                                   | 0  | $-\frac{\sqrt{30}}{160}$   | 0                         | $\frac{11\sqrt{15}}{240}$ | 0                          | $\frac{5\sqrt{6}}{96}$  | 0                          | 0                       | 0                         | 0                      | 0                         | 0                      | 0                          | 0                      |
|     |                                   | $-\frac{5\sqrt{2}}{32}$                          | 0                          | $-\frac{3\sqrt{5}}{80}$   | 0                         | $-\frac{23\sqrt{10}}{480}$ | 0                       | 0                          | 0                       | 0                         | 0                      | 0                         | 0                      | 0                          | 0                      |
|     |                                   | 0  | $-\frac{\sqrt{70}}{32}$    | 0                         | $\frac{\sqrt{35}}{80}$    | 0                          | $\frac{\sqrt{14}}{96}$  | 0                          | 0                       | 0                         | 0                      | 0                         | 0                      | 0                          | 0                      |
| 919 | symmetry                          | $-\frac{\sqrt{105}z(x-y)(x+y)(x^2+y^2-2z^2)}{4}$ |                            |                           |                           |                            |                         |                            |                         |                           |                        |                           |                        |                            |                        |

*continued ...*

Table 10

| No.                               | multipole | matrix                                 |                          |                          |                          |                          |                         |                         |                          |                         |                          |                          |                         |                          |                         |
|-----------------------------------|-----------|--|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|-------------------------|--------------------------|-------------------------|--------------------------|--------------------------|-------------------------|--------------------------|-------------------------|
| $\mathbb{G}_{5,2}^{(1,0;a)}(T_2)$ |           | 0                                      | 0                        | 0                        | 0                        | 0                        | 0                       | 0                       | 0                        | 0                       | $-\frac{\sqrt{10}i}{12}$ | 0                        | 0                       | 0                        | 0                       |
|                                   |           | 0                                      | 0                        | 0                        | 0                        | 0                        | 0                       | $\frac{\sqrt{70}i}{60}$ | 0                        | 0                       | 0                        | $\frac{\sqrt{2}i}{6}$    | 0                       | 0                        | 0                       |
|                                   |           | 0                                      | 0                        | 0                        | 0                        | 0                        | 0                       | 0                       | $-\frac{2\sqrt{5}i}{15}$ | 0                       | 0                        | 0                        | $\frac{\sqrt{15}i}{30}$ | 0                        | 0                       |
|                                   |           | 0                                      | 0                        | 0                        | 0                        | 0                        | 0                       | 0                       | 0                        | $\frac{\sqrt{15}i}{30}$ | 0                        | 0                        | 0                       | $-\frac{2\sqrt{5}i}{15}$ | 0                       |
|                                   |           | 0                                      | 0                        | 0                        | 0                        | 0                        | 0                       | 0                       | 0                        | 0                       | $\frac{\sqrt{2}i}{6}$    | 0                        | 0                       | 0                        | $\frac{\sqrt{70}i}{60}$ |
|                                   |           | 0                                      | 0                        | 0                        | 0                        | 0                        | 0                       | 0                       | 0                        | 0                       | 0                        | $-\frac{\sqrt{10}i}{12}$ | 0                       | 0                        | 0                       |
|                                   |           | 0                                      | $-\frac{\sqrt{70}i}{60}$ | 0                        | 0                        | 0                        | 0                       | 0                       | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        | 0                       |
|                                   |           | 0                                      | 0                        | $\frac{2\sqrt{5}i}{15}$  | 0                        | 0                        | 0                       | 0                       | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        | 0                       |
|                                   |           | 0                                      | 0                        | 0                        | $-\frac{\sqrt{15}i}{30}$ | 0                        | 0                       | 0                       | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        | 0                       |
|                                   |           | $\frac{\sqrt{10}i}{12}$                | 0                        | 0                        | 0                        | $-\frac{\sqrt{2}i}{6}$   | 0                       | 0                       | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        | 0                       |
|                                   |           | 0                                      | $-\frac{\sqrt{2}i}{6}$   | 0                        | 0                        | 0                        | $\frac{\sqrt{10}i}{12}$ | 0                       | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        | 0                       |
|                                   |           | 0                                      | 0                        | $-\frac{\sqrt{15}i}{30}$ | 0                        | 0                        | 0                       | 0                       | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        | 0                       |
|                                   |           | 0                                      | 0                        | 0                        | $\frac{2\sqrt{5}i}{15}$  | 0                        | 0                       | 0                       | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        | 0                       |
|                                   |           | 0                                      | 0                        | 0                        | 0                        | $-\frac{\sqrt{70}i}{60}$ | 0                       | 0                       | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        | 0                       |
| 920                               | symmetry  | $-\frac{x^2}{2} - \frac{y^2}{2} + z^2$ |                          |                          |                          |                          |                         |                         |                          |                         |                          |                          |                         |                          |                         |

*continued ...*

Table 10

| No.                             | multipole | matrix                         |                          |                          |                         |                         |                          |   |                          |                         |                         |                          |                          |                           |   |
|---------------------------------|-----------|--------------------------------|--------------------------|--------------------------|-------------------------|-------------------------|--------------------------|---|--------------------------|-------------------------|-------------------------|--------------------------|--------------------------|---------------------------|---|
| $\mathbb{T}_{2,0}^{(1,0;a)}(E)$ |           | 0                              | 0                        | 0                        | 0                       | 0                       | 0                        | 0 | $\frac{5\sqrt{42}i}{84}$ | 0                       | 0                       | 0                        | 0                        | 0                         | 0 |
|                                 |           | 0                              | 0                        | 0                        | 0                       | 0                       | 0                        | 0 | 0                        | $\frac{\sqrt{70}i}{28}$ | 0                       | 0                        | 0                        | 0                         | 0 |
|                                 |           | 0                              | 0                        | 0                        | 0                       | 0                       | 0                        | 0 | 0                        | 0                       | $\frac{\sqrt{21}i}{42}$ | 0                        | 0                        | 0                         | 0 |
|                                 |           | 0                              | 0                        | 0                        | 0                       | 0                       | 0                        | 0 | 0                        | 0                       | 0                       | $-\frac{\sqrt{21}i}{42}$ | 0                        | 0                         | 0 |
|                                 |           | 0                              | 0                        | 0                        | 0                       | 0                       | 0                        | 0 | 0                        | 0                       | 0                       | 0                        | $-\frac{\sqrt{70}i}{28}$ | 0                         | 0 |
|                                 |           | 0                              | 0                        | 0                        | 0                       | 0                       | 0                        | 0 | 0                        | 0                       | 0                       | 0                        | 0                        | $-\frac{5\sqrt{42}i}{84}$ | 0 |
|                                 |           | 0                              | 0                        | 0                        | 0                       | 0                       | 0                        | 0 | 0                        | 0                       | 0                       | 0                        | 0                        | 0                         | 0 |
|                                 |           | $-\frac{5\sqrt{42}i}{84}$      | 0                        | 0                        | 0                       | 0                       | 0                        | 0 | 0                        | 0                       | 0                       | 0                        | 0                        | 0                         | 0 |
|                                 |           | 0                              | $-\frac{\sqrt{70}i}{28}$ | 0                        | 0                       | 0                       | 0                        | 0 | 0                        | 0                       | 0                       | 0                        | 0                        | 0                         | 0 |
|                                 |           | 0                              | 0                        | $-\frac{\sqrt{21}i}{42}$ | 0                       | 0                       | 0                        | 0 | 0                        | 0                       | 0                       | 0                        | 0                        | 0                         | 0 |
|                                 |           | 0                              | 0                        | 0                        | $\frac{\sqrt{21}i}{42}$ | 0                       | 0                        | 0 | 0                        | 0                       | 0                       | 0                        | 0                        | 0                         | 0 |
|                                 |           | 0                              | 0                        | 0                        | 0                       | $\frac{\sqrt{70}i}{28}$ | 0                        | 0 | 0                        | 0                       | 0                       | 0                        | 0                        | 0                         | 0 |
|                                 |           | 0                              | 0                        | 0                        | 0                       | 0                       | $\frac{5\sqrt{42}i}{84}$ | 0 | 0                        | 0                       | 0                       | 0                        | 0                        | 0                         | 0 |
|                                 |           | 0                              | 0                        | 0                        | 0                       | 0                       | 0                        | 0 | 0                        | 0                       | 0                       | 0                        | 0                        | 0                         | 0 |
| 921                             | symmetry  | $\frac{\sqrt{3}(x-y)(x+y)}{2}$ |                          |                          |                         |                         |                          |   |                          |                         |                         |                          |                          |                           |   |

*continued ...*

Table 10

| No.                             | multipole | matrix                   |                          |                           |                          |                          |                         |                          |                          |                           |                          |                          |                          |                         |                         |
|---------------------------------|-----------|--------------------------|--------------------------|---------------------------|--------------------------|--------------------------|-------------------------|--------------------------|--------------------------|---------------------------|--------------------------|--------------------------|--------------------------|-------------------------|-------------------------|
| $\mathbb{T}_{2,1}^{(1,0;a)}(E)$ |           | 0                        | 0                        | 0                         | 0                        | 0                        | 0                       | 0                        | 0                        | 0                         | $\frac{\sqrt{70}i}{84}$  | 0                        | 0                        | 0                       | 0                       |
|                                 |           | 0                        | 0                        | 0                         | 0                        | 0                        | 0                       | $-\frac{\sqrt{10}i}{12}$ | 0                        | 0                         | 0                        | $\frac{\sqrt{14}i}{21}$  | 0                        | 0                       | 0                       |
|                                 |           | 0                        | 0                        | 0                         | 0                        | 0                        | 0                       | 0                        | $-\frac{\sqrt{35}i}{21}$ | 0                         | 0                        | 0                        | $\frac{\sqrt{105}i}{42}$ | 0                       | 0                       |
|                                 |           | 0                        | 0                        | 0                         | 0                        | 0                        | 0                       | 0                        | 0                        | $-\frac{\sqrt{105}i}{42}$ | 0                        | 0                        | 0                        | $\frac{\sqrt{35}i}{21}$ | 0                       |
|                                 |           | 0                        | 0                        | 0                         | 0                        | 0                        | 0                       | 0                        | 0                        | 0                         | $-\frac{\sqrt{14}i}{21}$ | 0                        | 0                        | 0                       | $\frac{\sqrt{10}i}{12}$ |
|                                 |           | 0                        | 0                        | 0                         | 0                        | 0                        | 0                       | 0                        | 0                        | 0                         | 0                        | $-\frac{\sqrt{70}i}{84}$ | 0                        | 0                       | 0                       |
|                                 |           | 0                        | $\frac{\sqrt{10}i}{12}$  | 0                         | 0                        | 0                        | 0                       | 0                        | 0                        | 0                         | 0                        | 0                        | 0                        | 0                       | 0                       |
|                                 |           | 0                        | 0                        | $\frac{\sqrt{35}i}{21}$   | 0                        | 0                        | 0                       | 0                        | 0                        | 0                         | 0                        | 0                        | 0                        | 0                       | 0                       |
|                                 |           | 0                        | 0                        | 0                         | $\frac{\sqrt{105}i}{42}$ | 0                        | 0                       | 0                        | 0                        | 0                         | 0                        | 0                        | 0                        | 0                       | 0                       |
|                                 |           | $-\frac{\sqrt{70}i}{84}$ | 0                        | 0                         | 0                        | $\frac{\sqrt{14}i}{21}$  | 0                       | 0                        | 0                        | 0                         | 0                        | 0                        | 0                        | 0                       | 0                       |
|                                 |           | 0                        | $-\frac{\sqrt{14}i}{21}$ | 0                         | 0                        | 0                        | $\frac{\sqrt{70}i}{84}$ | 0                        | 0                        | 0                         | 0                        | 0                        | 0                        | 0                       | 0                       |
|                                 |           | 0                        | 0                        | $-\frac{\sqrt{105}i}{42}$ | 0                        | 0                        | 0                       | 0                        | 0                        | 0                         | 0                        | 0                        | 0                        | 0                       | 0                       |
|                                 |           | 0                        | 0                        | 0                         | $-\frac{\sqrt{35}i}{21}$ | 0                        | 0                       | 0                        | 0                        | 0                         | 0                        | 0                        | 0                        | 0                       | 0                       |
|                                 |           | 0                        | 0                        | 0                         | 0                        | $-\frac{\sqrt{10}i}{12}$ | 0                       | 0                        | 0                        | 0                         | 0                        | 0                        | 0                        | 0                       | 0                       |
| 922                             | symmetry  | $\sqrt{3}yz$             |                          |                           |                          |                          |                         |                          |                          |                           |                          |                          |                          |                         |                         |

*continued ...*

Table 10

| No.                      | multipole | matrix                   |                           |                          |                         |                            |                           |                        |                         |                          |                           |                            |                           |                          |                         |
|--------------------------|-----------|--------------------------|---------------------------|--------------------------|-------------------------|----------------------------|---------------------------|------------------------|-------------------------|--------------------------|---------------------------|----------------------------|---------------------------|--------------------------|-------------------------|
| $T_{2,0}^{(1,0;a)}(T_2)$ |           | 0                        | 0                         | 0                        | 0                       | 0                          | 0                         | $\frac{5\sqrt{2}}{24}$ | 0                       | $\frac{5\sqrt{42}}{168}$ | 0                         | 0                          | 0                         | 0                        | 0                       |
|                          |           | 0                        | 0                         | 0                        | 0                       | 0                          | 0                         | 0                      | $\frac{\sqrt{70}}{168}$ | 0                        | $\frac{11\sqrt{14}}{168}$ | 0                          | 0                         | 0                        | 0                       |
|                          |           | 0                        | 0                         | 0                        | 0                       | 0                          | 0                         | 0                      | 0                       | $-\frac{\sqrt{105}}{84}$ | 0                         | $\frac{\sqrt{7}}{12}$      | 0                         | 0                        | 0                       |
|                          |           | 0                        | 0                         | 0                        | 0                       | 0                          | 0                         | 0                      | 0                       | 0                        | $-\frac{\sqrt{7}}{12}$    | 0                          | $\frac{\sqrt{105}}{84}$   | 0                        | 0                       |
|                          |           | 0                        | 0                         | 0                        | 0                       | 0                          | 0                         | 0                      | 0                       | 0                        | 0                         | $-\frac{11\sqrt{14}}{168}$ | 0                         | $-\frac{\sqrt{70}}{168}$ | 0                       |
|                          |           | 0                        | 0                         | 0                        | 0                       | 0                          | 0                         | 0                      | 0                       | 0                        | 0                         | 0                          | $-\frac{5\sqrt{42}}{168}$ | 0                        | $-\frac{5\sqrt{2}}{24}$ |
|                          |           | $\frac{5\sqrt{2}}{24}$   | 0                         | 0                        | 0                       | 0                          | 0                         | 0                      | 0                       | 0                        | 0                         | 0                          | 0                         | 0                        | 0                       |
|                          |           | 0                        | $\frac{\sqrt{70}}{168}$   | 0                        | 0                       | 0                          | 0                         | 0                      | 0                       | 0                        | 0                         | 0                          | 0                         | 0                        | 0                       |
|                          |           | $\frac{5\sqrt{42}}{168}$ | 0                         | $-\frac{\sqrt{105}}{84}$ | 0                       | 0                          | 0                         | 0                      | 0                       | 0                        | 0                         | 0                          | 0                         | 0                        | 0                       |
|                          |           | 0                        | $\frac{11\sqrt{14}}{168}$ | 0                        | $-\frac{\sqrt{7}}{12}$  | 0                          | 0                         | 0                      | 0                       | 0                        | 0                         | 0                          | 0                         | 0                        | 0                       |
|                          |           | 0                        | 0                         | $\frac{\sqrt{7}}{12}$    | 0                       | $-\frac{11\sqrt{14}}{168}$ | 0                         | 0                      | 0                       | 0                        | 0                         | 0                          | 0                         | 0                        | 0                       |
|                          |           | 0                        | 0                         | 0                        | $\frac{\sqrt{105}}{84}$ | 0                          | $-\frac{5\sqrt{42}}{168}$ | 0                      | 0                       | 0                        | 0                         | 0                          | 0                         | 0                        | 0                       |
|                          |           | 0                        | 0                         | 0                        | 0                       | $-\frac{\sqrt{70}}{168}$   | 0                         | 0                      | 0                       | 0                        | 0                         | 0                          | 0                         | 0                        | 0                       |
|                          |           | 0                        | 0                         | 0                        | 0                       | 0                          | $-\frac{5\sqrt{2}}{24}$   | 0                      | 0                       | 0                        | 0                         | 0                          | 0                         | 0                        | 0                       |
| 923                      | symmetry  | $\sqrt{3}xz$             |                           |                          |                         |                            |                           |                        |                         |                          |                           |                            |                           |                          |                         |

*continued ...*

Table 10

| No.                      | multipole | matrix                     |                             |                           |                           |                             |                            |                           |                          |                            |                            |                           |                           |                          |   |
|--------------------------|-----------|----------------------------|-----------------------------|---------------------------|---------------------------|-----------------------------|----------------------------|---------------------------|--------------------------|----------------------------|----------------------------|---------------------------|---------------------------|--------------------------|---|
| $T_{2,1}^{(1,0;a)}(T_2)$ |           | 0                          | 0                           | 0                         | 0                         | 0                           | 0                          | $-\frac{5\sqrt{2}i}{24}$  | 0                        | $\frac{5\sqrt{42}i}{168}$  | 0                          | 0                         | 0                         | 0                        | 0 |
|                          |           | 0                          | 0                           | 0                         | 0                         | 0                           | 0                          | $-\frac{\sqrt{70}i}{168}$ | 0                        | $\frac{11\sqrt{14}i}{168}$ | 0                          | 0                         | 0                         | 0                        | 0 |
|                          |           | 0                          | 0                           | 0                         | 0                         | 0                           | 0                          | 0                         | $\frac{\sqrt{105}i}{84}$ | 0                          | $\frac{\sqrt{7}i}{12}$     | 0                         | 0                         | 0                        | 0 |
|                          |           | 0                          | 0                           | 0                         | 0                         | 0                           | 0                          | 0                         | 0                        | $\frac{\sqrt{7}i}{12}$     | 0                          | $\frac{\sqrt{105}i}{84}$  | 0                         | 0                        | 0 |
|                          |           | 0                          | 0                           | 0                         | 0                         | 0                           | 0                          | 0                         | 0                        | 0                          | $\frac{11\sqrt{14}i}{168}$ | 0                         | $-\frac{\sqrt{70}i}{168}$ | 0                        | 0 |
|                          |           | 0                          | 0                           | 0                         | 0                         | 0                           | 0                          | 0                         | 0                        | 0                          | 0                          | $\frac{5\sqrt{42}i}{168}$ | 0                         | $-\frac{5\sqrt{2}i}{24}$ | 0 |
|                          |           | $\frac{5\sqrt{2}i}{24}$    | 0                           | 0                         | 0                         | 0                           | 0                          | 0                         | 0                        | 0                          | 0                          | 0                         | 0                         | 0                        | 0 |
|                          |           | 0                          | $\frac{\sqrt{70}i}{168}$    | 0                         | 0                         | 0                           | 0                          | 0                         | 0                        | 0                          | 0                          | 0                         | 0                         | 0                        | 0 |
|                          |           | $-\frac{5\sqrt{42}i}{168}$ | 0                           | $-\frac{\sqrt{105}i}{84}$ | 0                         | 0                           | 0                          | 0                         | 0                        | 0                          | 0                          | 0                         | 0                         | 0                        | 0 |
|                          |           | 0                          | $-\frac{11\sqrt{14}i}{168}$ | 0                         | $-\frac{\sqrt{7}i}{12}$   | 0                           | 0                          | 0                         | 0                        | 0                          | 0                          | 0                         | 0                         | 0                        | 0 |
|                          |           | 0                          | 0                           | $-\frac{\sqrt{7}i}{12}$   | 0                         | $-\frac{11\sqrt{14}i}{168}$ | 0                          | 0                         | 0                        | 0                          | 0                          | 0                         | 0                         | 0                        | 0 |
|                          |           | 0                          | 0                           | 0                         | $-\frac{\sqrt{105}i}{84}$ | 0                           | $-\frac{5\sqrt{42}i}{168}$ | 0                         | 0                        | 0                          | 0                          | 0                         | 0                         | 0                        | 0 |
|                          |           | 0                          | 0                           | 0                         | 0                         | $\frac{\sqrt{70}i}{168}$    | 0                          | 0                         | 0                        | 0                          | 0                          | 0                         | 0                         | 0                        | 0 |
|                          |           | 0                          | 0                           | 0                         | 0                         | 0                           | $\frac{5\sqrt{2}i}{24}$    | 0                         | 0                        | 0                          | 0                          | 0                         | 0                         | 0                        | 0 |
| 924                      | symmetry  | $\sqrt{3}xy$               |                             |                           |                           |                             |                            |                           |                          |                            |                            |                           |                           |                          |   |

*continued ...*

Table 10

| No.                      | multipole | matrix   |                        |                         |                         |                        |                        |                        |                        |                         |                        |                        |                         |                        |                        |
|--------------------------|-----------|--|------------------------|-------------------------|-------------------------|------------------------|------------------------|------------------------|------------------------|-------------------------|------------------------|------------------------|-------------------------|------------------------|------------------------|
| $T_{2,2}^{(1,0;a)}(T_2)$ |           | 0  | 0                      | 0                       | 0                       | 0                      | 0                      | 0                      | 0                      | 0                       | $\frac{\sqrt{70}}{84}$ | 0                      | 0                       | 0                      | 0                      |
|                          |           | 0  | 0                      | 0                       | 0                       | 0                      | 0                      | $\frac{\sqrt{10}}{12}$ | 0                      | 0                       | 0                      | $\frac{\sqrt{14}}{21}$ | 0                       | 0                      | 0                      |
|                          |           | 0  | 0                      | 0                       | 0                       | 0                      | 0                      | 0                      | $\frac{\sqrt{35}}{21}$ | 0                       | 0                      | 0                      | $\frac{\sqrt{105}}{42}$ | 0                      | 0                      |
|                          |           | 0  | 0                      | 0                       | 0                       | 0                      | 0                      | 0                      | 0                      | $\frac{\sqrt{105}}{42}$ | 0                      | 0                      | 0                       | $\frac{\sqrt{35}}{21}$ | 0                      |
|                          |           | 0  | 0                      | 0                       | 0                       | 0                      | 0                      | 0                      | 0                      | 0                       | $\frac{\sqrt{14}}{21}$ | 0                      | 0                       | 0                      | $\frac{\sqrt{10}}{12}$ |
|                          |           | 0  | 0                      | 0                       | 0                       | 0                      | 0                      | 0                      | 0                      | 0                       | 0                      | $\frac{\sqrt{70}}{84}$ | 0                       | 0                      | 0                      |
|                          |           | 0  | $\frac{\sqrt{10}}{12}$ | 0                       | 0                       | 0                      | 0                      | 0                      | 0                      | 0                       | 0                      | 0                      | 0                       | 0                      | 0                      |
|                          |           | 0  | 0                      | $\frac{\sqrt{35}}{21}$  | 0                       | 0                      | 0                      | 0                      | 0                      | 0                       | 0                      | 0                      | 0                       | 0                      | 0                      |
|                          |           | 0  | 0                      | 0                       | $\frac{\sqrt{105}}{42}$ | 0                      | 0                      | 0                      | 0                      | 0                       | 0                      | 0                      | 0                       | 0                      | 0                      |
|                          |           | $\frac{\sqrt{70}}{84}$                                     | 0                      | 0                       | 0                       | $\frac{\sqrt{14}}{21}$ | 0                      | 0                      | 0                      | 0                       | 0                      | 0                      | 0                       | 0                      | 0                      |
|                          |           | 0  | $\frac{\sqrt{14}}{21}$ | 0                       | 0                       | 0                      | $\frac{\sqrt{70}}{84}$ | 0                      | 0                      | 0                       | 0                      | 0                      | 0                       | 0                      | 0                      |
|                          |           | 0  | 0                      | $\frac{\sqrt{105}}{42}$ | 0                       | 0                      | 0                      | 0                      | 0                      | 0                       | 0                      | 0                      | 0                       | 0                      | 0                      |
|                          |           | 0  | 0                      | 0                       | $\frac{\sqrt{35}}{21}$  | 0                      | 0                      | 0                      | 0                      | 0                       | 0                      | 0                      | 0                       | 0                      | 0                      |
|                          |           | 0  | 0                      | 0                       | 0                       | $\frac{\sqrt{10}}{12}$ | 0                      | 0                      | 0                      | 0                       | 0                      | 0                      | 0                       | 0                      | 0                      |
| 925                      | symmetry  | $\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$ |                        |                         |                         |                        |                        |                        |                        |                         |                        |                        |                         |                        |                        |

*continued ...*

Table 10

| No.                  | multipole | matrix   |                          |                          |                          |                          |                            |                         |                           |                           |                         |                          |                            |                          |                          |
|----------------------|-----------|--|--------------------------|--------------------------|--------------------------|--------------------------|----------------------------|-------------------------|---------------------------|---------------------------|-------------------------|--------------------------|----------------------------|--------------------------|--------------------------|
| $T_4^{(1,0;a)}(A_1)$ |           | 0  | 0                        | 0                        | 0                        | 0                        | 0                          | 0                       | $-\frac{\sqrt{110}i}{44}$ | 0                         | 0                       | 0                        | $-\frac{\sqrt{330}i}{132}$ | 0                        | 0                        |
|                      |           | 0  | 0                        | 0                        | 0                        | 0                        | 0                          | 0                       | 0                         | $\frac{\sqrt{66}i}{33}$   | 0                       | 0                        | 0                          | $-\frac{\sqrt{22}i}{22}$ | 0                        |
|                      |           | 0  | 0                        | 0                        | 0                        | 0                        | 0                          | 0                       | 0                         | 0                         | $\frac{\sqrt{55}i}{44}$ | 0                        | 0                          | 0                        | $-\frac{\sqrt{77}i}{44}$ |
|                      |           | 0  | 0                        | 0                        | 0                        | 0                        | 0                          | $\frac{\sqrt{77}i}{44}$ | 0                         | 0                         | 0                       | $-\frac{\sqrt{55}i}{44}$ | 0                          | 0                        | 0                        |
|                      |           | 0  | 0                        | 0                        | 0                        | 0                        | 0                          | 0                       | $\frac{\sqrt{22}i}{22}$   | 0                         | 0                       | 0                        | $-\frac{\sqrt{66}i}{33}$   | 0                        | 0                        |
|                      |           | 0  | 0                        | 0                        | 0                        | 0                        | 0                          | 0                       | 0                         | $\frac{\sqrt{330}i}{132}$ | 0                       | 0                        | 0                          | $\frac{\sqrt{110}i}{44}$ | 0                        |
|                      |           | 0  | 0                        | 0                        | $-\frac{\sqrt{77}i}{44}$ | 0                        | 0                          | 0                       | 0                         | 0                         | 0                       | 0                        | 0                          | 0                        | 0                        |
|                      |           | $\frac{\sqrt{110}i}{44}$                                       | 0                        | 0                        | 0                        | $-\frac{\sqrt{22}i}{22}$ | 0                          | 0                       | 0                         | 0                         | 0                       | 0                        | 0                          | 0                        | 0                        |
|                      |           | 0  | $-\frac{\sqrt{66}i}{33}$ | 0                        | 0                        | 0                        | $-\frac{\sqrt{330}i}{132}$ | 0                       | 0                         | 0                         | 0                       | 0                        | 0                          | 0                        | 0                        |
|                      |           | 0  | 0                        | $-\frac{\sqrt{55}i}{44}$ | 0                        | 0                        | 0                          | 0                       | 0                         | 0                         | 0                       | 0                        | 0                          | 0                        | 0                        |
|                      |           | 0  | 0                        | 0                        | $\frac{\sqrt{55}i}{44}$  | 0                        | 0                          | 0                       | 0                         | 0                         | 0                       | 0                        | 0                          | 0                        | 0                        |
|                      |           | $\frac{\sqrt{330}i}{132}$                                      | 0                        | 0                        | 0                        | $\frac{\sqrt{66}i}{33}$  | 0                          | 0                       | 0                         | 0                         | 0                       | 0                        | 0                          | 0                        | 0                        |
|                      |           | 0  | $\frac{\sqrt{22}i}{22}$  | 0                        | 0                        | 0                        | $-\frac{\sqrt{110}i}{44}$  | 0                       | 0                         | 0                         | 0                       | 0                        | 0                          | 0                        | 0                        |
|                      |           | 0  | 0                        | $\frac{\sqrt{77}i}{44}$  | 0                        | 0                        | 0                          | 0                       | 0                         | 0                         | 0                       | 0                        | 0                          | 0                        | 0                        |
| 926                  | symmetry  | $-\frac{\sqrt{15}(x^4-12x^2y^2+6x^2z^2+y^4+6y^2z^2-2z^4)}{12}$ |                          |                          |                          |                          |                            |                         |                           |                           |                         |                          |                            |                          |                          |

*continued ...*



Table 10

| No.                             | multipole                  | matrix                                       |                            |                           |                            |                             |                            |                             |                            |                           |                            |                             |                            |                           |  |
|---------------------------------|----------------------------|--|----------------------------|---------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|----------------------------|---------------------------|----------------------------|-----------------------------|----------------------------|---------------------------|--|
| $\mathbb{T}_{4,0}^{(1,0;a)}(E)$ | 0                          | 0  | 0                          | 0                         | 0                          | 0                           | 0                          | $-\frac{5\sqrt{154}i}{308}$ | 0                          | 0                         | 0                          | $\frac{\sqrt{462}i}{132}$   | 0                          | 0                         |  |
|                                 | 0                          | 0  | 0                          | 0                         | 0                          | 0                           | 0                          | 0                           | $\frac{\sqrt{2310}i}{231}$ | 0                         | 0                          | 0                           | $\frac{\sqrt{770}i}{110}$  | 0                         |  |
|                                 | 0                          | 0  | 0                          | 0                         | 0                          | 0                           | 0                          | 0                           | 0                          | $\frac{5\sqrt{77}i}{308}$ | 0                          | 0                           | 0                          | $\frac{7\sqrt{55}i}{220}$ |  |
|                                 | 0                          | 0  | 0                          | 0                         | 0                          | 0                           | $-\frac{7\sqrt{55}i}{220}$ | 0                           | 0                          | 0                         | $-\frac{5\sqrt{77}i}{308}$ | 0                           | 0                          | 0                         |  |
|                                 | 0                          | 0  | 0                          | 0                         | 0                          | 0                           | 0                          | $-\frac{\sqrt{770}i}{110}$  | 0                          | 0                         | 0                          | $-\frac{\sqrt{2310}i}{231}$ | 0                          | 0                         |  |
|                                 | 0                          | 0  | 0                          | 0                         | 0                          | 0                           | 0                          | 0                           | $-\frac{\sqrt{462}i}{132}$ | 0                         | 0                          | 0                           | $\frac{5\sqrt{154}i}{308}$ | 0                         |  |
|                                 | 0                          | 0  | 0                          | $\frac{7\sqrt{55}i}{220}$ | 0                          | 0                           | 0                          | 0                           | 0                          | 0                         | 0                          | 0                           | 0                          | 0                         |  |
|                                 | $\frac{5\sqrt{154}i}{308}$ | 0  | 0                          | 0                         | $\frac{\sqrt{770}i}{110}$  | 0                           | 0                          | 0                           | 0                          | 0                         | 0                          | 0                           | 0                          | 0                         |  |
|                                 | 0                          | $-\frac{\sqrt{2310}i}{231}$                  | 0                          | 0                         | 0                          | $\frac{\sqrt{462}i}{132}$   | 0                          | 0                           | 0                          | 0                         | 0                          | 0                           | 0                          | 0                         |  |
|                                 | 0                          | 0  | $-\frac{5\sqrt{77}i}{308}$ | 0                         | 0                          | 0                           | 0                          | 0                           | 0                          | 0                         | 0                          | 0                           | 0                          | 0                         |  |
|                                 | 0                          | 0  | 0                          | $\frac{5\sqrt{77}i}{308}$ | 0                          | 0                           | 0                          | 0                           | 0                          | 0                         | 0                          | 0                           | 0                          | 0                         |  |
|                                 | $-\frac{\sqrt{462}i}{132}$ | 0  | 0                          | 0                         | $\frac{\sqrt{2310}i}{231}$ | 0                           | 0                          | 0                           | 0                          | 0                         | 0                          | 0                           | 0                          | 0                         |  |
|                                 | 0                          | $-\frac{\sqrt{770}i}{110}$                   | 0                          | 0                         | 0                          | $-\frac{5\sqrt{154}i}{308}$ | 0                          | 0                           | 0                          | 0                         | 0                          | 0                           | 0                          | 0                         |  |
|                                 | 0                          | 0  | $-\frac{7\sqrt{55}i}{220}$ | 0                         | 0                          | 0                           | 0                          | 0                           | 0                          | 0                         | 0                          | 0                           | 0                          | 0                         |  |
| 927                             | symmetry                   | $\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$ |                            |                           |                            |                             |                            |                             |                            |                           |                            |                             |                            |                           |  |

continued ...

Table 10

| No. | multipole                       | matrix                            |                            |                               |                               |                             |                            |                              |   |                            |                             |                               |                               |                            |
|-----|---------------------------------|-----------------------------------|----------------------------|-------------------------------|-------------------------------|-----------------------------|----------------------------|------------------------------|---|----------------------------|-----------------------------|-------------------------------|-------------------------------|----------------------------|
| 928 | $\mathbb{T}_{4,1}^{(1,0;a)}(E)$ | 0                                 | 0                          | 0                             | 0                             | 0                           | 0                          | 0                            | 0 | $\frac{\sqrt{2310}i}{154}$ | 0                           | 0                             | 0                             | 0                          |
|     |                                 | 0                                 | 0                          | 0                             | 0                             | 0                           | 0                          | $-\frac{3\sqrt{330}i}{220}$  | 0 | 0                          | $\frac{\sqrt{462}i}{308}$   | 0                             | 0                             | 0                          |
|     |                                 | 0                                 | 0                          | 0                             | 0                             | 0                           | 0                          | $\frac{9\sqrt{1155}i}{1540}$ | 0 | 0                          | 0                           | $-\frac{17\sqrt{385}i}{1540}$ | 0                             | 0                          |
|     |                                 | 0                                 | 0                          | 0                             | 0                             | 0                           | 0                          | $\frac{17\sqrt{385}i}{1540}$ | 0 | 0                          | 0                           | 0                             | $-\frac{9\sqrt{1155}i}{1540}$ | 0                          |
|     |                                 | 0                                 | 0                          | 0                             | 0                             | 0                           | 0                          | 0                            | 0 | $-\frac{\sqrt{462}i}{308}$ | 0                           | 0                             | 0                             | $\frac{3\sqrt{330}i}{220}$ |
|     |                                 | 0                                 | 0                          | 0                             | 0                             | 0                           | 0                          | 0                            | 0 | 0                          | $-\frac{\sqrt{2310}i}{154}$ | 0                             | 0                             | 0                          |
|     |                                 | 0                                 | $\frac{3\sqrt{330}i}{220}$ | 0                             | 0                             | 0                           | 0                          | 0                            | 0 | 0                          | 0                           | 0                             | 0                             | 0                          |
|     |                                 | 0                                 | 0                          | $-\frac{9\sqrt{1155}i}{1540}$ | 0                             | 0                           | 0                          | 0                            | 0 | 0                          | 0                           | 0                             | 0                             | 0                          |
|     |                                 | 0                                 | 0                          | 0                             | $-\frac{17\sqrt{385}i}{1540}$ | 0                           | 0                          | 0                            | 0 | 0                          | 0                           | 0                             | 0                             | 0                          |
|     |                                 | $-\frac{\sqrt{2310}i}{154}$       | 0                          | 0                             | 0                             | $\frac{\sqrt{462}i}{308}$   | 0                          | 0                            | 0 | 0                          | 0                           | 0                             | 0                             | 0                          |
|     |                                 | 0                                 | $-\frac{\sqrt{462}i}{308}$ | 0                             | 0                             | 0                           | $\frac{\sqrt{2310}i}{154}$ | 0                            | 0 | 0                          | 0                           | 0                             | 0                             | 0                          |
|     |                                 | 0                                 | 0                          | $\frac{17\sqrt{385}i}{1540}$  | 0                             | 0                           | 0                          | 0                            | 0 | 0                          | 0                           | 0                             | 0                             | 0                          |
|     |                                 | 0                                 | 0                          | 0                             | $\frac{9\sqrt{1155}i}{1540}$  | 0                           | 0                          | 0                            | 0 | 0                          | 0                           | 0                             | 0                             | 0                          |
|     |                                 | 0                                 | 0                          | 0                             | 0                             | $-\frac{3\sqrt{330}i}{220}$ | 0                          | 0                            | 0 | 0                          | 0                           | 0                             | 0                             | 0                          |
| 928 | symmetry                        | $\frac{\sqrt{35}yz(y-z)(y+z)}{2}$ |                            |                               |                               |                             |                            |                              |   |                            |                             |                               |                               |                            |

*continued ...*

Table 10

| No.                      | multipole | matrix                             |                             |                            |                             |                            |                           |                             |                            |                           |                        |                           |                            |                             |
|--------------------------|-----------|------------------------------------|-----------------------------|----------------------------|-----------------------------|----------------------------|---------------------------|-----------------------------|----------------------------|---------------------------|------------------------|---------------------------|----------------------------|-----------------------------|
| $T_{4,0}^{(1,0;a)}(T_1)$ |           | 0                                  | 0                           | 0                          | 0                           | 0                          | 0                         | $\frac{\sqrt{462}}{176}$    | 0                          | $\frac{5\sqrt{22}}{88}$   | 0                      | $\frac{\sqrt{330}}{176}$  | 0                          | 0                           |
|                          |           | 0                                  | 0                           | 0                          | 0                           | 0                          | 0                         | $-\frac{13\sqrt{330}}{880}$ | 0                          | $-\frac{\sqrt{66}}{88}$   | 0                      | $\frac{7\sqrt{110}}{880}$ | 0                          | 0                           |
|                          |           | 0                                  | 0                           | 0                          | 0                           | 0                          | 0                         | $\frac{3\sqrt{1155}}{880}$  | 0                          | $\frac{\sqrt{55}}{880}$   | 0                      | $-\frac{7\sqrt{33}}{176}$ | 0                          | $-\frac{\sqrt{165}}{880}$   |
|                          |           | 0                                  | 0                           | 0                          | 0                           | 0                          | 0                         | $\frac{\sqrt{165}}{880}$    | 0                          | $\frac{7\sqrt{33}}{176}$  | 0                      | $-\frac{\sqrt{55}}{880}$  | 0                          | $-\frac{3\sqrt{1155}}{880}$ |
|                          |           | 0                                  | 0                           | 0                          | 0                           | 0                          | 0                         | 0                           | $-\frac{7\sqrt{110}}{880}$ | 0                         | $\frac{\sqrt{66}}{88}$ | 0                         | $\frac{13\sqrt{330}}{880}$ | 0                           |
|                          |           | 0                                  | 0                           | 0                          | 0                           | 0                          | 0                         | 0                           | 0                          | $-\frac{\sqrt{330}}{176}$ | 0                      | $-\frac{5\sqrt{22}}{88}$  | 0                          | $-\frac{\sqrt{462}}{176}$   |
|                          |           | $\frac{\sqrt{462}}{176}$           | 0                           | $\frac{3\sqrt{1155}}{880}$ | 0                           | 0                          | 0                         | 0                           | 0                          | 0                         | 0                      | 0                         | 0                          | 0                           |
|                          |           | 0                                  | $-\frac{13\sqrt{330}}{880}$ | 0                          | $\frac{\sqrt{165}}{880}$    | 0                          | 0                         | 0                           | 0                          | 0                         | 0                      | 0                         | 0                          | 0                           |
|                          |           | $\frac{5\sqrt{22}}{88}$            | 0                           | $\frac{\sqrt{55}}{880}$    | 0                           | $-\frac{7\sqrt{110}}{880}$ | 0                         | 0                           | 0                          | 0                         | 0                      | 0                         | 0                          | 0                           |
|                          |           | 0                                  | $-\frac{\sqrt{66}}{88}$     | 0                          | $\frac{7\sqrt{33}}{176}$    | 0                          | $-\frac{\sqrt{330}}{176}$ | 0                           | 0                          | 0                         | 0                      | 0                         | 0                          | 0                           |
|                          |           | $\frac{\sqrt{330}}{176}$           | 0                           | $-\frac{7\sqrt{33}}{176}$  | 0                           | $\frac{\sqrt{66}}{88}$     | 0                         | 0                           | 0                          | 0                         | 0                      | 0                         | 0                          | 0                           |
|                          |           | 0                                  | $\frac{7\sqrt{110}}{880}$   | 0                          | $-\frac{\sqrt{55}}{880}$    | 0                          | $-\frac{5\sqrt{22}}{88}$  | 0                           | 0                          | 0                         | 0                      | 0                         | 0                          | 0                           |
|                          |           | 0                                  | 0                           | $-\frac{\sqrt{165}}{880}$  | 0                           | $\frac{13\sqrt{330}}{880}$ | 0                         | 0                           | 0                          | 0                         | 0                      | 0                         | 0                          | 0                           |
|                          |           | 0                                  | 0                           | 0                          | $-\frac{3\sqrt{1155}}{880}$ | 0                          | $-\frac{\sqrt{462}}{176}$ | 0                           | 0                          | 0                         | 0                      | 0                         | 0                          | 0                           |
| 929                      | symmetry  | $-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$ |                             |                            |                             |                            |                           |                             |                            |                           |                        |                           |                            |                             |

*continued ...*

Table 10

| No.                      | multipole | matrix                            |                             |                             |                             |                             |                            |                              |                            |                           |                           |                            |                              |                              |
|--------------------------|-----------|-----------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|----------------------------|------------------------------|----------------------------|---------------------------|---------------------------|----------------------------|------------------------------|------------------------------|
| $T_{4,1}^{(1,0;a)}(T_1)$ |           | 0                                 | 0                           | 0                           | 0                           | 0                           | 0                          | $\frac{\sqrt{462}i}{176}$    | 0                          | $-\frac{5\sqrt{22}i}{88}$ | 0                         | $\frac{\sqrt{330}i}{176}$  | 0                            | 0                            |
|                          |           | 0                                 | 0                           | 0                           | 0                           | 0                           | 0                          | $-\frac{13\sqrt{330}i}{880}$ | 0                          | $\frac{\sqrt{66}i}{88}$   | 0                         | $\frac{7\sqrt{110}i}{880}$ | 0                            | 0                            |
|                          |           | 0                                 | 0                           | 0                           | 0                           | 0                           | 0                          | $-\frac{3\sqrt{1155}i}{880}$ | 0                          | $\frac{\sqrt{55}i}{880}$  | 0                         | $\frac{7\sqrt{33}i}{176}$  | 0                            | $-\frac{\sqrt{165}i}{880}$   |
|                          |           | 0                                 | 0                           | 0                           | 0                           | 0                           | 0                          | $-\frac{\sqrt{165}i}{880}$   | 0                          | $\frac{7\sqrt{33}i}{176}$ | 0                         | $\frac{\sqrt{55}i}{880}$   | 0                            | $-\frac{3\sqrt{1155}i}{880}$ |
|                          |           | 0                                 | 0                           | 0                           | 0                           | 0                           | 0                          | 0                            | $\frac{7\sqrt{110}i}{880}$ | 0                         | $\frac{\sqrt{66}i}{88}$   | 0                          | $-\frac{13\sqrt{330}i}{880}$ | 0                            |
|                          |           | 0                                 | 0                           | 0                           | 0                           | 0                           | 0                          | 0                            | 0                          | 0                         | $\frac{\sqrt{330}i}{176}$ | 0                          | $-\frac{5\sqrt{22}i}{88}$    | $\frac{\sqrt{462}i}{176}$    |
|                          |           | $-\frac{\sqrt{462}i}{176}$        | 0                           | $\frac{3\sqrt{1155}i}{880}$ | 0                           | 0                           | 0                          | 0                            | 0                          | 0                         | 0                         | 0                          | 0                            | 0                            |
|                          |           | 0                                 | $\frac{13\sqrt{330}i}{880}$ | 0                           | $\frac{\sqrt{165}i}{880}$   | 0                           | 0                          | 0                            | 0                          | 0                         | 0                         | 0                          | 0                            | 0                            |
|                          |           | $\frac{5\sqrt{22}i}{88}$          | 0                           | $-\frac{\sqrt{55}i}{880}$   | 0                           | $-\frac{7\sqrt{110}i}{880}$ | 0                          | 0                            | 0                          | 0                         | 0                         | 0                          | 0                            | 0                            |
|                          |           | 0                                 | $-\frac{\sqrt{66}i}{88}$    | 0                           | $-\frac{7\sqrt{33}i}{176}$  | 0                           | $-\frac{\sqrt{330}i}{176}$ | 0                            | 0                          | 0                         | 0                         | 0                          | 0                            | 0                            |
|                          |           | $-\frac{\sqrt{330}i}{176}$        | 0                           | $-\frac{7\sqrt{33}i}{176}$  | 0                           | $-\frac{\sqrt{66}i}{88}$    | 0                          | 0                            | 0                          | 0                         | 0                         | 0                          | 0                            | 0                            |
|                          |           | 0                                 | $-\frac{7\sqrt{110}i}{880}$ | 0                           | $-\frac{\sqrt{55}i}{880}$   | 0                           | $\frac{5\sqrt{22}i}{88}$   | 0                            | 0                          | 0                         | 0                         | 0                          | 0                            | 0                            |
|                          |           | 0                                 | 0                           | $\frac{\sqrt{165}i}{880}$   | 0                           | $\frac{13\sqrt{330}i}{880}$ | 0                          | 0                            | 0                          | 0                         | 0                         | 0                          | 0                            | 0                            |
|                          |           | 0                                 | 0                           | 0                           | $\frac{3\sqrt{1155}i}{880}$ | 0                           | $-\frac{\sqrt{462}i}{176}$ | 0                            | 0                          | 0                         | 0                         | 0                          | 0                            | 0                            |
| 930                      | symmetry  | $\frac{\sqrt{35}xy(x-y)(x+y)}{2}$ |                             |                             |                             |                             |                            |                              |                            |                           |                           |                            |                              |                              |

continued ...

Table 10

| No.                               | multipole               | matrix  |                            |   |                            |                          |                         |                            |                          |                         |   |   |                         |                          |                            |
|-----------------------------------|-------------------------|---|----------------------------|---|----------------------------|--------------------------|-------------------------|----------------------------|--------------------------|-------------------------|---|---|-------------------------|--------------------------|----------------------------|
| $\mathbb{T}_{4,2}^{(1,0;a)}(T_1)$ |                         | 0   | 0                          | 0 | 0                          | 0                        | 0                       | 0                          | 0                        | 0                       | 0 | 0 | $-\frac{\sqrt{22}}{22}$ | 0                        | 0                          |
|                                   |                         | 0   | 0                          | 0 | 0                          | 0                        | 0                       | 0                          | 0                        | 0                       | 0 | 0 | 0                       | $-\frac{\sqrt{330}}{55}$ | 0                          |
|                                   |                         | 0   | 0                          | 0 | 0                          | 0                        | 0                       | 0                          | 0                        | 0                       | 0 | 0 | 0                       | 0                        | $-\frac{\sqrt{1155}}{110}$ |
|                                   |                         | 0   | 0                          | 0 | 0                          | 0                        | 0                       | $-\frac{\sqrt{1155}}{110}$ | 0                        | 0                       | 0 | 0 | 0                       | 0                        | 0                          |
|                                   |                         | 0   | 0                          | 0 | 0                          | 0                        | 0                       | 0                          | $-\frac{\sqrt{330}}{55}$ | 0                       | 0 | 0 | 0                       | 0                        | 0                          |
|                                   |                         | 0   | 0                          | 0 | 0                          | 0                        | 0                       | 0                          | 0                        | $-\frac{\sqrt{22}}{22}$ | 0 | 0 | 0                       | 0                        | 0                          |
|                                   |                         | 0   | 0                          | 0 | $-\frac{\sqrt{1155}}{110}$ | 0                        | 0                       | 0                          | 0                        | 0                       | 0 | 0 | 0                       | 0                        | 0                          |
|                                   |                         | 0   | 0                          | 0 | 0                          | $-\frac{\sqrt{330}}{55}$ | 0                       | 0                          | 0                        | 0                       | 0 | 0 | 0                       | 0                        | 0                          |
|                                   |                         | 0   | 0                          | 0 | 0                          | 0                        | $-\frac{\sqrt{22}}{22}$ | 0                          | 0                        | 0                       | 0 | 0 | 0                       | 0                        | 0                          |
|                                   |                         | 0   | 0                          | 0 | 0                          | 0                        | 0                       | 0                          | 0                        | 0                       | 0 | 0 | 0                       | 0                        | 0                          |
|                                   |                         | 0   | 0                          | 0 | 0                          | 0                        | 0                       | 0                          | 0                        | 0                       | 0 | 0 | 0                       | 0                        | 0                          |
|                                   | $-\frac{\sqrt{22}}{22}$ | 0   | 0                          | 0 | 0                          | 0                        | 0                       | 0                          | 0                        | 0                       | 0 | 0 | 0                       | 0                        | 0                          |
|                                   | 0                       | $-\frac{\sqrt{330}}{55}$                        | 0                          | 0 | 0                          | 0                        | 0                       | 0                          | 0                        | 0                       | 0 | 0 | 0                       | 0                        | 0                          |
|                                   | 0                       | 0   | $-\frac{\sqrt{1155}}{110}$ | 0 | 0                          | 0                        | 0                       | 0                          | 0                        | 0                       | 0 | 0 | 0                       | 0                        | 0                          |
| 931                               | symmetry                | $\frac{\sqrt{5}yz\left(6x^2-y^2-z^2\right)}{2}$ |                            |   |                            |                          |                         |                            |                          |                         |   |   |                         |                          |                            |

*continued ...*

Table 10

| No.                      | multipole | matrix                                |                               |                             |                            |                              |                            |                               |                           |                           |                          |                            |                              |                            |   |
|--------------------------|-----------|---------------------------------------|-------------------------------|-----------------------------|----------------------------|------------------------------|----------------------------|-------------------------------|---------------------------|---------------------------|--------------------------|----------------------------|------------------------------|----------------------------|---|
| $T_{4,0}^{(1,0;a)}(T_2)$ |           | 0                                     | 0                             | 0                           | 0                          | 0                            | 0                          | $\frac{\sqrt{66}}{176}$       | 0                         | $\frac{5\sqrt{154}}{616}$ | 0                        | $-\frac{\sqrt{2310}}{176}$ | 0                            | 0                          | 0 |
|                          |           | 0                                     | 0                             | 0                           | 0                          | 0                            | 0                          | $-\frac{13\sqrt{2310}}{6160}$ | 0                         | $-\frac{\sqrt{462}}{616}$ | 0                        | $-\frac{7\sqrt{770}}{880}$ | 0                            | 0                          | 0 |
|                          |           | 0                                     | 0                             | 0                           | 0                          | 0                            | 0                          | $-\frac{21\sqrt{165}}{880}$   | 0                         | $\frac{\sqrt{385}}{6160}$ | 0                        | $-\frac{\sqrt{231}}{176}$  | 0                            | $\frac{\sqrt{1155}}{880}$  | 0 |
|                          |           | 0                                     | 0                             | 0                           | 0                          | 0                            | 0                          | $-\frac{\sqrt{1155}}{880}$    | 0                         | $\frac{\sqrt{231}}{176}$  | 0                        | $-\frac{\sqrt{385}}{6160}$ | 0                            | $\frac{21\sqrt{165}}{880}$ | 0 |
|                          |           | 0                                     | 0                             | 0                           | 0                          | 0                            | 0                          | 0                             | $\frac{7\sqrt{770}}{880}$ | 0                         | $\frac{\sqrt{462}}{616}$ | 0                          | $\frac{13\sqrt{2310}}{6160}$ | 0                          | 0 |
|                          |           | 0                                     | 0                             | 0                           | 0                          | 0                            | 0                          | 0                             | 0                         | $\frac{\sqrt{2310}}{176}$ | 0                        | $-\frac{5\sqrt{154}}{616}$ | 0                            | $-\frac{\sqrt{66}}{176}$   | 0 |
|                          |           | $\frac{\sqrt{66}}{176}$               | 0                             | $-\frac{21\sqrt{165}}{880}$ | 0                          | 0                            | 0                          | 0                             | 0                         | 0                         | 0                        | 0                          | 0                            | 0                          | 0 |
|                          |           | 0                                     | $-\frac{13\sqrt{2310}}{6160}$ | 0                           | $-\frac{\sqrt{1155}}{880}$ | 0                            | 0                          | 0                             | 0                         | 0                         | 0                        | 0                          | 0                            | 0                          | 0 |
|                          |           | $\frac{5\sqrt{154}}{616}$             | 0                             | $\frac{\sqrt{385}}{6160}$   | 0                          | $\frac{7\sqrt{770}}{880}$    | 0                          | 0                             | 0                         | 0                         | 0                        | 0                          | 0                            | 0                          | 0 |
|                          |           | 0                                     | $-\frac{\sqrt{462}}{616}$     | 0                           | $\frac{\sqrt{231}}{176}$   | 0                            | $\frac{\sqrt{2310}}{176}$  | 0                             | 0                         | 0                         | 0                        | 0                          | 0                            | 0                          | 0 |
|                          |           | $-\frac{\sqrt{2310}}{176}$            | 0                             | $-\frac{\sqrt{231}}{176}$   | 0                          | $\frac{\sqrt{462}}{616}$     | 0                          | 0                             | 0                         | 0                         | 0                        | 0                          | 0                            | 0                          | 0 |
|                          |           | 0                                     | $-\frac{7\sqrt{770}}{880}$    | 0                           | $-\frac{\sqrt{385}}{6160}$ | 0                            | $-\frac{5\sqrt{154}}{616}$ | 0                             | 0                         | 0                         | 0                        | 0                          | 0                            | 0                          | 0 |
|                          |           | 0                                     | 0                             | $\frac{\sqrt{1155}}{880}$   | 0                          | $\frac{13\sqrt{2310}}{6160}$ | 0                          | 0                             | 0                         | 0                         | 0                        | 0                          | 0                            | 0                          | 0 |
|                          |           | 0                                     | 0                             | 0                           | $\frac{21\sqrt{165}}{880}$ | 0                            | $-\frac{\sqrt{66}}{176}$   | 0                             | 0                         | 0                         | 0                        | 0                          | 0                            | 0                          | 0 |
| 932                      | symmetry  | $-\frac{\sqrt{5}xz(x^2-6y^2+z^2)}{2}$ |                               |                             |                            |                              |                            |                               |                           |                           |                          |                            |                              |                            |   |

*continued ...*

Table 10

| No.                      | multipole | matrix                                |                                |                             |                             |                                |                             |                              |                               |                             |                            |                            |                             |                               |                              |
|--------------------------|-----------|---------------------------------------|--------------------------------|-----------------------------|-----------------------------|--------------------------------|-----------------------------|------------------------------|-------------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------|-------------------------------|------------------------------|
| $T_{4,1}^{(1,0;a)}(T_2)$ |           | 0                                     | 0                              | 0                           | 0                           | 0                              | 0                           | $-\frac{\sqrt{66}i}{176}$    | 0                             | $\frac{5\sqrt{154}i}{616}$  | 0                          | $\frac{\sqrt{2310}i}{176}$ | 0                           | 0                             | 0                            |
|                          |           | 0                                     | 0                              | 0                           | 0                           | 0                              | 0                           | 0                            | $\frac{13\sqrt{2310}i}{6160}$ | 0                           | $-\frac{\sqrt{462}i}{616}$ | 0                          | $\frac{7\sqrt{770}i}{880}$  | 0                             | 0                            |
|                          |           | 0                                     | 0                              | 0                           | 0                           | 0                              | 0                           | $-\frac{21\sqrt{165}i}{880}$ | 0                             | $-\frac{\sqrt{385}i}{6160}$ | 0                          | $-\frac{\sqrt{231}i}{176}$ | 0                           | $-\frac{\sqrt{1155}i}{880}$   | 0                            |
|                          |           | 0                                     | 0                              | 0                           | 0                           | 0                              | 0                           | 0                            | $-\frac{\sqrt{1155}i}{880}$   | 0                           | $-\frac{\sqrt{231}i}{176}$ | 0                          | $-\frac{\sqrt{385}i}{6160}$ | 0                             | $-\frac{21\sqrt{165}i}{880}$ |
|                          |           | 0                                     | 0                              | 0                           | 0                           | 0                              | 0                           | 0                            | 0                             | $\frac{7\sqrt{770}i}{880}$  | 0                          | $-\frac{\sqrt{462}i}{616}$ | 0                           | $\frac{13\sqrt{2310}i}{6160}$ | 0                            |
|                          |           | 0                                     | 0                              | 0                           | 0                           | 0                              | 0                           | 0                            | 0                             | 0                           | $\frac{\sqrt{2310}i}{176}$ | 0                          | $\frac{5\sqrt{154}i}{616}$  | 0                             | $-\frac{\sqrt{66}i}{176}$    |
|                          |           | $\frac{\sqrt{66}i}{176}$              | 0                              | $\frac{21\sqrt{165}i}{880}$ | 0                           | 0                              | 0                           | 0                            | 0                             | 0                           | 0                          | 0                          | 0                           | 0                             | 0                            |
|                          |           | 0                                     | $-\frac{13\sqrt{2310}i}{6160}$ | 0                           | $\frac{\sqrt{1155}i}{880}$  | 0                              | 0                           | 0                            | 0                             | 0                           | 0                          | 0                          | 0                           | 0                             | 0                            |
|                          |           | $-\frac{5\sqrt{154}i}{616}$           | 0                              | $\frac{\sqrt{385}i}{6160}$  | 0                           | $-\frac{7\sqrt{770}i}{880}$    | 0                           | 0                            | 0                             | 0                           | 0                          | 0                          | 0                           | 0                             | 0                            |
|                          |           | 0                                     | $\frac{\sqrt{462}i}{616}$      | 0                           | $\frac{\sqrt{231}i}{176}$   | 0                              | $-\frac{\sqrt{2310}i}{176}$ | 0                            | 0                             | 0                           | 0                          | 0                          | 0                           | 0                             | 0                            |
|                          |           | $-\frac{\sqrt{2310}i}{176}$           | 0                              | $\frac{\sqrt{231}i}{176}$   | 0                           | $\frac{\sqrt{462}i}{616}$      | 0                           | 0                            | 0                             | 0                           | 0                          | 0                          | 0                           | 0                             | 0                            |
|                          |           | 0                                     | $-\frac{7\sqrt{770}i}{880}$    | 0                           | $\frac{\sqrt{385}i}{6160}$  | 0                              | $-\frac{5\sqrt{154}i}{616}$ | 0                            | 0                             | 0                           | 0                          | 0                          | 0                           | 0                             | 0                            |
|                          |           | 0                                     | 0                              | $\frac{\sqrt{1155}i}{880}$  | 0                           | $-\frac{13\sqrt{2310}i}{6160}$ | 0                           | 0                            | 0                             | 0                           | 0                          | 0                          | 0                           | 0                             | 0                            |
|                          |           | 0                                     | 0                              | 0                           | $\frac{21\sqrt{165}i}{880}$ | 0                              | $\frac{\sqrt{66}i}{176}$    | 0                            | 0                             | 0                           | 0                          | 0                          | 0                           | 0                             | 0                            |
| 933                      | symmetry  | $-\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$ |                                |                             |                             |                                |                             |                              |                               |                             |                            |                            |                             |                               |                              |

continued ...

Table 10

| No.                      | multipole | matrix  |                            |                             |                             |                            |                            |                            |                             |                             |                            |                            |                             |                             |                            |
|--------------------------|-----------|---|----------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|----------------------------|
| $T_{4,2}^{(1,0;a)}(T_2)$ |           | 0   | 0                          | 0                           | 0                           | 0                          | 0                          | 0                          | 0                           | 0                           | $-\frac{\sqrt{2310}}{154}$ | 0                          | 0                           | 0                           | 0                          |
|                          |           | 0   | 0                          | 0                           | 0                           | 0                          | 0                          | $-\frac{3\sqrt{330}}{220}$ | 0                           | 0                           | 0                          | $-\frac{\sqrt{462}}{308}$  | 0                           | 0                           | 0                          |
|                          |           | 0   | 0                          | 0                           | 0                           | 0                          | 0                          | 0                          | $\frac{9\sqrt{1155}}{1540}$ | 0                           | 0                          | 0                          | $\frac{17\sqrt{385}}{1540}$ | 0                           | 0                          |
|                          |           | 0   | 0                          | 0                           | 0                           | 0                          | 0                          | 0                          | 0                           | $\frac{17\sqrt{385}}{1540}$ | 0                          | 0                          | 0                           | $\frac{9\sqrt{1155}}{1540}$ | 0                          |
|                          |           | 0   | 0                          | 0                           | 0                           | 0                          | 0                          | 0                          | 0                           | 0                           | $-\frac{\sqrt{462}}{308}$  | 0                          | 0                           | 0                           | $-\frac{3\sqrt{330}}{220}$ |
|                          |           | 0   | 0                          | 0                           | 0                           | 0                          | 0                          | 0                          | 0                           | 0                           | 0                          | $-\frac{\sqrt{2310}}{154}$ | 0                           | 0                           | 0                          |
|                          |           | 0   | $-\frac{3\sqrt{330}}{220}$ | 0                           | 0                           | 0                          | 0                          | 0                          | 0                           | 0                           | 0                          | 0                          | 0                           | 0                           | 0                          |
|                          |           | 0   | 0                          | $\frac{9\sqrt{1155}}{1540}$ | 0                           | 0                          | 0                          | 0                          | 0                           | 0                           | 0                          | 0                          | 0                           | 0                           | 0                          |
|                          |           | 0   | 0                          | 0                           | $\frac{17\sqrt{385}}{1540}$ | 0                          | 0                          | 0                          | 0                           | 0                           | 0                          | 0                          | 0                           | 0                           | 0                          |
|                          |           | $-\frac{\sqrt{2310}}{154}$  | 0                          | 0                           | 0                           | $-\frac{\sqrt{462}}{308}$  | 0                          | 0                          | 0                           | 0                           | 0                          | 0                          | 0                           | 0                           | 0                          |
|                          |           | 0   | $-\frac{\sqrt{462}}{308}$  | 0                           | 0                           | 0                          | $-\frac{\sqrt{2310}}{154}$ | 0                          | 0                           | 0                           | 0                          | 0                          | 0                           | 0                           | 0                          |
|                          |           | 0   | 0                          | $\frac{17\sqrt{385}}{1540}$ | 0                           | 0                          | 0                          | 0                          | 0                           | 0                           | 0                          | 0                          | 0                           | 0                           | 0                          |
|                          |           | 0   | 0                          | 0                           | $\frac{9\sqrt{1155}}{1540}$ | 0                          | 0                          | 0                          | 0                           | 0                           | 0                          | 0                          | 0                           | 0                           | 0                          |
|                          |           | 0   | 0                          | 0                           | 0                           | $-\frac{3\sqrt{330}}{220}$ | 0                          | 0                          | 0                           | 0                           | 0                          | 0                          | 0                           | 0                           | 0                          |
| 934                      | symmetry  | $\frac{\sqrt{2}(2x^6-15x^4y^2-15x^4z^2-15x^2y^4+180x^2y^2z^2-15x^2z^4+2y^6-15y^4z^2-15y^2z^4+2z^6)}{8}$ |                            |                             |                             |                            |                            |                            |                             |                             |                            |                            |                             |                             |                            |

*continued ...*



Table 10

| No.                           | multipole | matrix   |                             |                            |                             |                            |                           |                            |                             |                          |                           |                            |                           |                            |                             |
|-------------------------------|-----------|--|-----------------------------|----------------------------|-----------------------------|----------------------------|---------------------------|----------------------------|-----------------------------|--------------------------|---------------------------|----------------------------|---------------------------|----------------------------|-----------------------------|
| $\mathbb{T}_6^{(1,0;a)}(A_1)$ |           | 0  | 0                           | 0                          | 0                           | 0                          | 0                         | 0                          | $\frac{\sqrt{33}i}{264}$    | 0                        | 0                         | 0                          | $-\frac{7\sqrt{11}i}{88}$ | 0                          | 0                           |
|                               |           | 0  | 0                           | 0                          | 0                           | 0                          | 0                         | 0                          | 0                           | $-\frac{\sqrt{55}i}{88}$ | 0                         | 0                          | 0                         | $\frac{7\sqrt{165}i}{264}$ | 0                           |
|                               |           | 0  | 0                           | 0                          | 0                           | 0                          | 0                         | 0                          | 0                           | 0                        | $\frac{5\sqrt{66}i}{264}$ | 0                          | 0                         | 0                          | $-\frac{\sqrt{2310}i}{264}$ |
|                               |           | 0  | 0                           | 0                          | 0                           | 0                          | 0                         | $\frac{\sqrt{2310}i}{264}$ | 0                           | 0                        | 0                         | $-\frac{5\sqrt{66}i}{264}$ | 0                         | 0                          | 0                           |
|                               |           | 0  | 0                           | 0                          | 0                           | 0                          | 0                         | 0                          | $-\frac{7\sqrt{165}i}{264}$ | 0                        | 0                         | 0                          | $\frac{\sqrt{55}i}{88}$   | 0                          | 0                           |
|                               |           | 0  | 0                           | 0                          | 0                           | 0                          | 0                         | 0                          | 0                           | $\frac{7\sqrt{11}i}{88}$ | 0                         | 0                          | 0                         | $-\frac{\sqrt{33}i}{264}$  | 0                           |
|                               |           | 0  | 0                           | 0                          | $-\frac{\sqrt{2310}i}{264}$ | 0                          | 0                         | 0                          | 0                           | 0                        | 0                         | 0                          | 0                         | 0                          | 0                           |
|                               |           | $-\frac{\sqrt{33}i}{264}$                              | 0                           | 0                          | 0                           | $\frac{7\sqrt{165}i}{264}$ | 0                         | 0                          | 0                           | 0                        | 0                         | 0                          | 0                         | 0                          | 0                           |
|                               |           | 0  | $\frac{\sqrt{55}i}{88}$     | 0                          | 0                           | 0                          | $-\frac{7\sqrt{11}i}{88}$ | 0                          | 0                           | 0                        | 0                         | 0                          | 0                         | 0                          | 0                           |
|                               |           | 0  | 0                           | $-\frac{5\sqrt{66}i}{264}$ | 0                           | 0                          | 0                         | 0                          | 0                           | 0                        | 0                         | 0                          | 0                         | 0                          | 0                           |
|                               |           | 0  | 0                           | 0                          | $\frac{5\sqrt{66}i}{264}$   | 0                          | 0                         | 0                          | 0                           | 0                        | 0                         | 0                          | 0                         | 0                          | 0                           |
|                               |           | $\frac{7\sqrt{11}i}{88}$                               | 0                           | 0                          | 0                           | $-\frac{\sqrt{55}i}{88}$   | 0                         | 0                          | 0                           | 0                        | 0                         | 0                          | 0                         | 0                          | 0                           |
|                               |           | 0  | $-\frac{7\sqrt{165}i}{264}$ | 0                          | 0                           | 0                          | $\frac{\sqrt{33}i}{264}$  | 0                          | 0                           | 0                        | 0                         | 0                          | 0                         | 0                          | 0                           |
|                               |           | 0  | 0                           | $\frac{\sqrt{2310}i}{264}$ | 0                           | 0                          | 0                         | 0                          | 0                           | 0                        | 0                         | 0                          | 0                         | 0                          | 0                           |
| 935                           | symmetry  | $-\frac{\sqrt{2310}(x-y)(x+y)(x-z)(x+z)(y-z)(y+z)}{8}$ |                             |                            |                             |                            |                           |                            |                             |                          |                           |                            |                           |                            |                             |

*continued ...*

Table 10

| No.                           | multipole | matrix   |                          |                         |                          |                         |                         |                          |   |                         |                          |                          |   |                         |                       |
|-------------------------------|-----------|--|--------------------------|-------------------------|--------------------------|-------------------------|-------------------------|--------------------------|---|-------------------------|--------------------------|--------------------------|---|-------------------------|-----------------------|
| $\mathbb{T}_6^{(1,0;a)}(A_2)$ |           | 0  | 0                        | 0                       | 0                        | 0                       | 0                       | 0                        | 0 | 0                       | $-\frac{\sqrt{7}i}{24}$  | 0                        | 0 | 0                       | $\frac{\sqrt{5}i}{8}$ |
|                               |           | 0  | 0                        | 0                       | 0                        | 0                       | 0                       | $\frac{i}{24}$           | 0 | 0                       | 0                        | $\frac{\sqrt{35}i}{24}$  | 0 | 0                       | 0                     |
|                               |           | 0  | 0                        | 0                       | 0                        | 0                       | 0                       | $-\frac{\sqrt{14}i}{24}$ | 0 | 0                       | 0                        | $-\frac{\sqrt{42}i}{24}$ | 0 | 0                       | 0                     |
|                               |           | 0  | 0                        | 0                       | 0                        | 0                       | 0                       | 0                        | 0 | $\frac{\sqrt{42}i}{24}$ | 0                        | 0                        | 0 | $\frac{\sqrt{14}i}{24}$ | 0                     |
|                               |           | 0  | 0                        | 0                       | 0                        | 0                       | 0                       | 0                        | 0 | 0                       | $-\frac{\sqrt{35}i}{24}$ | 0                        | 0 | 0                       | $-\frac{i}{24}$       |
|                               |           | 0  | 0                        | 0                       | 0                        | 0                       | 0                       | $-\frac{\sqrt{5}i}{8}$   | 0 | 0                       | 0                        | $\frac{\sqrt{7}i}{24}$   | 0 | 0                       | 0                     |
|                               |           | 0  | $-\frac{i}{24}$          | 0                       | 0                        | 0                       | $\frac{\sqrt{5}i}{8}$   | 0                        | 0 | 0                       | 0                        | 0                        | 0 | 0                       | 0                     |
|                               |           | 0  | 0                        | $\frac{\sqrt{14}i}{24}$ | 0                        | 0                       | 0                       | 0                        | 0 | 0                       | 0                        | 0                        | 0 | 0                       | 0                     |
|                               |           | 0  | 0                        | 0                       | $-\frac{\sqrt{42}i}{24}$ | 0                       | 0                       | 0                        | 0 | 0                       | 0                        | 0                        | 0 | 0                       | 0                     |
|                               |           | $\frac{\sqrt{7}i}{24}$   | 0                        | 0                       | 0                        | $\frac{\sqrt{35}i}{24}$ | 0                       | 0                        | 0 | 0                       | 0                        | 0                        | 0 | 0                       | 0                     |
|                               |           | 0  | $-\frac{\sqrt{35}i}{24}$ | 0                       | 0                        | 0                       | $-\frac{\sqrt{7}i}{24}$ | 0                        | 0 | 0                       | 0                        | 0                        | 0 | 0                       | 0                     |
|                               |           | 0  | 0                        | $\frac{\sqrt{42}i}{24}$ | 0                        | 0                       | 0                       | 0                        | 0 | 0                       | 0                        | 0                        | 0 | 0                       | 0                     |
|                               |           | 0  | 0                        | 0                       | $-\frac{\sqrt{14}i}{24}$ | 0                       | 0                       | 0                        | 0 | 0                       | 0                        | 0                        | 0 | 0                       | 0                     |
|                               |           | $-\frac{\sqrt{5}i}{8}$   | 0                        | 0                       | 0                        | $\frac{i}{24}$          | 0                       | 0                        | 0 | 0                       | 0                        | 0                        | 0 | 0                       | 0                     |
| 936                           | symmetry  | $-\frac{\sqrt{14}(x^6-15x^4z^2+15x^2z^4+y^6-15y^4z^2+15y^2z^4-2z^6)}{8}$ |                          |                         |                          |                         |                         |                          |   |                         |                          |                          |   |                         |                       |

*continued ...*

Table 10

| No.                             | multipole | matrix  |                            |                             |                            |                             |                           |                            |                            |                           |                            |                             |                          |                             |                           |
|---------------------------------|-----------|---|----------------------------|-----------------------------|----------------------------|-----------------------------|---------------------------|----------------------------|----------------------------|---------------------------|----------------------------|-----------------------------|--------------------------|-----------------------------|---------------------------|
| $\mathbb{T}_{6,0}^{(1,0;a)}(E)$ |           | 0   | 0                          | 0                           | 0                          | 0                           | 0                         | 0                          | $\frac{\sqrt{231}i}{264}$  | 0                         | 0                          | 0                           | $\frac{\sqrt{77}i}{88}$  | 0                           | 0                         |
|                                 |           | 0   | 0                          | 0                           | 0                          | 0                           | 0                         | 0                          | 0                          | $-\frac{\sqrt{385}i}{88}$ | 0                          | 0                           | 0                        | $-\frac{\sqrt{1155}i}{264}$ | 0                         |
|                                 |           | 0   | 0                          | 0                           | 0                          | 0                           | 0                         | 0                          | 0                          | 0                         | $\frac{5\sqrt{462}i}{264}$ | 0                           | 0                        | 0                           | $\frac{\sqrt{330}i}{264}$ |
|                                 |           | 0   | 0                          | 0                           | 0                          | 0                           | 0                         | $-\frac{\sqrt{330}i}{264}$ | 0                          | 0                         | 0                          | $-\frac{5\sqrt{462}i}{264}$ | 0                        | 0                           | 0                         |
|                                 |           | 0   | 0                          | 0                           | 0                          | 0                           | 0                         | 0                          | $\frac{\sqrt{1155}i}{264}$ | 0                         | 0                          | 0                           | $\frac{\sqrt{385}i}{88}$ | 0                           | 0                         |
|                                 |           | 0   | 0                          | 0                           | 0                          | 0                           | 0                         | 0                          | 0                          | $-\frac{\sqrt{77}i}{88}$  | 0                          | 0                           | 0                        | $-\frac{\sqrt{231}i}{264}$  | 0                         |
|                                 |           | 0   | 0                          | 0                           | $\frac{\sqrt{330}i}{264}$  | 0                           | 0                         | 0                          | 0                          | 0                         | 0                          | 0                           | 0                        | 0                           | 0                         |
|                                 |           | $-\frac{\sqrt{231}i}{264}$  | 0                          | 0                           | 0                          | $-\frac{\sqrt{1155}i}{264}$ | 0                         | 0                          | 0                          | 0                         | 0                          | 0                           | 0                        | 0                           | 0                         |
|                                 |           | 0   | $\frac{\sqrt{385}i}{88}$   | 0                           | 0                          | 0                           | $\frac{\sqrt{77}i}{88}$   | 0                          | 0                          | 0                         | 0                          | 0                           | 0                        | 0                           | 0                         |
|                                 |           | 0   | 0                          | $-\frac{5\sqrt{462}i}{264}$ | 0                          | 0                           | 0                         | 0                          | 0                          | 0                         | 0                          | 0                           | 0                        | 0                           | 0                         |
|                                 |           | 0   | 0                          | 0                           | $\frac{5\sqrt{462}i}{264}$ | 0                           | 0                         | 0                          | 0                          | 0                         | 0                          | 0                           | 0                        | 0                           | 0                         |
|                                 |           | $-\frac{\sqrt{77}i}{88}$  | 0                          | 0                           | 0                          | $-\frac{\sqrt{385}i}{88}$   | 0                         | 0                          | 0                          | 0                         | 0                          | 0                           | 0                        | 0                           | 0                         |
|                                 |           | 0   | $\frac{\sqrt{1155}i}{264}$ | 0                           | 0                          | 0                           | $\frac{\sqrt{231}i}{264}$ | 0                          | 0                          | 0                         | 0                          | 0                           | 0                        | 0                           | 0                         |
|                                 |           | 0   | 0                          | $-\frac{\sqrt{330}i}{264}$  | 0                          | 0                           | 0                         | 0                          | 0                          | 0                         | 0                          | 0                           | 0                        | 0                           | 0                         |
| 937                             | symmetry  | $\frac{\sqrt{42}(x-y)(x+y)(x^4-9x^2y^2-5x^2z^2+y^4-5y^2z^2+5z^4)}{8}$ |                            |                             |                            |                             |                           |                            |                            |                           |                            |                             |                          |                             |                           |

*continued ...*

Table 10

| No.                             | multipole | matrix   |                           |                             |                            |                            |                           |                           |                           |                             |                           |                            |                            |                            |                          |
|---------------------------------|-----------|--|---------------------------|-----------------------------|----------------------------|----------------------------|---------------------------|---------------------------|---------------------------|-----------------------------|---------------------------|----------------------------|----------------------------|----------------------------|--------------------------|
| $\mathbb{T}_{6,1}^{(1,0;a)}(E)$ |           | 0  | 0                         | 0                           | 0                          | 0                          | 0                         | 0                         | 0                         | 0                           | $\frac{\sqrt{385}i}{264}$ | 0                          | 0                          | 0                          | $\frac{\sqrt{11}i}{8}$   |
|                                 |           | 0  | 0                         | 0                           | 0                          | 0                          | 0                         | $-\frac{\sqrt{55}i}{264}$ | 0                         | 0                           | 0                         | $-\frac{5\sqrt{77}i}{264}$ | 0                          | 0                          | 0                        |
|                                 |           | 0  | 0                         | 0                           | 0                          | 0                          | 0                         | 0                         | $\frac{\sqrt{770}i}{264}$ | 0                           | 0                         | 0                          | $\frac{\sqrt{2310}i}{264}$ | 0                          | 0                        |
|                                 |           | 0  | 0                         | 0                           | 0                          | 0                          | 0                         | 0                         | 0                         | $-\frac{\sqrt{2310}i}{264}$ | 0                         | 0                          | 0                          | $-\frac{\sqrt{770}i}{264}$ | 0                        |
|                                 |           | 0  | 0                         | 0                           | 0                          | 0                          | 0                         | 0                         | 0                         | 0                           | $\frac{5\sqrt{77}i}{264}$ | 0                          | 0                          | 0                          | $\frac{\sqrt{55}i}{264}$ |
|                                 |           | 0  | 0                         | 0                           | 0                          | 0                          | 0                         | $-\frac{\sqrt{11}i}{8}$   | 0                         | 0                           | 0                         | 0                          | $-\frac{\sqrt{385}i}{264}$ | 0                          | 0                        |
|                                 |           | 0  | $\frac{\sqrt{55}i}{264}$  | 0                           | 0                          | 0                          | 0                         | $\frac{\sqrt{11}i}{8}$    | 0                         | 0                           | 0                         | 0                          | 0                          | 0                          | 0                        |
|                                 |           | 0  | 0                         | $-\frac{\sqrt{770}i}{264}$  | 0                          | 0                          | 0                         | 0                         | 0                         | 0                           | 0                         | 0                          | 0                          | 0                          | 0                        |
|                                 |           | 0  | 0                         | 0                           | $\frac{\sqrt{2310}i}{264}$ | 0                          | 0                         | 0                         | 0                         | 0                           | 0                         | 0                          | 0                          | 0                          | 0                        |
|                                 |           | $-\frac{\sqrt{385}i}{264}$                       | 0                         | 0                           | 0                          | $-\frac{5\sqrt{77}i}{264}$ | 0                         | 0                         | 0                         | 0                           | 0                         | 0                          | 0                          | 0                          | 0                        |
|                                 |           | 0  | $\frac{5\sqrt{77}i}{264}$ | 0                           | 0                          | 0                          | $\frac{\sqrt{385}i}{264}$ | 0                         | 0                         | 0                           | 0                         | 0                          | 0                          | 0                          | 0                        |
|                                 |           | 0  | 0                         | $-\frac{\sqrt{2310}i}{264}$ | 0                          | 0                          | 0                         | 0                         | 0                         | 0                           | 0                         | 0                          | 0                          | 0                          | 0                        |
|                                 |           | 0  | 0                         | 0                           | $\frac{\sqrt{770}i}{264}$  | 0                          | 0                         | 0                         | 0                         | 0                           | 0                         | 0                          | 0                          | 0                          | 0                        |
|                                 |           | $-\frac{\sqrt{11}i}{8}$                          | 0                         | 0                           | 0                          | $-\frac{\sqrt{55}i}{264}$  | 0                         | 0                         | 0                         | 0                           | 0                         | 0                          | 0                          | 0                          | 0                        |
| 938                             | symmetry  | $\frac{3\sqrt{7}yz(y-z)(y+z)(10x^2-y^2-z^2)}{4}$ |                           |                             |                            |                            |                           |                           |                           |                             |                           |                            |                            |                            |                          |

*continued ...*

Table 10

| No.                      | multipole | matrix   |                             |                            |                            |                            |                           |                             |   |                             |   |                            |   |                            |   |
|--------------------------|-----------|--|-----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|-----------------------------|---|-----------------------------|---|----------------------------|---|----------------------------|---|
| $T_{6,0}^{(1,0;a)}(T_1)$ |           | 0  | 0                           | 0                          | 0                          | 0                          | 0                         | $\frac{\sqrt{66}}{1056}$    | 0 | $\frac{\sqrt{154}}{352}$    | 0 | $-\frac{\sqrt{2310}}{352}$ | 0 | $-\frac{\sqrt{462}}{96}$   | 0 |
|                          |           | 0  | 0                           | 0                          | 0                          | 0                          | 0                         | $-\frac{\sqrt{2310}}{1056}$ | 0 | $-\frac{5\sqrt{462}}{1056}$ | 0 | $\frac{3\sqrt{770}}{352}$  | 0 | $\frac{\sqrt{330}}{96}$    | 0 |
|                          |           | 0  | 0                           | 0                          | 0                          | 0                          | 0                         | $-\frac{\sqrt{165}}{176}$   | 0 | $\frac{\sqrt{385}}{176}$    | 0 | $\frac{5\sqrt{231}}{528}$  | 0 | $-\frac{\sqrt{1155}}{176}$ | 0 |
|                          |           | 0  | 0                           | 0                          | 0                          | 0                          | 0                         | $\frac{\sqrt{1155}}{176}$   | 0 | $-\frac{5\sqrt{231}}{528}$  | 0 | $-\frac{\sqrt{385}}{176}$  | 0 | $\frac{\sqrt{165}}{176}$   | 0 |
|                          |           | 0  | 0                           | 0                          | 0                          | 0                          | 0                         | $-\frac{\sqrt{330}}{96}$    | 0 | $-\frac{3\sqrt{770}}{352}$  | 0 | $\frac{5\sqrt{462}}{1056}$ | 0 | $\frac{\sqrt{2310}}{1056}$ | 0 |
|                          |           | 0  | 0                           | 0                          | 0                          | 0                          | 0                         | $\frac{\sqrt{462}}{96}$     | 0 | $\frac{\sqrt{2310}}{352}$   | 0 | $-\frac{\sqrt{154}}{352}$  | 0 | $-\frac{\sqrt{66}}{1056}$  | 0 |
|                          |           | $\frac{\sqrt{66}}{1056}$                         | 0                           | $-\frac{\sqrt{165}}{176}$  | 0                          | $-\frac{\sqrt{330}}{96}$   | 0                         | 0                           | 0 | 0                           | 0 | 0                          | 0 | 0                          | 0 |
|                          |           | 0  | $-\frac{\sqrt{2310}}{1056}$ | 0                          | $\frac{\sqrt{1155}}{176}$  | 0                          | $\frac{\sqrt{462}}{96}$   | 0                           | 0 | 0                           | 0 | 0                          | 0 | 0                          | 0 |
|                          |           | $\frac{\sqrt{154}}{352}$                         | 0                           | $\frac{\sqrt{385}}{176}$   | 0                          | $-\frac{3\sqrt{770}}{352}$ | 0                         | 0                           | 0 | 0                           | 0 | 0                          | 0 | 0                          | 0 |
|                          |           | 0  | $-\frac{5\sqrt{462}}{1056}$ | 0                          | $-\frac{5\sqrt{231}}{528}$ | 0                          | $\frac{\sqrt{2310}}{352}$ | 0                           | 0 | 0                           | 0 | 0                          | 0 | 0                          | 0 |
|                          |           | $-\frac{\sqrt{2310}}{352}$                       | 0                           | $\frac{5\sqrt{231}}{528}$  | 0                          | $\frac{5\sqrt{462}}{1056}$ | 0                         | 0                           | 0 | 0                           | 0 | 0                          | 0 | 0                          | 0 |
|                          |           | 0  | $\frac{3\sqrt{770}}{352}$   | 0                          | $-\frac{\sqrt{385}}{176}$  | 0                          | $-\frac{\sqrt{154}}{352}$ | 0                           | 0 | 0                           | 0 | 0                          | 0 | 0                          | 0 |
|                          |           | $-\frac{\sqrt{462}}{96}$                         | 0                           | $-\frac{\sqrt{1155}}{176}$ | 0                          | $\frac{\sqrt{2310}}{1056}$ | 0                         | 0                           | 0 | 0                           | 0 | 0                          | 0 | 0                          | 0 |
|                          |           | 0  | $\frac{\sqrt{330}}{96}$     | 0                          | $\frac{\sqrt{165}}{176}$   | 0                          | $-\frac{\sqrt{66}}{1056}$ | 0                           | 0 | 0                           | 0 | 0                          | 0 | 0                          | 0 |
| 939                      | symmetry  | $\frac{3\sqrt{7}xz(x-z)(x+z)(x^2-10y^2+z^2)}{4}$ |                             |                            |                            |                            |                           |                             |   |                             |   |                            |   |                            |   |

*continued ...*

Table 10

| No.                      | multipole | matrix  |                              |                            |                            |                              |                            |                              |   |                             |   |                             |   |                              |   |
|--------------------------|-----------|---|------------------------------|----------------------------|----------------------------|------------------------------|----------------------------|------------------------------|---|-----------------------------|---|-----------------------------|---|------------------------------|---|
| $T_{6,1}^{(1,0;a)}(T_1)$ |           | 0   | 0                            | 0                          | 0                          | 0                            | 0                          | $\frac{\sqrt{66}i}{1056}$    | 0 | $-\frac{\sqrt{154}i}{352}$  | 0 | $-\frac{\sqrt{2310}i}{352}$ | 0 | $\frac{\sqrt{462}i}{96}$     | 0 |
|                          |           | 0   | 0                            | 0                          | 0                          | 0                            | 0                          | $-\frac{\sqrt{2310}i}{1056}$ | 0 | $\frac{5\sqrt{462}i}{1056}$ | 0 | $\frac{3\sqrt{770}i}{352}$  | 0 | $-\frac{\sqrt{330}i}{96}$    |   |
|                          |           | 0   | 0                            | 0                          | 0                          | 0                            | 0                          | $\frac{\sqrt{165}i}{176}$    | 0 | $\frac{\sqrt{385}i}{176}$   | 0 | $-\frac{5\sqrt{231}i}{528}$ | 0 | $-\frac{\sqrt{1155}i}{176}$  | 0 |
|                          |           | 0   | 0                            | 0                          | 0                          | 0                            | 0                          | $-\frac{\sqrt{1155}i}{176}$  | 0 | $-\frac{5\sqrt{231}i}{528}$ | 0 | $\frac{\sqrt{385}i}{176}$   | 0 | $\frac{\sqrt{165}i}{176}$    |   |
|                          |           | 0   | 0                            | 0                          | 0                          | 0                            | 0                          | $-\frac{\sqrt{330}i}{96}$    | 0 | $\frac{3\sqrt{770}i}{352}$  | 0 | $\frac{5\sqrt{462}i}{1056}$ | 0 | $-\frac{\sqrt{2310}i}{1056}$ | 0 |
|                          |           | 0   | 0                            | 0                          | 0                          | 0                            | 0                          | $\frac{\sqrt{462}i}{96}$     | 0 | $-\frac{\sqrt{2310}i}{352}$ | 0 | $-\frac{\sqrt{154}i}{352}$  | 0 | $\frac{\sqrt{66}i}{1056}$    |   |
|                          |           | $-\frac{\sqrt{66}i}{1056}$                        | 0                            | $-\frac{\sqrt{165}i}{176}$ | 0                          | $\frac{\sqrt{330}i}{96}$     | 0                          | 0                            | 0 | 0                           | 0 | 0                           | 0 | 0                            | 0 |
|                          |           | 0   | $\frac{\sqrt{2310}i}{1056}$  | 0                          | $\frac{\sqrt{1155}i}{176}$ | 0                            | $-\frac{\sqrt{462}i}{96}$  | 0                            | 0 | 0                           | 0 | 0                           | 0 | 0                            | 0 |
|                          |           | $\frac{\sqrt{154}i}{352}$                         | 0                            | $-\frac{\sqrt{385}i}{176}$ | 0                          | $-\frac{3\sqrt{770}i}{352}$  | 0                          | 0                            | 0 | 0                           | 0 | 0                           | 0 | 0                            | 0 |
|                          |           | 0   | $-\frac{5\sqrt{462}i}{1056}$ | 0                          | $\frac{5\sqrt{231}i}{528}$ | 0                            | $\frac{\sqrt{2310}i}{352}$ | 0                            | 0 | 0                           | 0 | 0                           | 0 | 0                            | 0 |
|                          |           | $\frac{\sqrt{2310}i}{352}$                        | 0                            | $\frac{5\sqrt{231}i}{528}$ | 0                          | $-\frac{5\sqrt{462}i}{1056}$ | 0                          | 0                            | 0 | 0                           | 0 | 0                           | 0 | 0                            | 0 |
|                          |           | 0   | $-\frac{3\sqrt{770}i}{352}$  | 0                          | $-\frac{\sqrt{385}i}{176}$ | 0                            | $\frac{\sqrt{154}i}{352}$  | 0                            | 0 | 0                           | 0 | 0                           | 0 | 0                            | 0 |
|                          |           | $-\frac{\sqrt{462}i}{96}$                         | 0                            | $\frac{\sqrt{1155}i}{176}$ | 0                          | $\frac{\sqrt{2310}i}{1056}$  | 0                          | 0                            | 0 | 0                           | 0 | 0                           | 0 | 0                            | 0 |
|                          |           | 0   | $\frac{\sqrt{330}i}{96}$     | 0                          | $-\frac{\sqrt{165}i}{176}$ | 0                            | $-\frac{\sqrt{66}i}{1056}$ | 0                            | 0 | 0                           | 0 | 0                           | 0 | 0                            | 0 |
| 940                      | symmetry  | $-\frac{3\sqrt{7}xy(x-y)(x+y)(x^2+y^2-10z^2)}{4}$ |                              |                            |                            |                              |                            |                              |   |                             |   |                             |   |                              |   |

*continued ...*

Table 10

| No.                               | multipole | matrix  |                            |                         |                         |                            |                         |                         |                            |                         |   |                         |                            |                         |  |
|-----------------------------------|-----------|---|----------------------------|-------------------------|-------------------------|----------------------------|-------------------------|-------------------------|----------------------------|-------------------------|---|-------------------------|----------------------------|-------------------------|--|
| $\mathbb{T}_{6,2}^{(1,0;a)}(T_1)$ |           | 0   | 0                          | 0                       | 0                       | 0                          | 0                       | 0                       | 0                          | 0                       | 0 | $\frac{\sqrt{154}}{44}$ | 0                          | 0                       |  |
|                                   |           | 0   | 0                          | 0                       | 0                       | 0                          | 0                       | 0                       | 0                          | 0                       | 0 | 0                       | $-\frac{\sqrt{2310}}{132}$ | 0                       |  |
|                                   |           | 0   | 0                          | 0                       | 0                       | 0                          | 0                       | 0                       | 0                          | 0                       | 0 | 0                       | 0                          | $\frac{\sqrt{165}}{66}$ |  |
|                                   |           | 0   | 0                          | 0                       | 0                       | 0                          | 0                       | $\frac{\sqrt{165}}{66}$ | 0                          | 0                       | 0 | 0                       | 0                          | 0                       |  |
|                                   |           | 0   | 0                          | 0                       | 0                       | 0                          | 0                       | 0                       | $-\frac{\sqrt{2310}}{132}$ | 0                       | 0 | 0                       | 0                          | 0                       |  |
|                                   |           | 0   | 0                          | 0                       | 0                       | 0                          | 0                       | 0                       | 0                          | $\frac{\sqrt{154}}{44}$ | 0 | 0                       | 0                          | 0                       |  |
|                                   |           | 0   | 0                          | 0                       | $\frac{\sqrt{165}}{66}$ | 0                          | 0                       | 0                       | 0                          | 0                       | 0 | 0                       | 0                          | 0                       |  |
|                                   |           | 0   | 0                          | 0                       | 0                       | $-\frac{\sqrt{2310}}{132}$ | 0                       | 0                       | 0                          | 0                       | 0 | 0                       | 0                          | 0                       |  |
|                                   |           | 0   | 0                          | 0                       | 0                       | 0                          | $\frac{\sqrt{154}}{44}$ | 0                       | 0                          | 0                       | 0 | 0                       | 0                          | 0                       |  |
|                                   |           | 0   | 0                          | 0                       | 0                       | 0                          | 0                       | 0                       | 0                          | 0                       | 0 | 0                       | 0                          | 0                       |  |
|                                   |           | 0   | 0                          | 0                       | 0                       | 0                          | 0                       | 0                       | 0                          | 0                       | 0 | 0                       | 0                          | 0                       |  |
|                                   |           | $\frac{\sqrt{154}}{44}$                       | 0                          | 0                       | 0                       | 0                          | 0                       | 0                       | 0                          | 0                       | 0 | 0                       | 0                          | 0                       |  |
|                                   |           | 0   | $-\frac{\sqrt{2310}}{132}$ | 0                       | 0                       | 0                          | 0                       | 0                       | 0                          | 0                       | 0 | 0                       | 0                          | 0                       |  |
|                                   |           | 0   | 0                          | $\frac{\sqrt{165}}{66}$ | 0                       | 0                          | 0                       | 0                       | 0                          | 0                       | 0 | 0                       | 0                          | 0                       |  |
| 941                               | symmetry  | $\frac{\sqrt{462}yz(y^2-3z^2)(3y^2-z^2)}{16}$ |                            |                         |                         |                            |                         |                         |                            |                         |   |                         |                            |                         |  |

continued ...

Table 10

| No.                                  | multipole | matrix  |                          |                         |                          |                         |                         |                         |   |                          |   |                          |   |                         |   |
|--------------------------------------|-----------|---|--------------------------|-------------------------|--------------------------|-------------------------|-------------------------|-------------------------|---|--------------------------|---|--------------------------|---|-------------------------|---|
| $\mathbb{T}_{6,0}^{(1,0;a)}(T_2, 1)$ |           | 0   | 0                        | 0                       | 0                        | 0                       | 0                       | $\frac{1}{64}$          | 0 | $\frac{\sqrt{21}}{64}$   | 0 | $\frac{\sqrt{35}}{64}$   | 0 | $\frac{\sqrt{7}}{64}$   | 0 |
|                                      |           | 0   | 0                        | 0                       | 0                        | 0                       | 0                       | $-\frac{\sqrt{35}}{64}$ | 0 | $-\frac{5\sqrt{7}}{64}$  | 0 | $-\frac{\sqrt{105}}{64}$ | 0 | $-\frac{\sqrt{5}}{64}$  |   |
|                                      |           | 0   | 0                        | 0                       | 0                        | 0                       | 0                       | $\frac{\sqrt{10}}{64}$  | 0 | $\frac{\sqrt{210}}{64}$  | 0 | $\frac{5\sqrt{14}}{64}$  | 0 | $\frac{\sqrt{70}}{64}$  | 0 |
|                                      |           | 0   | 0                        | 0                       | 0                        | 0                       | 0                       | $-\frac{\sqrt{70}}{64}$ | 0 | $-\frac{5\sqrt{14}}{64}$ | 0 | $-\frac{\sqrt{210}}{64}$ | 0 | $-\frac{\sqrt{10}}{64}$ |   |
|                                      |           | 0   | 0                        | 0                       | 0                        | 0                       | 0                       | $\frac{\sqrt{5}}{64}$   | 0 | $\frac{\sqrt{105}}{64}$  | 0 | $\frac{5\sqrt{7}}{64}$   | 0 | $\frac{\sqrt{35}}{64}$  | 0 |
|                                      |           | 0   | 0                        | 0                       | 0                        | 0                       | 0                       | $-\frac{\sqrt{7}}{64}$  | 0 | $-\frac{\sqrt{35}}{64}$  | 0 | $-\frac{\sqrt{21}}{64}$  | 0 | $-\frac{1}{64}$         |   |
|                                      |           | $\frac{1}{64}$                                | 0                        | $\frac{\sqrt{10}}{64}$  | 0                        | $\frac{\sqrt{5}}{64}$   | 0                       | 0                       | 0 | 0                        | 0 | 0                        | 0 | 0                       | 0 |
|                                      |           | 0   | $-\frac{\sqrt{35}}{64}$  | 0                       | $-\frac{\sqrt{70}}{64}$  | 0                       | $-\frac{\sqrt{7}}{64}$  | 0                       | 0 | 0                        | 0 | 0                        | 0 | 0                       | 0 |
|                                      |           | $\frac{\sqrt{21}}{64}$                        | 0                        | $\frac{\sqrt{210}}{64}$ | 0                        | $\frac{\sqrt{105}}{64}$ | 0                       | 0                       | 0 | 0                        | 0 | 0                        | 0 | 0                       | 0 |
|                                      |           | 0   | $-\frac{5\sqrt{7}}{64}$  | 0                       | $-\frac{5\sqrt{14}}{64}$ | 0                       | $-\frac{\sqrt{35}}{64}$ | 0                       | 0 | 0                        | 0 | 0                        | 0 | 0                       | 0 |
|                                      |           | $\frac{\sqrt{35}}{64}$                        | 0                        | $\frac{5\sqrt{14}}{64}$ | 0                        | $\frac{5\sqrt{7}}{64}$  | 0                       | 0                       | 0 | 0                        | 0 | 0                        | 0 | 0                       | 0 |
|                                      |           | 0   | $-\frac{\sqrt{105}}{64}$ | 0                       | $-\frac{\sqrt{210}}{64}$ | 0                       | $-\frac{\sqrt{21}}{64}$ | 0                       | 0 | 0                        | 0 | 0                        | 0 | 0                       | 0 |
|                                      |           | $\frac{\sqrt{7}}{64}$                         | 0                        | $\frac{\sqrt{70}}{64}$  | 0                        | $\frac{\sqrt{35}}{64}$  | 0                       | 0                       | 0 | 0                        | 0 | 0                        | 0 | 0                       | 0 |
|                                      |           | 0   | $-\frac{\sqrt{5}}{64}$   | 0                       | $-\frac{\sqrt{10}}{64}$  | 0                       | $-\frac{1}{64}$         | 0                       | 0 | 0                        | 0 | 0                        | 0 | 0                       | 0 |
| 942                                  | symmetry  | $\frac{\sqrt{462}xz(x^2-3z^2)(3x^2-z^2)}{16}$ |                          |                         |                          |                         |                         |                         |   |                          |   |                          |   |                         |   |

continued ...



Table 10

| No.                                  | multipole | matrix  |                           |                           |                           |                           |                          |                         |                          |                           |                          |                          |                           |                          |                         |
|--------------------------------------|-----------|---|---------------------------|---------------------------|---------------------------|---------------------------|--------------------------|-------------------------|--------------------------|---------------------------|--------------------------|--------------------------|---------------------------|--------------------------|-------------------------|
| $\mathbb{T}_{6,1}^{(1,0;a)}(T_2, 1)$ |           | 0   | 0                         | 0                         | 0                         | 0                         | 0                        | $-\frac{i}{64}$         | 0                        | $\frac{\sqrt{21}i}{64}$   | 0                        | $-\frac{\sqrt{35}i}{64}$ | 0                         | $\frac{\sqrt{7}i}{64}$   | 0                       |
|                                      |           | 0   | 0                         | 0                         | 0                         | 0                         | 0                        | 0                       | $\frac{\sqrt{35}i}{64}$  | 0                         | $-\frac{5\sqrt{7}i}{64}$ | 0                        | $\frac{\sqrt{105}i}{64}$  | 0                        | $-\frac{\sqrt{5}i}{64}$ |
|                                      |           | 0   | 0                         | 0                         | 0                         | 0                         | 0                        | $\frac{\sqrt{10}i}{64}$ | 0                        | $-\frac{\sqrt{210}i}{64}$ | 0                        | $\frac{5\sqrt{14}i}{64}$ | 0                         | $-\frac{\sqrt{70}i}{64}$ | 0                       |
|                                      |           | 0   | 0                         | 0                         | 0                         | 0                         | 0                        | 0                       | $-\frac{\sqrt{70}i}{64}$ | 0                         | $\frac{5\sqrt{14}i}{64}$ | 0                        | $-\frac{\sqrt{210}i}{64}$ | 0                        | $\frac{\sqrt{10}i}{64}$ |
|                                      |           | 0   | 0                         | 0                         | 0                         | 0                         | 0                        | $-\frac{\sqrt{5}i}{64}$ | 0                        | $\frac{\sqrt{105}i}{64}$  | 0                        | $-\frac{5\sqrt{7}i}{64}$ | 0                         | $\frac{\sqrt{35}i}{64}$  | 0                       |
|                                      |           | 0   | 0                         | 0                         | 0                         | 0                         | 0                        | 0                       | $\frac{\sqrt{7}i}{64}$   | 0                         | $-\frac{\sqrt{35}i}{64}$ | 0                        | $\frac{\sqrt{21}i}{64}$   | 0                        | $-\frac{i}{64}$         |
|                                      |           | $\frac{i}{64}$                                | 0                         | $-\frac{\sqrt{10}i}{64}$  | 0                         | $\frac{\sqrt{5}i}{64}$    | 0                        | 0                       | 0                        | 0                         | 0                        | 0                        | 0                         | 0                        | 0                       |
|                                      |           | 0   | $-\frac{\sqrt{35}i}{64}$  | 0                         | $\frac{\sqrt{70}i}{64}$   | 0                         | $-\frac{\sqrt{7}i}{64}$  | 0                       | 0                        | 0                         | 0                        | 0                        | 0                         | 0                        | 0                       |
|                                      |           | $-\frac{\sqrt{21}i}{64}$                      | 0                         | $\frac{\sqrt{210}i}{64}$  | 0                         | $-\frac{\sqrt{105}i}{64}$ | 0                        | 0                       | 0                        | 0                         | 0                        | 0                        | 0                         | 0                        | 0                       |
|                                      |           | 0   | $\frac{5\sqrt{7}i}{64}$   | 0                         | $-\frac{5\sqrt{14}i}{64}$ | 0                         | $\frac{\sqrt{35}i}{64}$  | 0                       | 0                        | 0                         | 0                        | 0                        | 0                         | 0                        | 0                       |
|                                      |           | $\frac{\sqrt{35}i}{64}$                       | 0                         | $-\frac{5\sqrt{14}i}{64}$ | 0                         | $\frac{5\sqrt{7}i}{64}$   | 0                        | 0                       | 0                        | 0                         | 0                        | 0                        | 0                         | 0                        | 0                       |
|                                      |           | 0   | $-\frac{\sqrt{105}i}{64}$ | 0                         | $\frac{\sqrt{210}i}{64}$  | 0                         | $-\frac{\sqrt{21}i}{64}$ | 0                       | 0                        | 0                         | 0                        | 0                        | 0                         | 0                        | 0                       |
|                                      |           | $-\frac{\sqrt{7}i}{64}$                       | 0                         | $\frac{\sqrt{70}i}{64}$   | 0                         | $-\frac{\sqrt{35}i}{64}$  | 0                        | 0                       | 0                        | 0                         | 0                        | 0                        | 0                         | 0                        | 0                       |
|                                      |           | 0   | $\frac{\sqrt{5}i}{64}$    | 0                         | $-\frac{\sqrt{10}i}{64}$  | 0                         | $\frac{i}{64}$           | 0                       | 0                        | 0                         | 0                        | 0                        | 0                         | 0                        | 0                       |
| 943                                  | symmetry  | $\frac{\sqrt{462}xy(x^2-3y^2)(3x^2-y^2)}{16}$ |                           |                           |                           |                           |                          |                         |                          |                           |                          |                          |                           |                          |                         |

*continued ...*

Table 10

| No.                                  | multipole | matrix   |   |   |   |   |               |               |   |   |   |   |   |   |   |               |  |
|--------------------------------------|-----------|--|---|---|---|---|---------------|---------------|---|---|---|---|---|---|---|---------------|--|
| $\mathbb{T}_{6,2}^{(1,0;a)}(T_2, 1)$ |           | 0  | 0 | 0 | 0 | 0 | 0             | 0             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{1}{2}$ |  |
|                                      |           | 0  | 0 | 0 | 0 | 0 | 0             | 0             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0             |  |
|                                      |           | 0  | 0 | 0 | 0 | 0 | 0             | 0             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0             |  |
|                                      |           | 0  | 0 | 0 | 0 | 0 | 0             | 0             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0             |  |
|                                      |           | 0  | 0 | 0 | 0 | 0 | 0             | 0             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0             |  |
|                                      |           | 0  | 0 | 0 | 0 | 0 | 0             | $\frac{1}{2}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0             |  |
|                                      |           | 0  | 0 | 0 | 0 | 0 | $\frac{1}{2}$ | 0             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0             |  |
|                                      |           | 0  | 0 | 0 | 0 | 0 | 0             | 0             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0             |  |
|                                      |           | 0  | 0 | 0 | 0 | 0 | 0             | 0             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0             |  |
|                                      |           | 0  | 0 | 0 | 0 | 0 | 0             | 0             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0             |  |
|                                      |           | 0  | 0 | 0 | 0 | 0 | 0             | 0             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0             |  |
|                                      |           | 0  | 0 | 0 | 0 | 0 | 0             | 0             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0             |  |
|                                      |           | 0  | 0 | 0 | 0 | 0 | 0             | 0             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0             |  |
|                                      |           | $\frac{1}{2}$  | 0 | 0 | 0 | 0 | 0             | 0             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0             |  |
| 944                                  | symmetry  | $\frac{\sqrt{210}yz(16x^4-16x^2y^2-16x^2z^2+y^4+2y^2z^2+z^4)}{16}$ |   |   |   |   |               |               |   |   |   |   |   |   |   |               |  |

*continued ...*

Table 10

| No.                                  | multipole | matrix   |                             |                            |                             |                            |                             |                            |   |                             |   |                             |   |                            |   |
|--------------------------------------|-----------|--|-----------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|----------------------------|---|-----------------------------|---|-----------------------------|---|----------------------------|---|
| $\mathbb{T}_{6,0}^{(1,0;a)}(T_2, 2)$ |           | 0  | 0                           | 0                          | 0                           | 0                          | 0                           | $\frac{\sqrt{55}}{2112}$   | 0 | $\frac{\sqrt{1155}}{2112}$  | 0 | $-\frac{9\sqrt{77}}{704}$   | 0 | $\frac{\sqrt{385}}{64}$    | 0 |
|                                      |           | 0  | 0                           | 0                          | 0                           | 0                          | 0                           | $-\frac{5\sqrt{77}}{2112}$ | 0 | $-\frac{5\sqrt{385}}{2112}$ | 0 | $\frac{9\sqrt{231}}{704}$   | 0 | $-\frac{5\sqrt{11}}{64}$   |   |
|                                      |           | 0  | 0                           | 0                          | 0                           | 0                          | 0                           | $-\frac{9\sqrt{22}}{704}$  | 0 | $\frac{5\sqrt{462}}{2112}$  | 0 | $\frac{5\sqrt{770}}{2112}$  | 0 | $-\frac{9\sqrt{154}}{704}$ | 0 |
|                                      |           | 0  | 0                           | 0                          | 0                           | 0                          | 0                           | $\frac{9\sqrt{154}}{704}$  | 0 | $-\frac{5\sqrt{770}}{2112}$ | 0 | $-\frac{5\sqrt{462}}{2112}$ | 0 | $\frac{9\sqrt{22}}{704}$   |   |
|                                      |           | 0  | 0                           | 0                          | 0                           | 0                          | 0                           | $\frac{5\sqrt{11}}{64}$    | 0 | $-\frac{9\sqrt{231}}{704}$  | 0 | $\frac{5\sqrt{385}}{2112}$  | 0 | $\frac{5\sqrt{77}}{2112}$  | 0 |
|                                      |           | 0  | 0                           | 0                          | 0                           | 0                          | 0                           | $-\frac{\sqrt{385}}{64}$   | 0 | $\frac{9\sqrt{77}}{704}$    | 0 | $-\frac{\sqrt{1155}}{2112}$ | 0 | $-\frac{\sqrt{55}}{2112}$  |   |
|                                      |           | $\frac{\sqrt{55}}{2112}$   | 0                           | $-\frac{9\sqrt{22}}{704}$  | 0                           | $\frac{5\sqrt{11}}{64}$    | 0                           | 0                          | 0 | 0                           | 0 | 0                           | 0 | 0                          | 0 |
|                                      |           | 0  | $-\frac{5\sqrt{77}}{2112}$  | 0                          | $\frac{9\sqrt{154}}{704}$   | 0                          | $-\frac{\sqrt{385}}{64}$    | 0                          | 0 | 0                           | 0 | 0                           | 0 | 0                          | 0 |
|                                      |           | $\frac{\sqrt{1155}}{2112}$   | 0                           | $\frac{5\sqrt{462}}{2112}$ | 0                           | $-\frac{9\sqrt{231}}{704}$ | 0                           | 0                          | 0 | 0                           | 0 | 0                           | 0 | 0                          | 0 |
|                                      |           | 0  | $-\frac{5\sqrt{385}}{2112}$ | 0                          | $-\frac{5\sqrt{770}}{2112}$ | 0                          | $\frac{9\sqrt{77}}{704}$    | 0                          | 0 | 0                           | 0 | 0                           | 0 | 0                          | 0 |
|                                      |           | $-\frac{9\sqrt{77}}{704}$  | 0                           | $\frac{5\sqrt{770}}{2112}$ | 0                           | $\frac{5\sqrt{385}}{2112}$ | 0                           | 0                          | 0 | 0                           | 0 | 0                           | 0 | 0                          | 0 |
|                                      |           | 0  | $\frac{9\sqrt{231}}{704}$   | 0                          | $-\frac{5\sqrt{462}}{2112}$ | 0                          | $-\frac{\sqrt{1155}}{2112}$ | 0                          | 0 | 0                           | 0 | 0                           | 0 | 0                          | 0 |
|                                      |           | $\frac{\sqrt{385}}{64}$  | 0                           | $-\frac{9\sqrt{154}}{704}$ | 0                           | $\frac{5\sqrt{77}}{2112}$  | 0                           | 0                          | 0 | 0                           | 0 | 0                           | 0 | 0                          | 0 |
|                                      |           | 0  | $-\frac{5\sqrt{11}}{64}$    | 0                          | $\frac{9\sqrt{22}}{704}$    | 0                          | $-\frac{\sqrt{55}}{2112}$   | 0                          | 0 | 0                           | 0 | 0                           | 0 | 0                          | 0 |
| 945                                  | symmetry  | $\frac{\sqrt{210}xz(x^4-16x^2y^2+2x^2z^2+16y^4-16y^2z^2+z^4)}{16}$ |                             |                            |                             |                            |                             |                            |   |                             |   |                             |   |                            |   |

*continued ...*

Table 10

| No.                                  | multipole                    | matrix   |                              |                              |                             |                              |                            |                            |                              |                              |                              |                              |                            |                            |
|--------------------------------------|------------------------------|--|------------------------------|------------------------------|-----------------------------|------------------------------|----------------------------|----------------------------|------------------------------|------------------------------|------------------------------|------------------------------|----------------------------|----------------------------|
| $\mathbb{T}_{6,1}^{(1,0;a)}(T_2, 2)$ | 0                            | 0  | 0                            | 0                            | 0                           | 0                            | $-\frac{\sqrt{55}i}{2112}$ | 0                          | $\frac{\sqrt{1155}i}{2112}$  | 0                            | $\frac{9\sqrt{77}i}{704}$    | 0                            | $\frac{\sqrt{385}i}{64}$   | 0                          |
|                                      | 0                            | 0  | 0                            | 0                            | 0                           | 0                            | 0                          | $\frac{5\sqrt{77}i}{2112}$ | 0                            | $-\frac{5\sqrt{385}i}{2112}$ | 0                            | $-\frac{9\sqrt{231}i}{704}$  | 0                          | $-\frac{5\sqrt{11}i}{64}$  |
|                                      | 0                            | 0  | 0                            | 0                            | 0                           | 0                            | $-\frac{9\sqrt{22}i}{704}$ | 0                          | $-\frac{5\sqrt{462}i}{2112}$ | 0                            | $\frac{5\sqrt{770}i}{2112}$  | 0                            | $\frac{9\sqrt{154}i}{704}$ | 0                          |
|                                      | 0                            | 0  | 0                            | 0                            | 0                           | 0                            | 0                          | $\frac{9\sqrt{154}i}{704}$ | 0                            | $\frac{5\sqrt{770}i}{2112}$  | 0                            | $-\frac{5\sqrt{462}i}{2112}$ | 0                          | $-\frac{9\sqrt{22}i}{704}$ |
|                                      | 0                            | 0  | 0                            | 0                            | 0                           | 0                            | $-\frac{5\sqrt{11}i}{64}$  | 0                          | $-\frac{9\sqrt{231}i}{704}$  | 0                            | $-\frac{5\sqrt{385}i}{2112}$ | 0                            | $\frac{5\sqrt{77}i}{2112}$ | 0                          |
|                                      | 0                            | 0  | 0                            | 0                            | 0                           | 0                            | 0                          | $\frac{\sqrt{385}i}{64}$   | 0                            | $\frac{9\sqrt{77}i}{704}$    | 0                            | $\frac{\sqrt{1155}i}{2112}$  | 0                          | $-\frac{\sqrt{55}i}{2112}$ |
|                                      | $\frac{\sqrt{55}i}{2112}$    | 0  | $\frac{9\sqrt{22}i}{704}$    | 0                            | $\frac{5\sqrt{11}i}{64}$    | 0                            | 0                          | 0                          | 0                            | 0                            | 0                            | 0                            | 0                          | 0                          |
|                                      | 0                            | $-\frac{5\sqrt{77}i}{2112}$  | 0                            | $-\frac{9\sqrt{154}i}{704}$  | 0                           | $-\frac{\sqrt{385}i}{64}$    | 0                          | 0                          | 0                            | 0                            | 0                            | 0                            | 0                          | 0                          |
|                                      | $-\frac{\sqrt{1155}i}{2112}$ | 0  | $\frac{5\sqrt{462}i}{2112}$  | 0                            | $\frac{9\sqrt{231}i}{704}$  | 0                            | 0                          | 0                          | 0                            | 0                            | 0                            | 0                            | 0                          | 0                          |
|                                      | 0                            | $\frac{5\sqrt{385}i}{2112}$  | 0                            | $-\frac{5\sqrt{770}i}{2112}$ | 0                           | $-\frac{9\sqrt{77}i}{704}$   | 0                          | 0                          | 0                            | 0                            | 0                            | 0                            | 0                          | 0                          |
|                                      | $-\frac{9\sqrt{77}i}{704}$   | 0  | $-\frac{5\sqrt{770}i}{2112}$ | 0                            | $\frac{5\sqrt{385}i}{2112}$ | 0                            | 0                          | 0                          | 0                            | 0                            | 0                            | 0                            | 0                          | 0                          |
|                                      | 0                            | $\frac{9\sqrt{231}i}{704}$   | 0                            | $\frac{5\sqrt{462}i}{2112}$  | 0                           | $-\frac{\sqrt{1155}i}{2112}$ | 0                          | 0                          | 0                            | 0                            | 0                            | 0                            | 0                          | 0                          |
|                                      | $-\frac{\sqrt{385}i}{64}$    | 0  | $-\frac{9\sqrt{154}i}{704}$  | 0                            | $-\frac{5\sqrt{77}i}{2112}$ | 0                            | 0                          | 0                          | 0                            | 0                            | 0                            | 0                            | 0                          | 0                          |
|                                      | 0                            | $\frac{5\sqrt{11}i}{64}$   | 0                            | $\frac{9\sqrt{22}i}{704}$    | 0                           | $\frac{\sqrt{55}i}{2112}$    | 0                          | 0                          | 0                            | 0                            | 0                            | 0                            | 0                          | 0                          |
| 946                                  | symmetry                     | $\frac{\sqrt{210}xy(x^4+2x^2y^2-16x^2z^2+y^4-16y^2z^2+16z^4)}{16}$ |                              |                              |                             |                              |                            |                            |                              |                              |                              |                              |                            |                            |

continued ...

Table 10

| No.                                  | multipole | matrix                 |                          |                          |                          |                          |                        |                        |                          |                         |                          |                          |                         |                          |                        |
|--------------------------------------|-----------|------------------------|--------------------------|--------------------------|--------------------------|--------------------------|------------------------|------------------------|--------------------------|-------------------------|--------------------------|--------------------------|-------------------------|--------------------------|------------------------|
| $\mathbb{T}_{6,2}^{(1,0;a)}(T_2, 2)$ |           | 0                      | 0                        | 0                        | 0                        | 0                        | 0                      | 0                      | 0                        | 0                       | $\frac{\sqrt{77}}{66}$   | 0                        | 0                       | 0                        | 0                      |
|                                      |           | 0                      | 0                        | 0                        | 0                        | 0                        | 0                      | $\frac{\sqrt{11}}{66}$ | 0                        | 0                       | 0                        | $-\frac{\sqrt{385}}{66}$ | 0                       | 0                        | 0                      |
|                                      |           | 0                      | 0                        | 0                        | 0                        | 0                        | 0                      | 0                      | $-\frac{\sqrt{154}}{66}$ | 0                       | 0                        | 0                        | $\frac{\sqrt{462}}{66}$ | 0                        | 0                      |
|                                      |           | 0                      | 0                        | 0                        | 0                        | 0                        | 0                      | 0                      | 0                        | $\frac{\sqrt{462}}{66}$ | 0                        | 0                        | 0                       | $-\frac{\sqrt{154}}{66}$ | 0                      |
|                                      |           | 0                      | 0                        | 0                        | 0                        | 0                        | 0                      | 0                      | 0                        | 0                       | $-\frac{\sqrt{385}}{66}$ | 0                        | 0                       | 0                        | $\frac{\sqrt{11}}{66}$ |
|                                      |           | 0                      | 0                        | 0                        | 0                        | 0                        | 0                      | 0                      | 0                        | 0                       | 0                        | $\frac{\sqrt{77}}{66}$   | 0                       | 0                        | 0                      |
|                                      |           | 0                      | $\frac{\sqrt{11}}{66}$   | 0                        | 0                        | 0                        | 0                      | 0                      | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        | 0                      |
|                                      |           | 0                      | 0                        | $-\frac{\sqrt{154}}{66}$ | 0                        | 0                        | 0                      | 0                      | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        | 0                      |
|                                      |           | 0                      | 0                        | 0                        | $\frac{\sqrt{462}}{66}$  | 0                        | 0                      | 0                      | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        | 0                      |
|                                      |           | $\frac{\sqrt{77}}{66}$ | 0                        | 0                        | 0                        | $-\frac{\sqrt{385}}{66}$ | 0                      | 0                      | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        | 0                      |
|                                      |           | 0                      | $-\frac{\sqrt{385}}{66}$ | 0                        | 0                        | 0                        | $\frac{\sqrt{77}}{66}$ | 0                      | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        | 0                      |
|                                      |           | 0                      | 0                        | $\frac{\sqrt{462}}{66}$  | 0                        | 0                        | 0                      | 0                      | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        | 0                      |
|                                      |           | 0                      | 0                        | 0                        | $-\frac{\sqrt{154}}{66}$ | 0                        | 0                      | 0                      | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        | 0                      |
|                                      |           | 0                      | 0                        | 0                        | 0                        | $\frac{\sqrt{11}}{66}$   | 0                      | 0                      | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        | 0                      |
| 947                                  | symmetry  | $x$                    |                          |                          |                          |                          |                        |                        |                          |                         |                          |                          |                         |                          |                        |

*continued ...*

Table 10

| No.                  | multipole | matrix                 |                           |                          |                          |                          |                         |                        |                           |                           |                           |                           |                           |                          |   |
|----------------------|-----------|------------------------|---------------------------|--------------------------|--------------------------|--------------------------|-------------------------|------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|--------------------------|---|
| $M_{1,0}^{(a)}(T_1)$ |           | 0                      | $\frac{\sqrt{70}}{49}$    | 0                        | 0                        | 0                        | 0                       | $-\frac{\sqrt{3}}{28}$ | 0                         | $\frac{\sqrt{7}}{196}$    | 0                         | 0                         | 0                         | 0                        | 0 |
|                      |           | $\frac{\sqrt{70}}{49}$ | 0                         | $\frac{4\sqrt{7}}{49}$   | 0                        | 0                        | 0                       | 0                      | $-\frac{\sqrt{105}}{196}$ | 0                         | $\frac{\sqrt{21}}{196}$   | 0                         | 0                         | 0                        | 0 |
|                      |           | 0                      | $\frac{4\sqrt{7}}{49}$    | 0                        | $\frac{3\sqrt{14}}{49}$  | 0                        | 0                       | 0                      | 0                         | $-\frac{\sqrt{70}}{196}$  | 0                         | $\frac{\sqrt{42}}{196}$   | 0                         | 0                        | 0 |
|                      |           | 0                      | 0                         | $\frac{3\sqrt{14}}{49}$  | 0                        | $\frac{4\sqrt{7}}{49}$   | 0                       | 0                      | 0                         | 0                         | $-\frac{\sqrt{42}}{196}$  | 0                         | $\frac{\sqrt{70}}{196}$   | 0                        | 0 |
|                      |           | 0                      | 0                         | 0                        | $\frac{4\sqrt{7}}{49}$   | 0                        | $\frac{\sqrt{70}}{49}$  | 0                      | 0                         | 0                         | 0                         | $-\frac{\sqrt{21}}{196}$  | 0                         | $\frac{\sqrt{105}}{196}$ | 0 |
|                      |           | 0                      | 0                         | 0                        | 0                        | $\frac{\sqrt{70}}{49}$   | 0                       | 0                      | 0                         | 0                         | 0                         | $-\frac{\sqrt{7}}{196}$   | 0                         | $\frac{\sqrt{3}}{28}$    | 0 |
|                      |           | $-\frac{\sqrt{3}}{28}$ | 0                         | 0                        | 0                        | 0                        | 0                       | 0                      | $\frac{3\sqrt{2}}{28}$    | 0                         | 0                         | 0                         | 0                         | 0                        | 0 |
|                      |           | 0                      | $-\frac{\sqrt{105}}{196}$ | 0                        | 0                        | 0                        | 0                       | $\frac{3\sqrt{2}}{28}$ | 0                         | $\frac{3\sqrt{42}}{98}$   | 0                         | 0                         | 0                         | 0                        | 0 |
|                      |           | $\frac{\sqrt{7}}{196}$ | 0                         | $-\frac{\sqrt{70}}{196}$ | 0                        | 0                        | 0                       | 0                      | $\frac{3\sqrt{42}}{98}$   | 0                         | $\frac{3\sqrt{210}}{196}$ | 0                         | 0                         | 0                        | 0 |
|                      |           | 0                      | $\frac{\sqrt{21}}{196}$   | 0                        | $-\frac{\sqrt{42}}{196}$ | 0                        | 0                       | 0                      | 0                         | $\frac{3\sqrt{210}}{196}$ | 0                         | $\frac{3\sqrt{14}}{49}$   | 0                         | 0                        | 0 |
|                      |           | 0                      | 0                         | $\frac{\sqrt{42}}{196}$  | 0                        | $-\frac{\sqrt{21}}{196}$ | 0                       | 0                      | 0                         | 0                         | $\frac{3\sqrt{14}}{49}$   | 0                         | $\frac{3\sqrt{210}}{196}$ | 0                        | 0 |
|                      |           | 0                      | 0                         | 0                        | $\frac{\sqrt{70}}{196}$  | 0                        | $-\frac{\sqrt{7}}{196}$ | 0                      | 0                         | 0                         | 0                         | $\frac{3\sqrt{210}}{196}$ | 0                         | $\frac{3\sqrt{42}}{98}$  | 0 |
|                      |           | 0                      | 0                         | 0                        | 0                        | $\frac{\sqrt{105}}{196}$ | 0                       | 0                      | 0                         | 0                         | 0                         | $\frac{3\sqrt{42}}{98}$   | 0                         | $\frac{3\sqrt{2}}{28}$   | 0 |
|                      |           | 0                      | 0                         | 0                        | 0                        | 0                        | $\frac{\sqrt{3}}{28}$   | 0                      | 0                         | 0                         | 0                         | 0                         | 0                         | $\frac{3\sqrt{2}}{28}$   | 0 |
| 948                  | symmetry  | $y$                    |                           |                          |                          |                          |                         |                        |                           |                           |                           |                           |                           |                          |   |

*continued ...*

Table 10

| No.                  | multipole | matrix                  |                           |                          |                           |                           |                          |                         |                            |                            |                             |                            |                             |                            |                          |
|----------------------|-----------|-------------------------|---------------------------|--------------------------|---------------------------|---------------------------|--------------------------|-------------------------|----------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|----------------------------|--------------------------|
| $M_{1,1}^{(a)}(T_1)$ |           | 0                       | $-\frac{\sqrt{70}i}{49}$  | 0                        | 0                         | 0                         | 0                        | $-\frac{\sqrt{3}i}{28}$ | 0                          | $-\frac{\sqrt{7}i}{196}$   | 0                           | 0                          | 0                           | 0                          | 0                        |
|                      |           | $\frac{\sqrt{70}i}{49}$ | 0                         | $-\frac{4\sqrt{7}i}{49}$ | 0                         | 0                         | 0                        | 0                       | $-\frac{\sqrt{105}i}{196}$ | 0                          | $-\frac{\sqrt{21}i}{196}$   | 0                          | 0                           | 0                          | 0                        |
|                      |           | 0                       | $\frac{4\sqrt{7}i}{49}$   | 0                        | $-\frac{3\sqrt{14}i}{49}$ | 0                         | 0                        | 0                       | 0                          | $-\frac{\sqrt{70}i}{196}$  | 0                           | $-\frac{\sqrt{42}i}{196}$  | 0                           | 0                          | 0                        |
|                      |           | 0                       | 0                         | $\frac{3\sqrt{14}i}{49}$ | 0                         | $-\frac{4\sqrt{7}i}{49}$  | 0                        | 0                       | 0                          | 0                          | $-\frac{\sqrt{42}i}{196}$   | 0                          | $-\frac{\sqrt{70}i}{196}$   | 0                          | 0                        |
|                      |           | 0                       | 0                         | 0                        | $\frac{4\sqrt{7}i}{49}$   | 0                         | $-\frac{\sqrt{70}i}{49}$ | 0                       | 0                          | 0                          | 0                           | $-\frac{\sqrt{21}i}{196}$  | 0                           | $-\frac{\sqrt{105}i}{196}$ | 0                        |
|                      |           | 0                       | 0                         | 0                        | 0                         | $\frac{\sqrt{70}i}{49}$   | 0                        | 0                       | 0                          | 0                          | 0                           | $-\frac{\sqrt{7}i}{196}$   | 0                           | $-\frac{\sqrt{3}i}{28}$    | 0                        |
|                      |           | $\frac{\sqrt{3}i}{28}$  | 0                         | 0                        | 0                         | 0                         | 0                        | 0                       | $-\frac{3\sqrt{2}i}{28}$   | 0                          | 0                           | 0                          | 0                           | 0                          | 0                        |
|                      |           | 0                       | $\frac{\sqrt{105}i}{196}$ | 0                        | 0                         | 0                         | 0                        | $\frac{3\sqrt{2}i}{28}$ | 0                          | $-\frac{3\sqrt{42}i}{98}$  | 0                           | 0                          | 0                           | 0                          | 0                        |
|                      |           | $\frac{\sqrt{7}i}{196}$ | 0                         | $\frac{\sqrt{70}i}{196}$ | 0                         | 0                         | 0                        | 0                       | $\frac{3\sqrt{42}i}{98}$   | 0                          | $-\frac{3\sqrt{210}i}{196}$ | 0                          | 0                           | 0                          | 0                        |
|                      |           | 0                       | $\frac{\sqrt{21}i}{196}$  | 0                        | $\frac{\sqrt{42}i}{196}$  | 0                         | 0                        | 0                       | 0                          | $\frac{3\sqrt{210}i}{196}$ | 0                           | $-\frac{3\sqrt{14}i}{49}$  | 0                           | 0                          | 0                        |
|                      |           | 0                       | 0                         | $\frac{\sqrt{42}i}{196}$ | 0                         | $\frac{\sqrt{21}i}{196}$  | 0                        | 0                       | 0                          | 0                          | $\frac{3\sqrt{14}i}{49}$    | 0                          | $-\frac{3\sqrt{210}i}{196}$ | 0                          | 0                        |
|                      |           | 0                       | 0                         | 0                        | $\frac{\sqrt{70}i}{196}$  | 0                         | $\frac{\sqrt{7}i}{196}$  | 0                       | 0                          | 0                          | 0                           | $\frac{3\sqrt{210}i}{196}$ | 0                           | $-\frac{3\sqrt{42}i}{98}$  | 0                        |
|                      |           | 0                       | 0                         | 0                        | 0                         | $\frac{\sqrt{105}i}{196}$ | 0                        | 0                       | 0                          | 0                          | 0                           | 0                          | $\frac{3\sqrt{42}i}{98}$    | 0                          | $-\frac{3\sqrt{2}i}{28}$ |
|                      |           | 0                       | 0                         | 0                        | 0                         | 0                         | $\frac{\sqrt{3}i}{28}$   | 0                       | 0                          | 0                          | 0                           | 0                          | 0                           | $\frac{3\sqrt{2}i}{28}$    | 0                        |
| 949                  | symmetry  | $z$                     |                           |                          |                           |                           |                          |                         |                            |                            |                             |                            |                             |                            |                          |

*continued ...*

Table 10

| No.                  | multipole | matrix                  |                         |                        |                         |                          |                          |                         |                           |                          |                          |                           |                           |                            |                          |
|----------------------|-----------|-------------------------|-------------------------|------------------------|-------------------------|--------------------------|--------------------------|-------------------------|---------------------------|--------------------------|--------------------------|---------------------------|---------------------------|----------------------------|--------------------------|
| $M_{1,2}^{(a)}(T_1)$ |           | $\frac{5\sqrt{14}}{49}$ | 0                       | 0                      | 0                       | 0                        | 0                        | 0                       | $\frac{\sqrt{21}}{98}$    | 0                        | 0                        | 0                         | 0                         | 0                          | 0                        |
|                      |           | 0                       | $\frac{3\sqrt{14}}{49}$ | 0                      | 0                       | 0                        | 0                        | 0                       | 0                         | $\frac{\sqrt{35}}{98}$   | 0                        | 0                         | 0                         | 0                          | 0                        |
|                      |           | 0                       | 0                       | $\frac{\sqrt{14}}{49}$ | 0                       | 0                        | 0                        | 0                       | 0                         | 0                        | $\frac{\sqrt{42}}{98}$   | 0                         | 0                         | 0                          | 0                        |
|                      |           | 0                       | 0                       | 0                      | $-\frac{\sqrt{14}}{49}$ | 0                        | 0                        | 0                       | 0                         | 0                        | 0                        | $\frac{\sqrt{42}}{98}$    | 0                         | 0                          | 0                        |
|                      |           | 0                       | 0                       | 0                      | 0                       | $-\frac{3\sqrt{14}}{49}$ | 0                        | 0                       | 0                         | 0                        | 0                        | 0                         | $\frac{\sqrt{35}}{98}$    | 0                          | 0                        |
|                      |           | 0                       | 0                       | 0                      | 0                       | 0                        | $-\frac{5\sqrt{14}}{49}$ | 0                       | 0                         | 0                        | 0                        | 0                         | 0                         | $\frac{\sqrt{21}}{98}$     | 0                        |
|                      |           | 0                       | 0                       | 0                      | 0                       | 0                        | 0                        | $\frac{3\sqrt{14}}{28}$ | 0                         | 0                        | 0                        | 0                         | 0                         | 0                          | 0                        |
|                      |           | $\frac{\sqrt{21}}{98}$  | 0                       | 0                      | 0                       | 0                        | 0                        | 0                       | $\frac{15\sqrt{14}}{196}$ | 0                        | 0                        | 0                         | 0                         | 0                          | 0                        |
|                      |           | 0                       | $\frac{\sqrt{35}}{98}$  | 0                      | 0                       | 0                        | 0                        | 0                       | 0                         | $\frac{9\sqrt{14}}{196}$ | 0                        | 0                         | 0                         | 0                          | 0                        |
|                      |           | 0                       | 0                       | $\frac{\sqrt{42}}{98}$ | 0                       | 0                        | 0                        | 0                       | 0                         | 0                        | $\frac{3\sqrt{14}}{196}$ | 0                         | 0                         | 0                          | 0                        |
|                      |           | 0                       | 0                       | 0                      | $\frac{\sqrt{42}}{98}$  | 0                        | 0                        | 0                       | 0                         | 0                        | 0                        | $-\frac{3\sqrt{14}}{196}$ | 0                         | 0                          | 0                        |
|                      |           | 0                       | 0                       | 0                      | 0                       | $\frac{\sqrt{35}}{98}$   | 0                        | 0                       | 0                         | 0                        | 0                        | 0                         | $-\frac{9\sqrt{14}}{196}$ | 0                          | 0                        |
|                      |           | 0                       | 0                       | 0                      | 0                       | 0                        | $\frac{\sqrt{21}}{98}$   | 0                       | 0                         | 0                        | 0                        | 0                         | 0                         | $-\frac{15\sqrt{14}}{196}$ | 0                        |
|                      |           | 0                       | 0                       | 0                      | 0                       | 0                        | 0                        | 0                       | 0                         | 0                        | 0                        | 0                         | 0                         | 0                          | $-\frac{3\sqrt{14}}{28}$ |
| 950                  | symmetry  | $\sqrt{15}xyz$          |                         |                        |                         |                          |                          |                         |                           |                          |                          |                           |                           |                            |                          |

*continued ...*



Table 10

| No.              | multipole | matrix                        |                          |                         |                         |                          |                          |                           |                          |                          |                         |                          |                         |                           |
|------------------|-----------|-------------------------------|--------------------------|-------------------------|-------------------------|--------------------------|--------------------------|---------------------------|--------------------------|--------------------------|-------------------------|--------------------------|-------------------------|---------------------------|
| $M_3^{(a)}(A_2)$ |           | 0                             | 0                        | $\frac{5\sqrt{2}i}{28}$ | 0                       | 0                        | 0                        | 0                         | 0                        | $\frac{\sqrt{6}i}{21}$   | 0                       | 0                        | 0                       | 0                         |
|                  |           | 0                             | 0                        | 0                       | $\frac{\sqrt{10}i}{28}$ | 0                        | 0                        | $\frac{\sqrt{42}i}{42}$   | 0                        | 0                        | $\frac{\sqrt{30}i}{42}$ | 0                        | 0                       | 0                         |
|                  |           | $-\frac{5\sqrt{2}i}{28}$      | 0                        | 0                       | 0                       | $-\frac{\sqrt{10}i}{28}$ | 0                        | 0                         | $\frac{\sqrt{3}i}{42}$   | 0                        | 0                       | $\frac{i}{14}$           | 0                       | 0                         |
|                  |           | 0                             | $-\frac{\sqrt{10}i}{28}$ | 0                       | 0                       | 0                        | $-\frac{5\sqrt{2}i}{28}$ | 0                         | 0                        | $-\frac{i}{14}$          | 0                       | 0                        | $-\frac{\sqrt{3}i}{42}$ | 0                         |
|                  |           | 0                             | 0                        | $\frac{\sqrt{10}i}{28}$ | 0                       | 0                        | 0                        | 0                         | 0                        | $-\frac{\sqrt{30}i}{42}$ | 0                       | 0                        | 0                       | $-\frac{\sqrt{42}i}{42}$  |
|                  |           | 0                             | 0                        | 0                       | $\frac{5\sqrt{2}i}{28}$ | 0                        | 0                        | 0                         | 0                        | 0                        | $-\frac{\sqrt{6}i}{21}$ | 0                        | 0                       | 0                         |
|                  |           | 0                             | $-\frac{\sqrt{42}i}{42}$ | 0                       | 0                       | 0                        | 0                        | 0                         | $\frac{\sqrt{105}i}{42}$ | 0                        | 0                       | 0                        | 0                       | 0                         |
|                  |           | 0                             | 0                        | $-\frac{\sqrt{3}i}{42}$ | 0                       | 0                        | 0                        | 0                         | 0                        | $\frac{3i}{14}$          | 0                       | 0                        | 0                       | 0                         |
|                  |           | 0                             | 0                        | 0                       | $\frac{i}{14}$          | 0                        | 0                        | $-\frac{\sqrt{105}i}{42}$ | 0                        | 0                        | $\frac{\sqrt{3}i}{21}$  | 0                        | 0                       | 0                         |
|                  |           | $-\frac{\sqrt{6}i}{21}$       | 0                        | 0                       | 0                       | $\frac{\sqrt{30}i}{42}$  | 0                        | 0                         | $-\frac{3i}{14}$         | 0                        | 0                       | $-\frac{\sqrt{3}i}{21}$  | 0                       | 0                         |
|                  |           | 0                             | $-\frac{\sqrt{30}i}{42}$ | 0                       | 0                       | 0                        | $\frac{\sqrt{6}i}{21}$   | 0                         | 0                        | $-\frac{\sqrt{3}i}{21}$  | 0                       | 0                        | $-\frac{3i}{14}$        | 0                         |
|                  |           | 0                             | 0                        | $-\frac{i}{14}$         | 0                       | 0                        | 0                        | 0                         | 0                        | $\frac{\sqrt{3}i}{21}$   | 0                       | 0                        | 0                       | $-\frac{\sqrt{105}i}{42}$ |
|                  |           | 0                             | 0                        | 0                       | $\frac{\sqrt{3}i}{42}$  | 0                        | 0                        | 0                         | 0                        | 0                        | $\frac{3i}{14}$         | 0                        | 0                       | 0                         |
|                  |           | 0                             | 0                        | 0                       | 0                       | $\frac{\sqrt{42}i}{42}$  | 0                        | 0                         | 0                        | 0                        | 0                       | $\frac{\sqrt{105}i}{42}$ | 0                       | 0                         |
| 951              | symmetry  | $\frac{x(2x^2-3y^2-3z^2)}{2}$ |                          |                         |                         |                          |                          |                           |                          |                          |                         |                          |                         |                           |

*continued ...*

Table 10

| No. | multipole            | matrix                         |                         |                           |                           |                         |                           |                          |                         |                         |                          |                          |                         |                         |                          |
|-----|----------------------|--------------------------------|-------------------------|---------------------------|---------------------------|-------------------------|---------------------------|--------------------------|-------------------------|-------------------------|--------------------------|--------------------------|-------------------------|-------------------------|--------------------------|
| 952 | $M_{3,0}^{(a)}(T_1)$ | 0                              | $\frac{\sqrt{15}}{28}$  | 0                         | $-\frac{5\sqrt{30}}{168}$ | 0                       | 0                         | $-\frac{\sqrt{14}}{56}$  | 0                       | $\frac{\sqrt{6}}{28}$   | 0                        | $-\frac{\sqrt{10}}{56}$  | 0                       | 0                       | 0                        |
|     |                      | $\frac{\sqrt{15}}{28}$         | 0                       | $-\frac{\sqrt{6}}{56}$    | 0                         | $-\frac{5\sqrt{3}}{42}$ | 0                         | 0                        | $\frac{\sqrt{10}}{56}$  | 0                       | $\frac{\sqrt{2}}{28}$    | 0                        | $-\frac{\sqrt{30}}{56}$ | 0                       | 0                        |
|     |                      | 0                              | $-\frac{\sqrt{6}}{56}$  | 0                         | $-\frac{\sqrt{3}}{14}$    | 0                       | $-\frac{5\sqrt{30}}{168}$ | $\frac{\sqrt{35}}{56}$   | 0                       | $\frac{\sqrt{15}}{56}$  | 0                        | $-\frac{1}{56}$          | 0                       | $-\frac{3\sqrt{5}}{56}$ | 0                        |
|     |                      | $-\frac{5\sqrt{30}}{168}$      | 0                       | $-\frac{\sqrt{3}}{14}$    | 0                         | $-\frac{\sqrt{6}}{56}$  | 0                         | 0                        | $\frac{3\sqrt{5}}{56}$  | 0                       | $\frac{1}{56}$           | 0                        | $-\frac{\sqrt{15}}{56}$ | 0                       | $-\frac{\sqrt{35}}{56}$  |
|     |                      | 0                              | $-\frac{5\sqrt{3}}{42}$ | 0                         | $-\frac{\sqrt{6}}{56}$    | 0                       | $\frac{\sqrt{15}}{28}$    | 0                        | 0                       | $\frac{\sqrt{30}}{56}$  | 0                        | $-\frac{\sqrt{2}}{28}$   | 0                       | $-\frac{\sqrt{10}}{56}$ | 0                        |
|     |                      | 0                              | 0                       | $-\frac{5\sqrt{30}}{168}$ | 0                         | $\frac{\sqrt{15}}{28}$  | 0                         | 0                        | 0                       | 0                       | $\frac{\sqrt{10}}{56}$   | 0                        | $-\frac{\sqrt{6}}{28}$  | 0                       | $\frac{\sqrt{14}}{56}$   |
|     |                      | $-\frac{\sqrt{14}}{56}$        | 0                       | $\frac{\sqrt{35}}{56}$    | 0                         | 0                       | 0                         | 0                        | $\frac{\sqrt{21}}{28}$  | 0                       | $-\frac{\sqrt{105}}{84}$ | 0                        | 0                       | 0                       | 0                        |
|     |                      | 0                              | $\frac{\sqrt{10}}{56}$  | 0                         | $\frac{3\sqrt{5}}{56}$    | 0                       | 0                         | $\frac{\sqrt{21}}{28}$   | 0                       | $\frac{1}{28}$          | 0                        | $-\frac{\sqrt{15}}{21}$  | 0                       | 0                       | 0                        |
|     |                      | $\frac{\sqrt{6}}{28}$          | 0                       | $\frac{\sqrt{15}}{56}$    | 0                         | $\frac{\sqrt{30}}{56}$  | 0                         | 0                        | $\frac{1}{28}$          | 0                       | $-\frac{\sqrt{5}}{28}$   | 0                        | $-\frac{5\sqrt{3}}{42}$ | 0                       | 0                        |
|     |                      | 0                              | $\frac{\sqrt{2}}{28}$   | 0                         | $\frac{1}{56}$            | 0                       | $\frac{\sqrt{10}}{56}$    | $-\frac{\sqrt{105}}{84}$ | 0                       | $-\frac{\sqrt{5}}{28}$  | 0                        | $-\frac{\sqrt{3}}{14}$   | 0                       | $-\frac{\sqrt{15}}{21}$ | 0                        |
|     |                      | $-\frac{\sqrt{10}}{56}$        | 0                       | $-\frac{1}{56}$           | 0                         | $-\frac{\sqrt{2}}{28}$  | 0                         | 0                        | $-\frac{\sqrt{15}}{21}$ | 0                       | $-\frac{\sqrt{3}}{14}$   | 0                        | $-\frac{\sqrt{5}}{28}$  | 0                       | $-\frac{\sqrt{105}}{84}$ |
|     |                      | 0                              | $-\frac{\sqrt{30}}{56}$ | 0                         | $-\frac{\sqrt{15}}{56}$   | 0                       | $-\frac{\sqrt{6}}{28}$    | 0                        | 0                       | $-\frac{5\sqrt{3}}{42}$ | 0                        | $-\frac{\sqrt{5}}{28}$   | 0                       | $\frac{1}{28}$          | 0                        |
|     |                      | 0                              | 0                       | $-\frac{3\sqrt{5}}{56}$   | 0                         | $-\frac{\sqrt{10}}{56}$ | 0                         | 0                        | 0                       | 0                       | $-\frac{\sqrt{15}}{21}$  | 0                        | $\frac{1}{28}$          | 0                       | $\frac{\sqrt{21}}{28}$   |
|     |                      | 0                              | 0                       | 0                         | $-\frac{\sqrt{35}}{56}$   | 0                       | $\frac{\sqrt{14}}{56}$    | 0                        | 0                       | 0                       | 0                        | $-\frac{\sqrt{105}}{84}$ | 0                       | $\frac{\sqrt{21}}{28}$  | 0                        |
| 952 | symmetry             | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ |                         |                           |                           |                         |                           |                          |                         |                         |                          |                          |                         |                         |                          |

*continued ...*

Table 10

| No. | multipole            | matrix                         |                          |                           |                            |                          |                            |                          |                          |                          |                           |                          |                          |                          |                           |  |
|-----|----------------------|--------------------------------|--------------------------|---------------------------|----------------------------|--------------------------|----------------------------|--------------------------|--------------------------|--------------------------|---------------------------|--------------------------|--------------------------|--------------------------|---------------------------|--|
| 953 | $M_{3,1}^{(a)}(T_1)$ | 0                              | $-\frac{\sqrt{15}i}{28}$ | 0                         | $-\frac{5\sqrt{30}i}{168}$ | 0                        | 0                          | $-\frac{\sqrt{14}i}{56}$ | 0                        | $-\frac{\sqrt{6}i}{28}$  | 0                         | $-\frac{\sqrt{10}i}{56}$ | 0                        | 0                        | 0                         |  |
|     |                      | $\frac{\sqrt{15}i}{28}$        | 0                        | $\frac{\sqrt{6}i}{56}$    | 0                          | $-\frac{5\sqrt{3}i}{42}$ | 0                          | 0                        | $\frac{\sqrt{10}i}{56}$  | 0                        | $-\frac{\sqrt{2}i}{28}$   | 0                        | $-\frac{\sqrt{30}i}{56}$ | 0                        | 0                         |  |
|     |                      | 0                              | $-\frac{\sqrt{6}i}{56}$  | 0                         | $\frac{\sqrt{3}i}{14}$     | 0                        | $-\frac{5\sqrt{30}i}{168}$ | $-\frac{\sqrt{35}i}{56}$ | 0                        | $\frac{\sqrt{15}i}{56}$  | 0                         | $\frac{i}{56}$           | 0                        | $-\frac{3\sqrt{5}i}{56}$ | 0                         |  |
|     |                      | $\frac{5\sqrt{30}i}{168}$      | 0                        | $-\frac{\sqrt{3}i}{14}$   | 0                          | $\frac{\sqrt{6}i}{56}$   | 0                          | 0                        | $-\frac{3\sqrt{5}i}{56}$ | 0                        | $\frac{i}{56}$            | 0                        | $\frac{\sqrt{15}i}{56}$  | 0                        | $-\frac{\sqrt{35}i}{56}$  |  |
|     |                      | 0                              | $\frac{5\sqrt{3}i}{42}$  | 0                         | $-\frac{\sqrt{6}i}{56}$    | 0                        | $-\frac{\sqrt{15}i}{28}$   | 0                        | 0                        | $-\frac{\sqrt{30}i}{56}$ | 0                         | $-\frac{\sqrt{2}i}{28}$  | 0                        | $\frac{\sqrt{10}i}{56}$  | 0                         |  |
|     |                      | 0                              | 0                        | $\frac{5\sqrt{30}i}{168}$ | 0                          | $\frac{\sqrt{15}i}{28}$  | 0                          | 0                        | 0                        | $-\frac{\sqrt{10}i}{56}$ | 0                         | $-\frac{\sqrt{6}i}{28}$  | 0                        | $-\frac{\sqrt{14}i}{56}$ |                           |  |
|     |                      | $\frac{\sqrt{14}i}{56}$        | 0                        | $\frac{\sqrt{35}i}{56}$   | 0                          | 0                        | 0                          | 0                        | $-\frac{\sqrt{21}i}{28}$ | 0                        | $-\frac{\sqrt{105}i}{84}$ | 0                        | 0                        | 0                        | 0                         |  |
|     |                      | 0                              | $-\frac{\sqrt{10}i}{56}$ | 0                         | $\frac{3\sqrt{5}i}{56}$    | 0                        | 0                          | $\frac{\sqrt{21}i}{28}$  | 0                        | $-\frac{i}{28}$          | 0                         | $-\frac{\sqrt{15}i}{21}$ | 0                        | 0                        | 0                         |  |
|     |                      | $\frac{\sqrt{6}i}{28}$         | 0                        | $-\frac{\sqrt{15}i}{56}$  | 0                          | $\frac{\sqrt{30}i}{56}$  | 0                          | 0                        | $\frac{i}{28}$           | 0                        | $\frac{\sqrt{5}i}{28}$    | 0                        | $-\frac{5\sqrt{3}i}{42}$ | 0                        | 0                         |  |
|     |                      | 0                              | $\frac{\sqrt{2}i}{28}$   | 0                         | $-\frac{i}{56}$            | 0                        | $\frac{\sqrt{10}i}{56}$    | $\frac{\sqrt{105}i}{84}$ | 0                        | $-\frac{\sqrt{5}i}{28}$  | 0                         | $\frac{\sqrt{3}i}{14}$   | 0                        | $-\frac{\sqrt{15}i}{21}$ | 0                         |  |
|     |                      | $\frac{\sqrt{10}i}{56}$        | 0                        | $-\frac{i}{56}$           | 0                          | $\frac{\sqrt{2}i}{28}$   | 0                          | 0                        | $\frac{\sqrt{15}i}{21}$  | 0                        | $-\frac{\sqrt{3}i}{14}$   | 0                        | $\frac{\sqrt{5}i}{28}$   | 0                        | $-\frac{\sqrt{105}i}{84}$ |  |
|     |                      | 0                              | $\frac{\sqrt{30}i}{56}$  | 0                         | $-\frac{\sqrt{15}i}{56}$   | 0                        | $\frac{\sqrt{6}i}{28}$     | 0                        | 0                        | $\frac{5\sqrt{3}i}{42}$  | 0                         | $-\frac{\sqrt{5}i}{28}$  | 0                        | $-\frac{i}{28}$          | 0                         |  |
|     |                      | 0                              | 0                        | $\frac{3\sqrt{5}i}{56}$   | 0                          | $-\frac{\sqrt{10}i}{56}$ | 0                          | 0                        | 0                        | 0                        | $\frac{\sqrt{15}i}{21}$   | 0                        | $\frac{i}{28}$           | 0                        | $-\frac{\sqrt{21}i}{28}$  |  |
|     |                      | 0                              | 0                        | 0                         | $\frac{\sqrt{35}i}{56}$    | 0                        | $\frac{\sqrt{14}i}{56}$    | 0                        | 0                        | 0                        | 0                         | $\frac{\sqrt{105}i}{84}$ | 0                        | $\frac{\sqrt{21}i}{28}$  | 0                         |  |
| 953 | symmetry             | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ |                          |                           |                            |                          |                            |                          |                          |                          |                           |                          |                          |                          |                           |  |

continued ...

Table 10

| No. | multipole            | matrix                           |                      |                        |                         |                       |                        |                       |                        |                      |                       |                        |                       |                         |                      |   |
|-----|----------------------|----------------------------------|----------------------|------------------------|-------------------------|-----------------------|------------------------|-----------------------|------------------------|----------------------|-----------------------|------------------------|-----------------------|-------------------------|----------------------|---|
|     | $M_{3,2}^{(a)}(T_1)$ | $-\frac{5\sqrt{3}}{42}$          | 0                    | 0                      | 0                       | 0                     | 0                      | 0                     | $-\frac{\sqrt{2}}{7}$  | 0                    | 0                     | 0                      | 0                     | 0                       | 0                    | 0 |
|     |                      | 0                                | $\frac{\sqrt{3}}{6}$ | 0                      | 0                       | 0                     | 0                      | 0                     | 0                      | 0                    | 0                     | 0                      | 0                     | 0                       | 0                    | 0 |
|     |                      | 0                                | 0                    | $\frac{2\sqrt{3}}{21}$ | 0                       | 0                     | 0                      | 0                     | 0                      | 0                    | $\frac{1}{7}$         | 0                      | 0                     | 0                       | 0                    | 0 |
|     |                      | 0                                | 0                    | 0                      | $-\frac{2\sqrt{3}}{21}$ | 0                     | 0                      | 0                     | 0                      | 0                    | 0                     | $\frac{1}{7}$          | 0                     | 0                       | 0                    | 0 |
|     |                      | 0                                | 0                    | 0                      | 0                       | $-\frac{\sqrt{3}}{6}$ | 0                      | 0                     | 0                      | 0                    | 0                     | 0                      | 0                     | 0                       | 0                    | 0 |
|     |                      | 0                                | 0                    | 0                      | 0                       | 0                     | $\frac{5\sqrt{3}}{42}$ | 0                     | 0                      | 0                    | 0                     | 0                      | 0                     | $-\frac{\sqrt{2}}{7}$   | 0                    | 0 |
|     |                      | 0                                | 0                    | 0                      | 0                       | 0                     | 0                      | $-\frac{\sqrt{3}}{6}$ | 0                      | 0                    | 0                     | 0                      | 0                     | 0                       | 0                    | 0 |
|     |                      | $-\frac{\sqrt{2}}{7}$            | 0                    | 0                      | 0                       | 0                     | 0                      | 0                     | $\frac{5\sqrt{3}}{42}$ | 0                    | 0                     | 0                      | 0                     | 0                       | 0                    | 0 |
|     |                      | 0                                | 0                    | 0                      | 0                       | 0                     | 0                      | 0                     | 0                      | $\frac{\sqrt{3}}{6}$ | 0                     | 0                      | 0                     | 0                       | 0                    | 0 |
|     |                      | 0                                | 0                    | $\frac{1}{7}$          | 0                       | 0                     | 0                      | 0                     | 0                      | 0                    | $\frac{\sqrt{3}}{14}$ | 0                      | 0                     | 0                       | 0                    | 0 |
|     |                      | 0                                | 0                    | 0                      | $\frac{1}{7}$           | 0                     | 0                      | 0                     | 0                      | 0                    | 0                     | $-\frac{\sqrt{3}}{14}$ | 0                     | 0                       | 0                    | 0 |
|     |                      | 0                                | 0                    | 0                      | 0                       | 0                     | 0                      | 0                     | 0                      | 0                    | 0                     | 0                      | $-\frac{\sqrt{3}}{6}$ | 0                       | 0                    | 0 |
|     |                      | 0                                | 0                    | 0                      | 0                       | 0                     | $-\frac{\sqrt{2}}{7}$  | 0                     | 0                      | 0                    | 0                     | 0                      | 0                     | $-\frac{5\sqrt{3}}{42}$ | 0                    | 0 |
|     |                      | 0                                | 0                    | 0                      | 0                       | 0                     | 0                      | 0                     | 0                      | 0                    | 0                     | 0                      | 0                     | 0                       | $\frac{\sqrt{3}}{6}$ | 0 |
| 954 | symmetry             | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ |                      |                        |                         |                       |                        |                       |                        |                      |                       |                        |                       |                         |                      |   |

*continued ...*

Table 10

| No.                  | multipole | matrix                            |                         |                          |                         |                          |                          |                           |                         |                         |                         |                          |                         |                          |                          |  |
|----------------------|-----------|-----------------------------------|-------------------------|--------------------------|-------------------------|--------------------------|--------------------------|---------------------------|-------------------------|-------------------------|-------------------------|--------------------------|-------------------------|--------------------------|--------------------------|--|
| $M_{3,0}^{(a)}(T_2)$ |           | 0                                 | $\frac{5}{28}$          | 0                        | $\frac{5\sqrt{2}}{56}$  | 0                        | 0                        | $-\frac{\sqrt{210}}{168}$ | 0                       | $\frac{\sqrt{10}}{28}$  | 0                       | $\frac{\sqrt{6}}{56}$    | 0                       | 0                        | 0                        |  |
|                      |           | $\frac{5}{28}$                    | 0                       | $-\frac{\sqrt{10}}{56}$  | 0                       | $\frac{\sqrt{5}}{14}$    | 0                        | 0                         | $\frac{5\sqrt{6}}{168}$ | 0                       | $\frac{\sqrt{30}}{84}$  | 0                        | $\frac{3\sqrt{2}}{56}$  | 0                        | 0                        |  |
|                      |           | 0                                 | $-\frac{\sqrt{10}}{56}$ | 0                        | $-\frac{\sqrt{5}}{14}$  | 0                        | $\frac{5\sqrt{2}}{56}$   | $-\frac{\sqrt{21}}{56}$   | 0                       | $\frac{5}{56}$          | 0                       | $-\frac{\sqrt{15}}{168}$ | 0                       | $\frac{3\sqrt{3}}{56}$   | 0                        |  |
|                      |           | $\frac{5\sqrt{2}}{56}$            | 0                       | $-\frac{\sqrt{5}}{14}$   | 0                       | $-\frac{\sqrt{10}}{56}$  | 0                        | 0                         | $-\frac{3\sqrt{3}}{56}$ | 0                       | $\frac{\sqrt{15}}{168}$ | 0                        | $-\frac{5}{56}$         | 0                        | $\frac{\sqrt{21}}{56}$   |  |
|                      |           | 0                                 | $\frac{\sqrt{5}}{14}$   | 0                        | $-\frac{\sqrt{10}}{56}$ | 0                        | $\frac{5}{28}$           | 0                         | 0                       | $-\frac{3\sqrt{2}}{56}$ | 0                       | $-\frac{\sqrt{30}}{84}$  | 0                       | $-\frac{5\sqrt{6}}{168}$ | 0                        |  |
|                      |           | 0                                 | 0                       | $\frac{5\sqrt{2}}{56}$   | 0                       | $\frac{5}{28}$           | 0                        | 0                         | 0                       | 0                       | $-\frac{\sqrt{6}}{56}$  | 0                        | $-\frac{\sqrt{10}}{28}$ | 0                        | $\frac{\sqrt{210}}{168}$ |  |
|                      |           | $-\frac{\sqrt{210}}{168}$         | 0                       | $-\frac{\sqrt{21}}{56}$  | 0                       | 0                        | 0                        | 0                         | $\frac{\sqrt{35}}{28}$  | 0                       | $\frac{\sqrt{7}}{28}$   | 0                        | 0                       | 0                        | 0                        |  |
|                      |           | 0                                 | $\frac{5\sqrt{6}}{168}$ | 0                        | $-\frac{3\sqrt{3}}{56}$ | 0                        | 0                        | $\frac{\sqrt{35}}{28}$    | 0                       | $\frac{\sqrt{15}}{84}$  | 0                       | $\frac{1}{7}$            | 0                       | 0                        | 0                        |  |
|                      |           | $\frac{\sqrt{10}}{28}$            | 0                       | $\frac{5}{56}$           | 0                       | $-\frac{3\sqrt{2}}{56}$  | 0                        | 0                         | $\frac{\sqrt{15}}{84}$  | 0                       | $-\frac{5\sqrt{3}}{84}$ | 0                        | $\frac{\sqrt{5}}{14}$   | 0                        | 0                        |  |
|                      |           | 0                                 | $\frac{\sqrt{30}}{84}$  | 0                        | $\frac{\sqrt{15}}{168}$ | 0                        | $-\frac{\sqrt{6}}{56}$   | $\frac{\sqrt{7}}{28}$     | 0                       | $-\frac{5\sqrt{3}}{84}$ | 0                       | $-\frac{\sqrt{5}}{14}$   | 0                       | $\frac{1}{7}$            | 0                        |  |
|                      |           | $\frac{\sqrt{6}}{56}$             | 0                       | $-\frac{\sqrt{15}}{168}$ | 0                       | $-\frac{\sqrt{30}}{84}$  | 0                        | 0                         | $\frac{1}{7}$           | 0                       | $-\frac{\sqrt{5}}{14}$  | 0                        | $-\frac{5\sqrt{3}}{84}$ | 0                        | $\frac{\sqrt{7}}{28}$    |  |
|                      |           | 0                                 | $\frac{3\sqrt{2}}{56}$  | 0                        | $-\frac{5}{56}$         | 0                        | $-\frac{\sqrt{10}}{28}$  | 0                         | 0                       | $\frac{\sqrt{5}}{14}$   | 0                       | $-\frac{5\sqrt{3}}{84}$  | 0                       | $\frac{\sqrt{15}}{84}$   | 0                        |  |
|                      |           | 0                                 | 0                       | $\frac{3\sqrt{3}}{56}$   | 0                       | $-\frac{5\sqrt{6}}{168}$ | 0                        | 0                         | 0                       | 0                       | $\frac{1}{7}$           | 0                        | $\frac{\sqrt{15}}{84}$  | 0                        | $\frac{\sqrt{35}}{28}$   |  |
|                      |           | 0                                 | 0                       | 0                        | $\frac{\sqrt{21}}{56}$  | 0                        | $\frac{\sqrt{210}}{168}$ | 0                         | 0                       | 0                       | 0                       | $\frac{\sqrt{7}}{28}$    | 0                       | $\frac{\sqrt{35}}{28}$   | 0                        |  |
| 955                  | symmetry  | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |                         |                          |                         |                          |                          |                           |                         |                         |                         |                          |                         |                          |                          |  |

*continued ...*

Table 10

| No.                  | multipole | matrix                           |                          |                          |                          |                          |                            |                           |                           |                          |                           |                           |                          |                           |                          |  |
|----------------------|-----------|----------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|----------------------------|---------------------------|---------------------------|--------------------------|---------------------------|---------------------------|--------------------------|---------------------------|--------------------------|--|
| $M_{3,1}^{(a)}(T_2)$ |           | 0                                | $\frac{5i}{28}$          | 0                        | $-\frac{5\sqrt{2}i}{56}$ | 0                        | 0                          | $\frac{\sqrt{210}i}{168}$ | 0                         | $\frac{\sqrt{10}i}{28}$  | 0                         | $-\frac{\sqrt{6}i}{56}$   | 0                        | 0                         | 0                        |  |
|                      |           | $-\frac{5i}{28}$                 | 0                        | $-\frac{\sqrt{10}i}{56}$ | 0                        | $-\frac{\sqrt{5}i}{14}$  | 0                          | 0                         | $-\frac{5\sqrt{6}i}{168}$ | 0                        | $\frac{\sqrt{30}i}{84}$   | 0                         | $-\frac{3\sqrt{2}i}{56}$ | 0                         | 0                        |  |
|                      |           | 0                                | $\frac{\sqrt{10}i}{56}$  | 0                        | $-\frac{\sqrt{5}i}{14}$  | 0                        | $-\frac{5\sqrt{2}i}{56}$   | $-\frac{\sqrt{21}i}{56}$  | 0                         | $-\frac{5i}{56}$         | 0                         | $-\frac{\sqrt{15}i}{168}$ | 0                        | $-\frac{3\sqrt{3}i}{56}$  | 0                        |  |
|                      |           | $\frac{5\sqrt{2}i}{56}$          | 0                        | $\frac{\sqrt{5}i}{14}$   | 0                        | $-\frac{\sqrt{10}i}{56}$ | 0                          | 0                         | $-\frac{3\sqrt{3}i}{56}$  | 0                        | $-\frac{\sqrt{15}i}{168}$ | 0                         | $-\frac{5i}{56}$         | 0                         | $-\frac{\sqrt{21}i}{56}$ |  |
|                      |           | 0                                | $\frac{\sqrt{5}i}{14}$   | 0                        | $\frac{\sqrt{10}i}{56}$  | 0                        | $\frac{5i}{28}$            | 0                         | 0                         | $-\frac{3\sqrt{2}i}{56}$ | 0                         | $\frac{\sqrt{30}i}{84}$   | 0                        | $-\frac{5\sqrt{6}i}{168}$ | 0                        |  |
|                      |           | 0                                | 0                        | $\frac{5\sqrt{2}i}{56}$  | 0                        | $-\frac{5i}{28}$         | 0                          | 0                         | 0                         | $-\frac{\sqrt{6}i}{56}$  | 0                         | $\frac{\sqrt{10}i}{28}$   | 0                        | $\frac{\sqrt{210}i}{168}$ |                          |  |
|                      |           | $-\frac{\sqrt{210}i}{168}$       | 0                        | $\frac{\sqrt{21}i}{56}$  | 0                        | 0                        | 0                          | 0                         | $\frac{\sqrt{35}i}{28}$   | 0                        | $-\frac{\sqrt{7}i}{28}$   | 0                         | 0                        | 0                         | 0                        |  |
|                      |           | 0                                | $\frac{5\sqrt{6}i}{168}$ | 0                        | $\frac{3\sqrt{3}i}{56}$  | 0                        | 0                          | $-\frac{\sqrt{35}i}{28}$  | 0                         | $\frac{\sqrt{15}i}{84}$  | 0                         | $-\frac{i}{7}$            | 0                        | 0                         | 0                        |  |
|                      |           | $-\frac{\sqrt{10}i}{28}$         | 0                        | $\frac{5i}{56}$          | 0                        | $\frac{3\sqrt{2}i}{56}$  | 0                          | 0                         | $-\frac{\sqrt{15}i}{84}$  | 0                        | $-\frac{5\sqrt{3}i}{84}$  | 0                         | $-\frac{\sqrt{5}i}{14}$  | 0                         | 0                        |  |
|                      |           | 0                                | $-\frac{\sqrt{30}i}{84}$ | 0                        | $\frac{\sqrt{15}i}{168}$ | 0                        | $\frac{\sqrt{6}i}{56}$     | $\frac{\sqrt{7}i}{28}$    | 0                         | $\frac{5\sqrt{3}i}{84}$  | 0                         | $-\frac{\sqrt{5}i}{14}$   | 0                        | $-\frac{i}{7}$            | 0                        |  |
|                      |           | $\frac{\sqrt{6}i}{56}$           | 0                        | $\frac{\sqrt{15}i}{168}$ | 0                        | $-\frac{\sqrt{30}i}{84}$ | 0                          | 0                         | $\frac{i}{7}$             | 0                        | $\frac{\sqrt{5}i}{14}$    | 0                         | $-\frac{5\sqrt{3}i}{84}$ | 0                         | $-\frac{\sqrt{7}i}{28}$  |  |
|                      |           | 0                                | $\frac{3\sqrt{2}i}{56}$  | 0                        | $\frac{5i}{56}$          | 0                        | $-\frac{\sqrt{10}i}{28}$   | 0                         | 0                         | $\frac{\sqrt{5}i}{14}$   | 0                         | $\frac{5\sqrt{3}i}{84}$   | 0                        | $\frac{\sqrt{15}i}{84}$   | 0                        |  |
|                      |           | 0                                | 0                        | $\frac{3\sqrt{3}i}{56}$  | 0                        | $\frac{5\sqrt{6}i}{168}$ | 0                          | 0                         | 0                         | 0                        | $\frac{i}{7}$             | 0                         | $-\frac{\sqrt{15}i}{84}$ | 0                         | $\frac{\sqrt{35}i}{28}$  |  |
|                      |           | 0                                | 0                        | 0                        | $\frac{\sqrt{21}i}{56}$  | 0                        | $-\frac{\sqrt{210}i}{168}$ | 0                         | 0                         | 0                        | 0                         | $\frac{\sqrt{7}i}{28}$    | 0                        | $-\frac{\sqrt{35}i}{28}$  | 0                        |  |
| 956                  | symmetry  | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ |                          |                          |                          |                          |                            |                           |                           |                          |                           |                           |                          |                           |                          |  |

continued ...

Table 10

| No.                  | multipole | matrix                              |                         |                         |                         |                         |                        |                          |                          |                         |                       |                         |                         |                       |                         |
|----------------------|-----------|-------------------------------------|-------------------------|-------------------------|-------------------------|-------------------------|------------------------|--------------------------|--------------------------|-------------------------|-----------------------|-------------------------|-------------------------|-----------------------|-------------------------|
| $M_{3,2}^{(a)}(T_2)$ |           | 0                                   | 0                       | $-\frac{5\sqrt{2}}{28}$ | 0                       | 0                       | 0                      | 0                        | 0                        | $-\frac{\sqrt{6}}{21}$  | 0                     | 0                       | 0                       | 0                     |                         |
|                      |           | 0                                   | 0                       | 0                       | $-\frac{\sqrt{10}}{28}$ | 0                       | 0                      | $\frac{\sqrt{42}}{42}$   | 0                        | 0                       | 0                     | $-\frac{\sqrt{30}}{42}$ | 0                       | 0                     | 0                       |
|                      |           | $-\frac{5\sqrt{2}}{28}$             | 0                       | 0                       | 0                       | $\frac{\sqrt{10}}{28}$  | 0                      | 0                        | $\frac{\sqrt{3}}{42}$    | 0                       | 0                     | 0                       | $-\frac{1}{14}$         | 0                     | 0                       |
|                      |           | 0                                   | $-\frac{\sqrt{10}}{28}$ | 0                       | 0                       | 0                       | $\frac{5\sqrt{2}}{28}$ | 0                        | 0                        | $-\frac{1}{14}$         | 0                     | 0                       | 0                       | $\frac{\sqrt{3}}{42}$ | 0                       |
|                      |           | 0                                   | 0                       | $\frac{\sqrt{10}}{28}$  | 0                       | 0                       | 0                      | 0                        | 0                        | $-\frac{\sqrt{30}}{42}$ | 0                     | 0                       | 0                       | 0                     | $\frac{\sqrt{42}}{42}$  |
|                      |           | 0                                   | 0                       | 0                       | $\frac{5\sqrt{2}}{28}$  | 0                       | 0                      | 0                        | 0                        | 0                       | 0                     | $-\frac{\sqrt{6}}{21}$  | 0                       | 0                     | 0                       |
|                      |           | 0                                   | $\frac{\sqrt{42}}{42}$  | 0                       | 0                       | 0                       | 0                      | 0                        | $-\frac{\sqrt{105}}{42}$ | 0                       | 0                     | 0                       | 0                       | 0                     | 0                       |
|                      |           | 0                                   | 0                       | $\frac{\sqrt{3}}{42}$   | 0                       | 0                       | 0                      | 0                        | 0                        | $-\frac{3}{14}$         | 0                     | 0                       | 0                       | 0                     | 0                       |
|                      |           | 0                                   | 0                       | 0                       | $-\frac{1}{14}$         | 0                       | 0                      | $-\frac{\sqrt{105}}{42}$ | 0                        | 0                       | 0                     | $-\frac{\sqrt{3}}{21}$  | 0                       | 0                     | 0                       |
|                      |           | $-\frac{\sqrt{6}}{21}$              | 0                       | 0                       | 0                       | $-\frac{\sqrt{30}}{42}$ | 0                      | 0                        | $-\frac{3}{14}$          | 0                       | 0                     | 0                       | $\frac{\sqrt{3}}{21}$   | 0                     | 0                       |
|                      |           | 0                                   | $-\frac{\sqrt{30}}{42}$ | 0                       | 0                       | 0                       | $-\frac{\sqrt{6}}{21}$ | 0                        | 0                        | $-\frac{\sqrt{3}}{21}$  | 0                     | 0                       | 0                       | $\frac{3}{14}$        | 0                       |
|                      |           | 0                                   | 0                       | $-\frac{1}{14}$         | 0                       | 0                       | 0                      | 0                        | 0                        | 0                       | $\frac{\sqrt{3}}{21}$ | 0                       | 0                       | 0                     | $\frac{\sqrt{105}}{42}$ |
|                      |           | 0                                   | 0                       | 0                       | $\frac{\sqrt{3}}{42}$   | 0                       | 0                      | 0                        | 0                        | 0                       | 0                     | $\frac{3}{14}$          | 0                       | 0                     | 0                       |
|                      |           | 0                                   | 0                       | 0                       | 0                       | $\frac{\sqrt{42}}{42}$  | 0                      | 0                        | 0                        | 0                       | 0                     | 0                       | $\frac{\sqrt{105}}{42}$ | 0                     | 0                       |
| 957                  | symmetry  | $\frac{3\sqrt{35}xyz(x-y)(x+y)}{2}$ |                         |                         |                         |                         |                        |                          |                          |                         |                       |                         |                         |                       |                         |

*continued ...*

Table 10

| No.                         | multipole | matrix                                  |                         |                          |                         |                         |                          |                          |                         |                          |                          |                          |                          |                         |                         |
|-----------------------------|-----------|---|-------------------------|--------------------------|-------------------------|-------------------------|--------------------------|--------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|-------------------------|
| $\mathbb{M}_{5,0}^{(a)}(E)$ |           | 0                                       | 0                       | 0                        | 0                       | $-\frac{\sqrt{6}i}{14}$ | 0                        | 0                        | 0                       | 0                        | 0                        | 0                        | $-\frac{\sqrt{15}i}{14}$ | 0                       | 0                       |
|                             |           | 0                                       | 0                       | 0                        | 0                       | 0                       | $\frac{\sqrt{6}i}{14}$   | 0                        | 0                       | 0                        | 0                        | 0                        | 0                        | $-\frac{i}{14}$         | 0                       |
|                             |           | 0                                       | 0                       | 0                        | 0                       | 0                       | 0                        | 0                        | 0                       | 0                        | 0                        | 0                        | 0                        | 0                       | $\frac{\sqrt{14}i}{14}$ |
|                             |           | 0                                       | 0                       | 0                        | 0                       | 0                       | 0                        | $-\frac{\sqrt{14}i}{14}$ | 0                       | 0                        | 0                        | 0                        | 0                        | 0                       | 0                       |
|                             |           | $\frac{\sqrt{6}i}{14}$                  | 0                       | 0                        | 0                       | 0                       | 0                        | 0                        | $\frac{i}{14}$          | 0                        | 0                        | 0                        | 0                        | 0                       | 0                       |
|                             |           | 0                                       | $-\frac{\sqrt{6}i}{14}$ | 0                        | 0                       | 0                       | 0                        | 0                        | 0                       | $\frac{\sqrt{15}i}{14}$  | 0                        | 0                        | 0                        | 0                       | 0                       |
|                             |           | 0                                       | 0                       | 0                        | $\frac{\sqrt{14}i}{14}$ | 0                       | 0                        | 0                        | 0                       | 0                        | $-\frac{\sqrt{42}i}{28}$ | 0                        | 0                        | 0                       | 0                       |
|                             |           | 0                                       | 0                       | 0                        | 0                       | $-\frac{i}{14}$         | 0                        | 0                        | 0                       | 0                        | 0                        | $-\frac{\sqrt{10}i}{28}$ | 0                        | 0                       | 0                       |
|                             |           | 0                                       | 0                       | 0                        | 0                       | 0                       | $-\frac{\sqrt{15}i}{14}$ | 0                        | 0                       | 0                        | 0                        | 0                        | 0                        | $\frac{\sqrt{10}i}{28}$ | 0                       |
|                             |           | 0                                       | 0                       | 0                        | 0                       | 0                       | 0                        | 0                        | 0                       | 0                        | 0                        | 0                        | 0                        | 0                       | $\frac{\sqrt{42}i}{28}$ |
|                             |           | 0                                       | 0                       | 0                        | 0                       | 0                       | 0                        | $\frac{\sqrt{42}i}{28}$  | 0                       | 0                        | 0                        | 0                        | 0                        | 0                       | 0                       |
|                             |           | $\frac{\sqrt{15}i}{14}$                 | 0                       | 0                        | 0                       | 0                       | 0                        | 0                        | $\frac{\sqrt{10}i}{28}$ | 0                        | 0                        | 0                        | 0                        | 0                       | 0                       |
|                             |           | 0                                       | $\frac{i}{14}$          | 0                        | 0                       | 0                       | 0                        | 0                        | 0                       | $-\frac{\sqrt{10}i}{28}$ | 0                        | 0                        | 0                        | 0                       | 0                       |
|                             |           | 0                                       | 0                       | $-\frac{\sqrt{14}i}{14}$ | 0                       | 0                       | 0                        | 0                        | 0                       | $-\frac{\sqrt{42}i}{28}$ | 0                        | 0                        | 0                        | 0                       | 0                       |
| 958                         | symmetry  | $\frac{\sqrt{105}xyz(x^2+y^2-2z^2)}{2}$ |                         |                          |                         |                         |                          |                          |                         |                          |                          |                          |                          |                         |                         |

*continued ...*



Table 10

| No.                         | multipole | matrix                   |  |                         |                          |                          |                         |                           |                          |                          |                          |                          |                          |                         |                           |
|-----------------------------|-----------|--------------------------|--|-------------------------|--------------------------|--------------------------|-------------------------|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|---------------------------|
| $\mathbb{M}_{5,1}^{(a)}(E)$ |           | 0                        | 0  | $\frac{i}{14}$          | 0                        | 0                        | 0                       | 0                         | 0                        | $\frac{5\sqrt{3}i}{42}$  | 0                        | 0                        | 0                        | 0                       |                           |
|                             |           | 0                        | 0  | 0                       | $-\frac{\sqrt{5}i}{14}$  | 0                        | 0                       | $\frac{\sqrt{21}i}{42}$   | 0                        | 0                        | 0                        | $-\frac{\sqrt{15}i}{21}$ | 0                        | 0                       | 0                         |
|                             |           | $-\frac{i}{14}$          | 0  | 0                       | 0                        | $\frac{\sqrt{5}i}{14}$   | 0                       | 0                         | $-\frac{2\sqrt{6}i}{21}$ | 0                        | 0                        | 0                        | $-\frac{\sqrt{2}i}{14}$  | 0                       | 0                         |
|                             |           | 0                        | $\frac{\sqrt{5}i}{14}$                                     | 0                       | 0                        | 0                        | $-\frac{i}{14}$         | 0                         | 0                        | $\frac{\sqrt{2}i}{14}$   | 0                        | 0                        | 0                        | $\frac{2\sqrt{6}i}{21}$ | 0                         |
|                             |           | 0                        | 0  | $-\frac{\sqrt{5}i}{14}$ | 0                        | 0                        | 0                       | 0                         | 0                        | $\frac{\sqrt{15}i}{21}$  | 0                        | 0                        | 0                        | 0                       | $-\frac{\sqrt{21}i}{42}$  |
|                             |           | 0                        | 0  | 0                       | $\frac{i}{14}$           | 0                        | 0                       | 0                         | 0                        | 0                        | 0                        | $-\frac{5\sqrt{3}i}{42}$ | 0                        | 0                       | 0                         |
|                             |           | 0                        | $-\frac{\sqrt{21}i}{42}$                                   | 0                       | 0                        | 0                        | 0                       | 0                         | 0                        | $\frac{\sqrt{210}i}{84}$ | 0                        | 0                        | 0                        | 0                       | 0                         |
|                             |           | 0                        | 0  | $\frac{2\sqrt{6}i}{21}$ | 0                        | 0                        | 0                       | 0                         | 0                        | 0                        | $-\frac{3\sqrt{2}i}{28}$ | 0                        | 0                        | 0                       | 0                         |
|                             |           | 0                        | 0  | 0                       | $-\frac{\sqrt{2}i}{14}$  | 0                        | 0                       | $-\frac{\sqrt{210}i}{84}$ | 0                        | 0                        | 0                        | $-\frac{\sqrt{6}i}{21}$  | 0                        | 0                       | 0                         |
|                             |           | $-\frac{5\sqrt{3}i}{42}$ | 0  | 0                       | 0                        | $-\frac{\sqrt{15}i}{21}$ | 0                       | 0                         | $\frac{3\sqrt{2}i}{28}$  | 0                        | 0                        | 0                        | $\frac{\sqrt{6}i}{21}$   | 0                       | 0                         |
|                             |           | 0                        | $\frac{\sqrt{15}i}{21}$                                    | 0                       | 0                        | 0                        | $\frac{5\sqrt{3}i}{42}$ | 0                         | 0                        | $\frac{\sqrt{6}i}{21}$   | 0                        | 0                        | 0                        | $\frac{3\sqrt{2}i}{28}$ | 0                         |
|                             |           | 0                        | 0  | $\frac{\sqrt{2}i}{14}$  | 0                        | 0                        | 0                       | 0                         | 0                        | 0                        | $-\frac{\sqrt{6}i}{21}$  | 0                        | 0                        | 0                       | $-\frac{\sqrt{210}i}{84}$ |
|                             |           | 0                        | 0  | 0                       | $-\frac{2\sqrt{6}i}{21}$ | 0                        | 0                       | 0                         | 0                        | 0                        | 0                        | $-\frac{3\sqrt{2}i}{28}$ | 0                        | 0                       | 0                         |
|                             |           | 0                        | 0  | 0                       | 0                        | $\frac{\sqrt{21}i}{42}$  | 0                       | 0                         | 0                        | 0                        | 0                        | 0                        | $\frac{\sqrt{210}i}{84}$ | 0                       | 0                         |
|                             | 959       | symmetry                 | $\frac{x(8x^4-40x^2y^2-40x^2z^2+15y^4+30y^2z^2+15z^4)}{8}$ |                         |                          |                          |                         |                           |                          |                          |                          |                          |                          |                         |                           |

*continued ...*

Table 10

| No.                     | multipole | matrix   |                            |                              |                             |                             |                             |                         |                            |                              |                            |                           |                             |                             |                         |
|-------------------------|-----------|--|----------------------------|------------------------------|-----------------------------|-----------------------------|-----------------------------|-------------------------|----------------------------|------------------------------|----------------------------|---------------------------|-----------------------------|-----------------------------|-------------------------|
| $M_{5,0}^{(a)}(T_1, 1)$ |           | 0  | $\frac{\sqrt{210}}{784}$   | 0                            | $-\frac{\sqrt{105}}{168}$   | 0                           | $\frac{3\sqrt{42}}{112}$    | $-\frac{5}{224}$        | 0                          | $\frac{25\sqrt{21}}{1568}$   | 0                          | $-\frac{5\sqrt{35}}{224}$ | 0                           | $\frac{15\sqrt{7}}{224}$    | 0                       |
|                         |           | $\frac{\sqrt{210}}{784}$   | 0                          | $-\frac{5\sqrt{21}}{392}$    | 0                           | $\frac{5\sqrt{42}}{336}$    | 0                           | 0                       | $\frac{23\sqrt{35}}{1568}$ | 0                            | $-\frac{65\sqrt{7}}{1568}$ | 0                         | $\frac{\sqrt{105}}{224}$    | 0                           | $\frac{3\sqrt{5}}{32}$  |
|                         |           | 0  | $-\frac{5\sqrt{21}}{392}$  | 0                            | $\frac{5\sqrt{42}}{392}$    | 0                           | $-\frac{\sqrt{105}}{168}$   | $\frac{\sqrt{10}}{32}$  | 0                          | $-\frac{11\sqrt{210}}{1568}$ | 0                          | $\frac{5\sqrt{14}}{1568}$ | 0                           | $\frac{3\sqrt{70}}{224}$    | 0                       |
|                         |           | $-\frac{\sqrt{105}}{168}$  | 0                          | $\frac{5\sqrt{42}}{392}$     | 0                           | $-\frac{5\sqrt{21}}{392}$   | 0                           | 0                       | $-\frac{3\sqrt{70}}{224}$  | 0                            | $-\frac{5\sqrt{14}}{1568}$ | 0                         | $\frac{11\sqrt{210}}{1568}$ | 0                           | $-\frac{\sqrt{10}}{32}$ |
|                         |           | 0  | $\frac{5\sqrt{42}}{336}$   | 0                            | $-\frac{5\sqrt{21}}{392}$   | 0                           | $\frac{\sqrt{210}}{784}$    | $-\frac{3\sqrt{5}}{32}$ | 0                          | $-\frac{\sqrt{105}}{224}$    | 0                          | $\frac{65\sqrt{7}}{1568}$ | 0                           | $-\frac{23\sqrt{35}}{1568}$ | 0                       |
|                         |           | $\frac{3\sqrt{42}}{112}$   | 0                          | $-\frac{\sqrt{105}}{168}$    | 0                           | $\frac{\sqrt{210}}{784}$    | 0                           | 0                       | $-\frac{15\sqrt{7}}{224}$  | 0                            | $\frac{5\sqrt{35}}{224}$   | 0                         | $-\frac{25\sqrt{21}}{1568}$ | 0                           | $\frac{5}{224}$         |
|                         |           | $-\frac{5}{224}$   | 0                          | $\frac{\sqrt{10}}{32}$       | 0                           | $-\frac{3\sqrt{5}}{32}$     | 0                           | 0                       | $\frac{5\sqrt{6}}{224}$    | 0                            | $-\frac{\sqrt{30}}{48}$    | 0                         | $\frac{3\sqrt{2}}{32}$      | 0                           | 0                       |
|                         |           | 0  | $\frac{23\sqrt{35}}{1568}$ | 0                            | $-\frac{3\sqrt{70}}{224}$   | 0                           | $-\frac{15\sqrt{7}}{224}$   | $\frac{5\sqrt{6}}{224}$ | 0                          | $-\frac{5\sqrt{14}}{196}$    | 0                          | $\frac{\sqrt{210}}{672}$  | 0                           | $\frac{3\sqrt{42}}{112}$    | 0                       |
|                         |           | $\frac{25\sqrt{21}}{1568}$   | 0                          | $-\frac{11\sqrt{210}}{1568}$ | 0                           | $-\frac{\sqrt{105}}{224}$   | 0                           | 0                       | $-\frac{5\sqrt{14}}{196}$  | 0                            | $\frac{\sqrt{70}}{1568}$   | 0                         | $\frac{5\sqrt{42}}{336}$    | 0                           | $\frac{3\sqrt{2}}{32}$  |
|                         |           | 0  | $-\frac{65\sqrt{7}}{1568}$ | 0                            | $-\frac{5\sqrt{14}}{1568}$  | 0                           | $\frac{5\sqrt{35}}{224}$    | $-\frac{\sqrt{30}}{48}$ | 0                          | $\frac{\sqrt{70}}{1568}$     | 0                          | $\frac{5\sqrt{42}}{392}$  | 0                           | $\frac{\sqrt{210}}{672}$    | 0                       |
|                         |           | $-\frac{5\sqrt{35}}{224}$  | 0                          | $\frac{5\sqrt{14}}{1568}$    | 0                           | $\frac{65\sqrt{7}}{1568}$   | 0                           | 0                       | $\frac{\sqrt{210}}{672}$   | 0                            | $\frac{5\sqrt{42}}{392}$   | 0                         | $\frac{\sqrt{70}}{1568}$    | 0                           | $-\frac{\sqrt{30}}{48}$ |
|                         |           | 0  | $\frac{\sqrt{105}}{224}$   | 0                            | $\frac{11\sqrt{210}}{1568}$ | 0                           | $-\frac{25\sqrt{21}}{1568}$ | $\frac{3\sqrt{2}}{32}$  | 0                          | $\frac{5\sqrt{42}}{336}$     | 0                          | $\frac{\sqrt{70}}{1568}$  | 0                           | $-\frac{5\sqrt{14}}{196}$   | 0                       |
|                         |           | $\frac{15\sqrt{7}}{224}$   | 0                          | $\frac{3\sqrt{70}}{224}$     | 0                           | $-\frac{23\sqrt{35}}{1568}$ | 0                           | 0                       | $\frac{3\sqrt{42}}{112}$   | 0                            | $\frac{\sqrt{210}}{672}$   | 0                         | $-\frac{5\sqrt{14}}{196}$   | 0                           | $\frac{5\sqrt{6}}{224}$ |
|                         |           | 0  | $\frac{3\sqrt{5}}{32}$     | 0                            | $-\frac{\sqrt{10}}{32}$     | 0                           | $\frac{5}{224}$             | 0                       | 0                          | $\frac{3\sqrt{2}}{32}$       | 0                          | $-\frac{\sqrt{30}}{48}$   | 0                           | $\frac{5\sqrt{6}}{224}$     | 0                       |
| 960                     | symmetry  | $\frac{y(15x^4 - 40x^2y^2 + 30x^2z^2 + 8y^4 - 40y^2z^2 + 15z^4)}{8}$ |                            |                              |                             |                             |                             |                         |                            |                              |                            |                           |                             |                             |                         |

*continued ...*

Table 10

| No.                              | multipole                   | matrix                       |  |                              |                              |                             |                          |                             |                               |                             |                             |                               |                             |                           |  |  |
|----------------------------------|-----------------------------|------------------------------|--|------------------------------|------------------------------|-----------------------------|--------------------------|-----------------------------|-------------------------------|-----------------------------|-----------------------------|-------------------------------|-----------------------------|---------------------------|--|--|
| $\mathbb{M}_{5,1}^{(a)}(T_1, 1)$ | 0                           | $-\frac{\sqrt{210}i}{784}$   | 0  | $-\frac{\sqrt{105}i}{168}$   | 0                            | $-\frac{3\sqrt{42}i}{112}$  | $-\frac{5i}{224}$        | 0                           | $-\frac{25\sqrt{21}i}{1568}$  | 0                           | $-\frac{5\sqrt{35}i}{224}$  | 0                             | $-\frac{15\sqrt{7}i}{224}$  | 0                         |  |  |
|                                  | $\frac{\sqrt{210}i}{784}$   | 0                            | $\frac{5\sqrt{21}i}{392}$                                  | 0                            | $\frac{5\sqrt{42}i}{336}$    | 0                           | 0                        | $\frac{23\sqrt{35}i}{1568}$ | 0                             | $\frac{65\sqrt{7}i}{1568}$  | 0                           | $\frac{\sqrt{105}i}{224}$     | 0                           | $-\frac{3\sqrt{5}i}{32}$  |  |  |
|                                  | 0                           | $-\frac{5\sqrt{21}i}{392}$   | 0  | $-\frac{5\sqrt{42}i}{392}$   | 0                            | $-\frac{\sqrt{105}i}{168}$  | $-\frac{\sqrt{10}i}{32}$ | 0                           | $-\frac{11\sqrt{210}i}{1568}$ | 0                           | $-\frac{5\sqrt{14}i}{1568}$ | 0                             | $\frac{3\sqrt{70}i}{224}$   | 0                         |  |  |
|                                  | $\frac{\sqrt{105}i}{168}$   | 0                            | $\frac{5\sqrt{42}i}{392}$                                  | 0                            | $\frac{5\sqrt{21}i}{392}$    | 0                           | 0                        | $\frac{3\sqrt{70}i}{224}$   | 0                             | $-\frac{5\sqrt{14}i}{1568}$ | 0                           | $-\frac{11\sqrt{210}i}{1568}$ | 0                           | $-\frac{\sqrt{10}i}{32}$  |  |  |
|                                  | 0                           | $-\frac{5\sqrt{42}i}{336}$   | 0  | $-\frac{5\sqrt{21}i}{392}$   | 0                            | $-\frac{\sqrt{210}i}{784}$  | $-\frac{3\sqrt{5}i}{32}$ | 0                           | $\frac{\sqrt{105}i}{224}$     | 0                           | $\frac{65\sqrt{7}i}{1568}$  | 0                             | $\frac{23\sqrt{35}i}{1568}$ | 0                         |  |  |
|                                  | $\frac{3\sqrt{42}i}{112}$   | 0                            | $\frac{\sqrt{105}i}{168}$                                  | 0                            | $\frac{\sqrt{210}i}{784}$    | 0                           | 0                        | $-\frac{15\sqrt{7}i}{224}$  | 0                             | $-\frac{5\sqrt{35}i}{224}$  | 0                           | $-\frac{25\sqrt{21}i}{1568}$  | 0                           | $-\frac{5i}{224}$         |  |  |
|                                  | $\frac{5i}{224}$            | 0                            | $\frac{\sqrt{10}i}{32}$                                    | 0                            | $\frac{3\sqrt{5}i}{32}$      | 0                           | 0                        | $-\frac{5\sqrt{6}i}{224}$   | 0                             | $-\frac{\sqrt{30}i}{48}$    | 0                           | $-\frac{3\sqrt{2}i}{32}$      | 0                           | 0                         |  |  |
|                                  | 0                           | $-\frac{23\sqrt{35}i}{1568}$ | 0  | $-\frac{3\sqrt{70}i}{224}$   | 0                            | $\frac{15\sqrt{7}i}{224}$   | $\frac{5\sqrt{6}i}{224}$ | 0                           | $\frac{5\sqrt{14}i}{196}$     | 0                           | $\frac{\sqrt{210}i}{672}$   | 0                             | $-\frac{3\sqrt{42}i}{112}$  | 0                         |  |  |
|                                  | $\frac{25\sqrt{21}i}{1568}$ | 0                            | $\frac{11\sqrt{210}i}{1568}$                               | 0                            | $-\frac{\sqrt{105}i}{224}$   | 0                           | 0                        | $-\frac{5\sqrt{14}i}{196}$  | 0                             | $-\frac{\sqrt{70}i}{1568}$  | 0                           | $\frac{5\sqrt{42}i}{336}$     | 0                           | $-\frac{3\sqrt{2}i}{32}$  |  |  |
|                                  | 0                           | $-\frac{65\sqrt{7}i}{1568}$  | 0  | $\frac{5\sqrt{14}i}{1568}$   | 0                            | $\frac{5\sqrt{35}i}{224}$   | $\frac{\sqrt{30}i}{48}$  | 0                           | $\frac{\sqrt{70}i}{1568}$     | 0                           | $-\frac{5\sqrt{42}i}{392}$  | 0                             | $\frac{\sqrt{210}i}{672}$   | 0                         |  |  |
|                                  | $\frac{5\sqrt{35}i}{224}$   | 0                            | $\frac{5\sqrt{14}i}{1568}$                                 | 0                            | $-\frac{65\sqrt{7}i}{1568}$  | 0                           | 0                        | $-\frac{\sqrt{210}i}{672}$  | 0                             | $\frac{5\sqrt{42}i}{392}$   | 0                           | $-\frac{\sqrt{70}i}{1568}$    | 0                           | $-\frac{\sqrt{30}i}{48}$  |  |  |
|                                  | 0                           | $-\frac{\sqrt{105}i}{224}$   | 0  | $\frac{11\sqrt{210}i}{1568}$ | 0                            | $\frac{25\sqrt{21}i}{1568}$ | $\frac{3\sqrt{2}i}{32}$  | 0                           | $-\frac{5\sqrt{42}i}{336}$    | 0                           | $\frac{\sqrt{70}i}{1568}$   | 0                             | $\frac{5\sqrt{14}i}{196}$   | 0                         |  |  |
|                                  | $\frac{15\sqrt{7}i}{224}$   | 0                            | $-\frac{3\sqrt{70}i}{224}$                                 | 0                            | $-\frac{23\sqrt{35}i}{1568}$ | 0                           | 0                        | $\frac{3\sqrt{42}i}{112}$   | 0                             | $-\frac{\sqrt{210}i}{672}$  | 0                           | $-\frac{5\sqrt{14}i}{196}$    | 0                           | $-\frac{5\sqrt{6}i}{224}$ |  |  |
|                                  | 0                           | $\frac{3\sqrt{5}i}{32}$      | 0  | $\frac{\sqrt{10}i}{32}$      | 0                            | $\frac{5i}{224}$            | 0                        | 0                           | $\frac{3\sqrt{2}i}{32}$       | 0                           | $\frac{\sqrt{30}i}{48}$     | 0                             | $\frac{5\sqrt{6}i}{224}$    | 0                         |  |  |
|                                  | 961                         | symmetry                     | $\frac{z(15x^4+30x^2y^2-40x^2z^2+15y^4-40y^2z^2+8z^4)}{8}$ |                              |                              |                             |                          |                             |                               |                             |                             |                               |                             |                           |  |  |

*continued ...*

Table 10

| No. | multipole               | matrix  |                           |                          |                           |                           |                          |                        |                            |                           |                          |                           |                            |                           |                         |
|-----|-------------------------|---|---------------------------|--------------------------|---------------------------|---------------------------|--------------------------|------------------------|----------------------------|---------------------------|--------------------------|---------------------------|----------------------------|---------------------------|-------------------------|
| 962 | $M_{5,2}^{(a)}(T_1, 1)$ | $\frac{\sqrt{42}}{294}$                           | 0                         | 0                        | 0                         | 0                         | 0                        | 0                      | $\frac{5\sqrt{7}}{98}$     | 0                         | 0                        | 0                         | 0                          | 0                         | 0                       |
|     |                         | 0   | $-\frac{5\sqrt{42}}{294}$ | 0                        | 0                         | 0                         | 0                        | 0                      | 0                          | $-\frac{3\sqrt{105}}{98}$ | 0                        | 0                         | 0                          | 0                         | 0                       |
|     |                         | 0   | 0                         | $\frac{5\sqrt{42}}{147}$ | 0                         | 0                         | 0                        | 0                      | 0                          | 0                         | $\frac{5\sqrt{14}}{98}$  | 0                         | 0                          | 0                         | 0                       |
|     |                         | 0   | 0                         | 0                        | $-\frac{5\sqrt{42}}{147}$ | 0                         | 0                        | 0                      | 0                          | 0                         | 0                        | $\frac{5\sqrt{14}}{98}$   | 0                          | 0                         | 0                       |
|     |                         | 0   | 0                         | 0                        | 0                         | $\frac{5\sqrt{42}}{294}$  | 0                        | 0                      | 0                          | 0                         | 0                        | 0                         | $-\frac{3\sqrt{105}}{98}$  | 0                         | 0                       |
|     |                         | 0   | 0                         | 0                        | 0                         | 0                         | $-\frac{\sqrt{42}}{294}$ | 0                      | 0                          | 0                         | 0                        | 0                         | 0                          | $\frac{5\sqrt{7}}{98}$    | 0                       |
|     |                         | 0   | 0                         | 0                        | 0                         | 0                         | 0                        | $\frac{\sqrt{42}}{84}$ | 0                          | 0                         | 0                        | 0                         | 0                          | 0                         | 0                       |
|     |                         | $\frac{5\sqrt{7}}{98}$                            | 0                         | 0                        | 0                         | 0                         | 0                        | 0                      | $-\frac{23\sqrt{42}}{588}$ | 0                         | 0                        | 0                         | 0                          | 0                         | 0                       |
|     |                         | 0   | $-\frac{3\sqrt{105}}{98}$ | 0                        | 0                         | 0                         | 0                        | 0                      | 0                          | $\frac{17\sqrt{42}}{588}$ | 0                        | 0                         | 0                          | 0                         | 0                       |
|     |                         | 0   | 0                         | $\frac{5\sqrt{14}}{98}$  | 0                         | 0                         | 0                        | 0                      | 0                          | 0                         | $\frac{5\sqrt{42}}{196}$ | 0                         | 0                          | 0                         | 0                       |
|     |                         | 0   | 0                         | 0                        | $\frac{5\sqrt{14}}{98}$   | 0                         | 0                        | 0                      | 0                          | 0                         | 0                        | $-\frac{5\sqrt{42}}{196}$ | 0                          | 0                         | 0                       |
|     |                         | 0   | 0                         | 0                        | 0                         | $-\frac{3\sqrt{105}}{98}$ | 0                        | 0                      | 0                          | 0                         | 0                        | 0                         | $-\frac{17\sqrt{42}}{588}$ | 0                         | 0                       |
|     |                         | 0   | 0                         | 0                        | 0                         | 0                         | $\frac{5\sqrt{7}}{98}$   | 0                      | 0                          | 0                         | 0                        | 0                         | 0                          | $\frac{23\sqrt{42}}{588}$ | 0                       |
|     |                         | 0   | 0                         | 0                        | 0                         | 0                         | 0                        | 0                      | 0                          | 0                         | 0                        | 0                         | 0                          | 0                         | $-\frac{\sqrt{42}}{84}$ |
| 962 | symmetry                | $\frac{3\sqrt{35}x(y^2-2yz-z^2)(y^2+2yz-z^2)}{8}$ |                           |                          |                           |                           |                          |                        |                            |                           |                          |                           |                            |                           |                         |

*continued ...*

Table 10

| No. | multipole               | matrix  |                           |                           |                          |                           |                           |                           |                          |                           |                           |                          |                           |                           |                          |
|-----|-------------------------|---|---------------------------|---------------------------|--------------------------|---------------------------|---------------------------|---------------------------|--------------------------|---------------------------|---------------------------|--------------------------|---------------------------|---------------------------|--------------------------|
| 963 | $M_{5,0}^{(a)}(T_1, 2)$ | 0   | $\frac{\sqrt{6}}{112}$    | 0                         | $\frac{3\sqrt{3}}{56}$   | 0                         | $\frac{\sqrt{30}}{112}$   | $-\frac{\sqrt{35}}{224}$  | 0                        | $\frac{5\sqrt{15}}{224}$  | 0                         | $\frac{45}{224}$         | 0                         | $\frac{5\sqrt{5}}{224}$   | 0                        |
|     |                         | $\frac{\sqrt{6}}{112}$                            | 0                         | $-\frac{\sqrt{15}}{56}$   | 0                        | $-\frac{3\sqrt{30}}{112}$ | 0                         | 0                         | $\frac{23}{224}$         | 0                         | $-\frac{13\sqrt{5}}{224}$ | 0                        | $-\frac{9\sqrt{3}}{224}$  | 0                         | $\frac{5\sqrt{7}}{224}$  |
|     |                         | 0   | $-\frac{\sqrt{15}}{56}$   | 0                         | $\frac{\sqrt{30}}{56}$   | 0                         | $\frac{3\sqrt{3}}{56}$    | $-\frac{9\sqrt{14}}{224}$ | 0                        | $-\frac{11\sqrt{6}}{224}$ | 0                         | $\frac{\sqrt{10}}{224}$  | 0                         | $-\frac{27\sqrt{2}}{224}$ | 0                        |
|     |                         | $\frac{3\sqrt{3}}{56}$                            | 0                         | $\frac{\sqrt{30}}{56}$    | 0                        | $-\frac{\sqrt{15}}{56}$   | 0                         | 0                         | $\frac{27\sqrt{2}}{224}$ | 0                         | $-\frac{\sqrt{10}}{224}$  | 0                        | $\frac{11\sqrt{6}}{224}$  | 0                         | $\frac{9\sqrt{14}}{224}$ |
|     |                         | 0   | $-\frac{3\sqrt{30}}{112}$ | 0                         | $-\frac{\sqrt{15}}{56}$  | 0                         | $\frac{\sqrt{6}}{112}$    | $-\frac{5\sqrt{7}}{224}$  | 0                        | $\frac{9\sqrt{3}}{224}$   | 0                         | $\frac{13\sqrt{5}}{224}$ | 0                         | $-\frac{23}{224}$         | 0                        |
|     |                         | $\frac{\sqrt{30}}{112}$                           | 0                         | $\frac{3\sqrt{3}}{56}$    | 0                        | $\frac{\sqrt{6}}{112}$    | 0                         | 0                         | $-\frac{5\sqrt{5}}{224}$ | 0                         | $-\frac{45}{224}$         | 0                        | $-\frac{5\sqrt{15}}{224}$ | 0                         | $\frac{\sqrt{35}}{224}$  |
|     |                         | $-\frac{\sqrt{35}}{224}$                          | 0                         | $-\frac{9\sqrt{14}}{224}$ | 0                        | $-\frac{5\sqrt{7}}{224}$  | 0                         | 0                         | $\frac{\sqrt{210}}{224}$ | 0                         | $\frac{3\sqrt{42}}{112}$  | 0                        | $\frac{\sqrt{70}}{224}$   | 0                         | 0                        |
|     |                         | 0   | $\frac{23}{224}$          | 0                         | $\frac{27\sqrt{2}}{224}$ | 0                         | $-\frac{5\sqrt{5}}{224}$  | $\frac{\sqrt{210}}{224}$  | 0                        | $-\frac{\sqrt{10}}{28}$   | 0                         | $-\frac{3\sqrt{6}}{224}$ | 0                         | $\frac{\sqrt{30}}{112}$   | 0                        |
|     |                         | $\frac{5\sqrt{15}}{224}$                          | 0                         | $-\frac{11\sqrt{6}}{224}$ | 0                        | $\frac{9\sqrt{3}}{224}$   | 0                         | 0                         | $-\frac{\sqrt{10}}{28}$  | 0                         | $\frac{\sqrt{2}}{224}$    | 0                        | $-\frac{3\sqrt{30}}{112}$ | 0                         | $\frac{\sqrt{70}}{224}$  |
|     |                         | 0   | $-\frac{13\sqrt{5}}{224}$ | 0                         | $-\frac{\sqrt{10}}{224}$ | 0                         | $-\frac{45}{224}$         | $\frac{3\sqrt{42}}{112}$  | 0                        | $\frac{\sqrt{2}}{224}$    | 0                         | $\frac{\sqrt{30}}{56}$   | 0                         | $-\frac{3\sqrt{6}}{224}$  | 0                        |
|     |                         | $\frac{45}{224}$                                  | 0                         | $\frac{\sqrt{10}}{224}$   | 0                        | $\frac{13\sqrt{5}}{224}$  | 0                         | 0                         | $-\frac{3\sqrt{6}}{224}$ | 0                         | $\frac{\sqrt{30}}{56}$    | 0                        | $\frac{\sqrt{2}}{224}$    | 0                         | $\frac{3\sqrt{42}}{112}$ |
|     |                         | 0   | $-\frac{9\sqrt{3}}{224}$  | 0                         | $\frac{11\sqrt{6}}{224}$ | 0                         | $-\frac{5\sqrt{15}}{224}$ | $\frac{\sqrt{70}}{224}$   | 0                        | $-\frac{3\sqrt{30}}{112}$ | 0                         | $\frac{\sqrt{2}}{224}$   | 0                         | $-\frac{\sqrt{10}}{28}$   | 0                        |
|     |                         | $\frac{5\sqrt{5}}{224}$                           | 0                         | $-\frac{27\sqrt{2}}{224}$ | 0                        | $-\frac{23}{224}$         | 0                         | 0                         | $\frac{\sqrt{30}}{112}$  | 0                         | $-\frac{3\sqrt{6}}{224}$  | 0                        | $-\frac{\sqrt{10}}{28}$   | 0                         | $\frac{\sqrt{210}}{224}$ |
|     |                         | 0   | $\frac{5\sqrt{7}}{224}$   | 0                         | $\frac{9\sqrt{14}}{224}$ | 0                         | $\frac{\sqrt{35}}{224}$   | 0                         | 0                        | $\frac{\sqrt{70}}{224}$   | 0                         | $\frac{3\sqrt{42}}{112}$ | 0                         | $\frac{\sqrt{210}}{224}$  | 0                        |
| 963 | symmetry                | $\frac{3\sqrt{35}y(x^2-2xz-z^2)(x^2+2xz-z^2)}{8}$ |                           |                           |                          |                           |                           |                           |                          |                           |                           |                          |                           |                           |                          |

*continued ...*

Table 10

| No.                     | multipole | matrix  |                            |                            |                            |                            |                           |                            |                            |                            |                           |                            |                            |                            |                            |
|-------------------------|-----------|---|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|----------------------------|----------------------------|----------------------------|---------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| $M_{5,1}^{(a)}(T_1, 2)$ |           | 0   | $-\frac{\sqrt{6}i}{112}$   | 0                          | $\frac{3\sqrt{3}i}{56}$    | 0                          | $-\frac{\sqrt{30}i}{112}$ | $-\frac{\sqrt{35}i}{224}$  | 0                          | $-\frac{5\sqrt{15}i}{224}$ | 0                         | $\frac{45i}{224}$          | 0                          | $-\frac{5\sqrt{5}i}{224}$  | 0                          |
|                         |           | $\frac{\sqrt{6}i}{112}$                           | 0                          | $\frac{\sqrt{15}i}{56}$    | 0                          | $-\frac{3\sqrt{30}i}{112}$ | 0                         | 0                          | $\frac{23i}{224}$          | 0                          | $\frac{13\sqrt{5}i}{224}$ | 0                          | $-\frac{9\sqrt{3}i}{224}$  | 0                          | $-\frac{5\sqrt{7}i}{224}$  |
|                         |           | 0   | $-\frac{\sqrt{15}i}{56}$   | 0                          | $-\frac{\sqrt{30}i}{56}$   | 0                          | $\frac{3\sqrt{3}i}{56}$   | $\frac{9\sqrt{14}i}{224}$  | 0                          | $-\frac{11\sqrt{6}i}{224}$ | 0                         | $-\frac{\sqrt{10}i}{224}$  | 0                          | $-\frac{27\sqrt{2}i}{224}$ | 0                          |
|                         |           | $-\frac{3\sqrt{3}i}{56}$                          | 0                          | $\frac{\sqrt{30}i}{56}$    | 0                          | $\frac{\sqrt{15}i}{56}$    | 0                         | 0                          | $-\frac{27\sqrt{2}i}{224}$ | 0                          | $-\frac{\sqrt{10}i}{224}$ | 0                          | $-\frac{11\sqrt{6}i}{224}$ | 0                          | $\frac{9\sqrt{14}i}{224}$  |
|                         |           | 0   | $\frac{3\sqrt{30}i}{112}$  | 0                          | $-\frac{\sqrt{15}i}{56}$   | 0                          | $-\frac{\sqrt{6}i}{112}$  | $-\frac{5\sqrt{7}i}{224}$  | 0                          | $-\frac{9\sqrt{3}i}{224}$  | 0                         | $\frac{13\sqrt{5}i}{224}$  | 0                          | $\frac{23i}{224}$          | 0                          |
|                         |           | $\frac{\sqrt{30}i}{112}$                          | 0                          | $-\frac{3\sqrt{3}i}{56}$   | 0                          | $\frac{\sqrt{6}i}{112}$    | 0                         | 0                          | $-\frac{5\sqrt{5}i}{224}$  | 0                          | $\frac{45i}{224}$         | 0                          | $-\frac{5\sqrt{15}i}{224}$ | 0                          | $-\frac{\sqrt{35}i}{224}$  |
|                         |           | $\frac{\sqrt{35}i}{224}$                          | 0                          | $-\frac{9\sqrt{14}i}{224}$ | 0                          | $\frac{5\sqrt{7}i}{224}$   | 0                         | 0                          | $-\frac{\sqrt{210}i}{224}$ | 0                          | $\frac{3\sqrt{42}i}{112}$ | 0                          | $-\frac{\sqrt{70}i}{224}$  | 0                          | 0                          |
|                         |           | 0   | $-\frac{23i}{224}$         | 0                          | $\frac{27\sqrt{2}i}{224}$  | 0                          | $\frac{5\sqrt{5}i}{224}$  | $\frac{\sqrt{210}i}{224}$  | 0                          | $\frac{\sqrt{10}i}{28}$    | 0                         | $-\frac{3\sqrt{6}i}{224}$  | 0                          | $-\frac{\sqrt{30}i}{112}$  | 0                          |
|                         |           | $\frac{5\sqrt{15}i}{224}$                         | 0                          | $\frac{11\sqrt{6}i}{224}$  | 0                          | $\frac{9\sqrt{3}i}{224}$   | 0                         | 0                          | $-\frac{\sqrt{10}i}{28}$   | 0                          | $-\frac{\sqrt{2}i}{224}$  | 0                          | $-\frac{3\sqrt{30}i}{112}$ | 0                          | $-\frac{\sqrt{70}i}{224}$  |
|                         |           | 0   | $-\frac{13\sqrt{5}i}{224}$ | 0                          | $\frac{\sqrt{10}i}{224}$   | 0                          | $-\frac{45i}{224}$        | $-\frac{3\sqrt{42}i}{112}$ | 0                          | $\frac{\sqrt{2}i}{224}$    | 0                         | $-\frac{\sqrt{30}i}{56}$   | 0                          | $-\frac{3\sqrt{6}i}{224}$  | 0                          |
|                         |           | $-\frac{45i}{224}$                                | 0                          | $\frac{\sqrt{10}i}{224}$   | 0                          | $-\frac{13\sqrt{5}i}{224}$ | 0                         | 0                          | $\frac{3\sqrt{6}i}{224}$   | 0                          | $\frac{\sqrt{30}i}{56}$   | 0                          | $-\frac{\sqrt{2}i}{224}$   | 0                          | $\frac{3\sqrt{42}i}{112}$  |
|                         |           | 0   | $\frac{9\sqrt{3}i}{224}$   | 0                          | $\frac{11\sqrt{6}i}{224}$  | 0                          | $\frac{5\sqrt{15}i}{224}$ | $\frac{\sqrt{70}i}{224}$   | 0                          | $\frac{3\sqrt{30}i}{112}$  | 0                         | $\frac{\sqrt{2}i}{224}$    | 0                          | $\frac{\sqrt{10}i}{28}$    | 0                          |
|                         |           | $\frac{5\sqrt{5}i}{224}$                          | 0                          | $\frac{27\sqrt{2}i}{224}$  | 0                          | $-\frac{23i}{224}$         | 0                         | 0                          | $\frac{\sqrt{30}i}{112}$   | 0                          | $\frac{3\sqrt{6}i}{224}$  | 0                          | $-\frac{\sqrt{10}i}{28}$   | 0                          | $-\frac{\sqrt{210}i}{224}$ |
|                         |           | 0   | $\frac{5\sqrt{7}i}{224}$   | 0                          | $-\frac{9\sqrt{14}i}{224}$ | 0                          | $\frac{\sqrt{35}i}{224}$  | 0                          | 0                          | $\frac{\sqrt{70}i}{224}$   | 0                         | $-\frac{3\sqrt{42}i}{112}$ | 0                          | $\frac{\sqrt{210}i}{224}$  | 0                          |
| 964                     | symmetry  | $\frac{3\sqrt{35}z(x^2-2xy-y^2)(x^2+2xy-y^2)}{8}$ |                            |                            |                            |                            |                           |                            |                            |                            |                           |                            |                            |                            |                            |

*continued ...*

Table 10

| No. | multipole               | matrix  |                        |                         |                         |                       |                        |                         |                        |                         |                         |                        |                        |                         |                         |
|-----|-------------------------|---|------------------------|-------------------------|-------------------------|-----------------------|------------------------|-------------------------|------------------------|-------------------------|-------------------------|------------------------|------------------------|-------------------------|-------------------------|
| 965 | $M_{5,2}^{(a)}(T_1, 2)$ | 0   | 0                      | 0                       | 0                       | $\frac{\sqrt{6}}{14}$ | 0                      | 0                       | 0                      | 0                       | 0                       | 0                      | $\frac{\sqrt{15}}{14}$ | 0                       | 0                       |
|     |                         | 0   | 0                      | 0                       | 0                       | 0                     | $-\frac{\sqrt{6}}{14}$ | 0                       | 0                      | 0                       | 0                       | 0                      | 0                      | $\frac{1}{14}$          | 0                       |
|     |                         | 0   | 0                      | 0                       | 0                       | 0                     | 0                      | 0                       | 0                      | 0                       | 0                       | 0                      | 0                      | 0                       | $-\frac{\sqrt{14}}{14}$ |
|     |                         | 0   | 0                      | 0                       | 0                       | 0                     | 0                      | $-\frac{\sqrt{14}}{14}$ | 0                      | 0                       | 0                       | 0                      | 0                      | 0                       | 0                       |
|     |                         | $\frac{\sqrt{6}}{14}$                           | 0                      | 0                       | 0                       | 0                     | 0                      | 0                       | $\frac{1}{14}$         | 0                       | 0                       | 0                      | 0                      | 0                       | 0                       |
|     |                         | 0   | $-\frac{\sqrt{6}}{14}$ | 0                       | 0                       | 0                     | 0                      | 0                       | 0                      | $\frac{\sqrt{15}}{14}$  | 0                       | 0                      | 0                      | 0                       | 0                       |
|     |                         | 0   | 0                      | 0                       | $-\frac{\sqrt{14}}{14}$ | 0                     | 0                      | 0                       | 0                      | 0                       | 0                       | $\frac{\sqrt{42}}{28}$ | 0                      | 0                       | 0                       |
|     |                         | 0   | 0                      | 0                       | 0                       | $\frac{1}{14}$        | 0                      | 0                       | 0                      | 0                       | 0                       | 0                      | $\frac{\sqrt{10}}{28}$ | 0                       | 0                       |
|     |                         | 0   | 0                      | 0                       | 0                       | 0                     | $\frac{\sqrt{15}}{14}$ | 0                       | 0                      | 0                       | 0                       | 0                      | 0                      | $-\frac{\sqrt{10}}{28}$ | 0                       |
|     |                         | 0   | 0                      | 0                       | 0                       | 0                     | 0                      | 0                       | 0                      | 0                       | 0                       | 0                      | 0                      | 0                       | $-\frac{\sqrt{42}}{28}$ |
|     |                         | 0   | 0                      | 0                       | 0                       | 0                     | 0                      | $\frac{\sqrt{42}}{28}$  | 0                      | 0                       | 0                       | 0                      | 0                      | 0                       | 0                       |
|     |                         | $\frac{\sqrt{15}}{14}$                          | 0                      | 0                       | 0                       | 0                     | 0                      | 0                       | $\frac{\sqrt{10}}{28}$ | 0                       | 0                       | 0                      | 0                      | 0                       | 0                       |
|     |                         | 0   | $\frac{1}{14}$         | 0                       | 0                       | 0                     | 0                      | 0                       | 0                      | $-\frac{\sqrt{10}}{28}$ | 0                       | 0                      | 0                      | 0                       | 0                       |
|     |                         | 0   | 0                      | $-\frac{\sqrt{14}}{14}$ | 0                       | 0                     | 0                      | 0                       | 0                      | 0                       | $-\frac{\sqrt{42}}{28}$ | 0                      | 0                      | 0                       | 0                       |
| 965 | symmetry                | $\frac{\sqrt{105}x(y-z)(y+z)(2x^2-y^2-z^2)}{4}$ |                        |                         |                         |                       |                        |                         |                        |                         |                         |                        |                        |                         |                         |

*continued ...*

Table 10

| No.                  | multipole | matrix  |                            |                           |                          |                           |                          |                           |                          |                           |                            |                           |                           |                           |                           |
|----------------------|-----------|---|----------------------------|---------------------------|--------------------------|---------------------------|--------------------------|---------------------------|--------------------------|---------------------------|----------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| $M_{5,0}^{(a)}(T_2)$ |           | 0   | $\frac{\sqrt{2}}{56}$      | 0                         | $-\frac{1}{28}$          | 0                         | $-\frac{3\sqrt{10}}{56}$ | $-\frac{\sqrt{105}}{336}$ | 0                        | $\frac{5\sqrt{5}}{112}$   | 0                          | $-\frac{5\sqrt{3}}{112}$  | 0                         | $-\frac{5\sqrt{15}}{112}$ | 0                         |
|                      |           | $\frac{\sqrt{2}}{56}$                           | 0                          | $-\frac{\sqrt{5}}{28}$    | 0                        | $\frac{\sqrt{10}}{56}$    | 0                        | 0                         | $\frac{23\sqrt{3}}{336}$ | 0                         | $-\frac{13\sqrt{15}}{336}$ | 0                         | $\frac{3}{112}$           | 0                         | $-\frac{5\sqrt{21}}{112}$ |
|                      |           | 0   | $-\frac{\sqrt{5}}{28}$     | 0                         | $\frac{\sqrt{10}}{28}$   | 0                         | $-\frac{1}{28}$          | $\frac{\sqrt{42}}{112}$   | 0                        | $-\frac{11\sqrt{2}}{112}$ | 0                          | $\frac{\sqrt{30}}{336}$   | 0                         | $\frac{3\sqrt{6}}{112}$   | 0                         |
|                      |           | $-\frac{1}{28}$                                 | 0                          | $\frac{\sqrt{10}}{28}$    | 0                        | $-\frac{\sqrt{5}}{28}$    | 0                        | 0                         | $-\frac{3\sqrt{6}}{112}$ | 0                         | $-\frac{\sqrt{30}}{336}$   | 0                         | $\frac{11\sqrt{2}}{112}$  | 0                         | $-\frac{\sqrt{42}}{112}$  |
|                      |           | 0   | $\frac{\sqrt{10}}{56}$     | 0                         | $-\frac{\sqrt{5}}{28}$   | 0                         | $\frac{\sqrt{2}}{56}$    | $\frac{5\sqrt{21}}{112}$  | 0                        | $-\frac{3}{112}$          | 0                          | $\frac{13\sqrt{15}}{336}$ | 0                         | $-\frac{23\sqrt{3}}{336}$ | 0                         |
|                      |           | $-\frac{3\sqrt{10}}{56}$                        | 0                          | $-\frac{1}{28}$           | 0                        | $\frac{\sqrt{2}}{56}$     | 0                        | 0                         | $\frac{5\sqrt{15}}{112}$ | 0                         | $\frac{5\sqrt{3}}{112}$    | 0                         | $-\frac{5\sqrt{5}}{112}$  | 0                         | $\frac{\sqrt{105}}{336}$  |
|                      |           | $-\frac{\sqrt{105}}{336}$                       | 0                          | $\frac{\sqrt{42}}{112}$   | 0                        | $\frac{5\sqrt{21}}{112}$  | 0                        | 0                         | $\frac{\sqrt{70}}{112}$  | 0                         | $-\frac{\sqrt{14}}{56}$    | 0                         | $-\frac{\sqrt{210}}{112}$ | 0                         | 0                         |
|                      |           | 0   | $\frac{23\sqrt{3}}{336}$   | 0                         | $-\frac{3\sqrt{6}}{112}$ | 0                         | $\frac{5\sqrt{15}}{112}$ | $\frac{\sqrt{70}}{112}$   | 0                        | $-\frac{\sqrt{30}}{42}$   | 0                          | $\frac{\sqrt{2}}{112}$    | 0                         | $-\frac{3\sqrt{10}}{56}$  | 0                         |
|                      |           | $\frac{5\sqrt{5}}{112}$                         | 0                          | $-\frac{11\sqrt{2}}{112}$ | 0                        | $-\frac{3}{112}$          | 0                        | 0                         | $-\frac{\sqrt{30}}{42}$  | 0                         | $\frac{\sqrt{6}}{336}$     | 0                         | $\frac{\sqrt{10}}{56}$    | 0                         | $-\frac{\sqrt{210}}{112}$ |
|                      |           | 0   | $-\frac{13\sqrt{15}}{336}$ | 0                         | $-\frac{\sqrt{30}}{336}$ | 0                         | $\frac{5\sqrt{3}}{112}$  | $-\frac{\sqrt{14}}{56}$   | 0                        | $\frac{\sqrt{6}}{336}$    | 0                          | $\frac{\sqrt{10}}{28}$    | 0                         | $\frac{\sqrt{2}}{112}$    | 0                         |
|                      |           | $-\frac{5\sqrt{3}}{112}$                        | 0                          | $\frac{\sqrt{30}}{336}$   | 0                        | $\frac{13\sqrt{15}}{336}$ | 0                        | 0                         | $\frac{\sqrt{2}}{112}$   | 0                         | $\frac{\sqrt{10}}{28}$     | 0                         | $\frac{\sqrt{6}}{336}$    | 0                         | $-\frac{\sqrt{14}}{56}$   |
|                      |           | 0   | $\frac{3}{112}$            | 0                         | $\frac{11\sqrt{2}}{112}$ | 0                         | $-\frac{5\sqrt{5}}{112}$ | $-\frac{\sqrt{210}}{112}$ | 0                        | $\frac{\sqrt{10}}{56}$    | 0                          | $\frac{\sqrt{6}}{336}$    | 0                         | $-\frac{\sqrt{30}}{42}$   | 0                         |
|                      |           | $-\frac{5\sqrt{15}}{112}$                       | 0                          | $\frac{3\sqrt{6}}{112}$   | 0                        | $-\frac{23\sqrt{3}}{336}$ | 0                        | 0                         | $-\frac{3\sqrt{10}}{56}$ | 0                         | $\frac{\sqrt{2}}{112}$     | 0                         | $-\frac{\sqrt{30}}{42}$   | 0                         | $\frac{\sqrt{70}}{112}$   |
|                      |           | 0   | $-\frac{5\sqrt{21}}{112}$  | 0                         | $-\frac{\sqrt{42}}{112}$ | 0                         | $\frac{\sqrt{105}}{336}$ | 0                         | 0                        | $-\frac{\sqrt{210}}{112}$ | 0                          | $-\frac{\sqrt{14}}{56}$   | 0                         | $\frac{\sqrt{70}}{112}$   | 0                         |
| 966                  | symmetry  | $\frac{\sqrt{105}y(x-z)(x+z)(x^2-2y^2+z^2)}{4}$ |                            |                           |                          |                           |                          |                           |                          |                           |                            |                           |                           |                           |                           |

*continued ...*



Table 10

| No.                  | multipole | matrix   |                            |                            |                            |                            |                            |                            |                            |                           |                             |                             |                            |                            |                            |
|----------------------|-----------|--|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|
| $M_{5,1}^{(a)}(T_2)$ |           | 0  | $\frac{\sqrt{2}i}{56}$     | 0                          | $\frac{i}{28}$             | 0                          | $-\frac{3\sqrt{10}i}{56}$  | $\frac{\sqrt{105}i}{336}$  | 0                          | $\frac{5\sqrt{5}i}{112}$  | 0                           | $\frac{5\sqrt{3}i}{112}$    | 0                          | $-\frac{5\sqrt{15}i}{112}$ | 0                          |
|                      |           | $-\frac{\sqrt{2}i}{56}$                          | 0                          | $-\frac{\sqrt{5}i}{28}$    | 0                          | $-\frac{\sqrt{10}i}{56}$   | 0                          | 0                          | $-\frac{23\sqrt{3}i}{336}$ | 0                         | $-\frac{13\sqrt{15}i}{336}$ | 0                           | $-\frac{3i}{112}$          | 0                          | $-\frac{5\sqrt{21}i}{112}$ |
|                      |           | 0  | $\frac{\sqrt{5}i}{28}$     | 0                          | $\frac{\sqrt{10}i}{28}$    | 0                          | $\frac{i}{28}$             | $\frac{\sqrt{42}i}{112}$   | 0                          | $\frac{11\sqrt{2}i}{112}$ | 0                           | $\frac{\sqrt{30}i}{336}$    | 0                          | $-\frac{3\sqrt{6}i}{112}$  | 0                          |
|                      |           | $-\frac{i}{28}$                                  | 0                          | $-\frac{\sqrt{10}i}{28}$   | 0                          | $-\frac{\sqrt{5}i}{28}$    | 0                          | 0                          | $-\frac{3\sqrt{6}i}{112}$  | 0                         | $\frac{\sqrt{30}i}{336}$    | 0                           | $\frac{11\sqrt{2}i}{112}$  | 0                          | $\frac{\sqrt{42}i}{112}$   |
|                      |           | 0  | $\frac{\sqrt{10}i}{56}$    | 0                          | $\frac{\sqrt{5}i}{28}$     | 0                          | $\frac{\sqrt{2}i}{56}$     | $-\frac{5\sqrt{21}i}{112}$ | 0                          | $-\frac{3i}{112}$         | 0                           | $-\frac{13\sqrt{15}i}{336}$ | 0                          | $-\frac{23\sqrt{3}i}{336}$ | 0                          |
|                      |           | $\frac{3\sqrt{10}i}{56}$                         | 0                          | $-\frac{i}{28}$            | 0                          | $-\frac{\sqrt{2}i}{56}$    | 0                          | 0                          | $-\frac{5\sqrt{15}i}{112}$ | 0                         | $\frac{5\sqrt{3}i}{112}$    | 0                           | $\frac{5\sqrt{5}i}{112}$   | 0                          | $\frac{\sqrt{105}i}{336}$  |
|                      |           | $-\frac{\sqrt{105}i}{336}$                       | 0                          | $-\frac{\sqrt{42}i}{112}$  | 0                          | $\frac{5\sqrt{21}i}{112}$  | 0                          | 0                          | $\frac{\sqrt{70}i}{112}$   | 0                         | $\frac{\sqrt{14}i}{56}$     | 0                           | $-\frac{\sqrt{210}i}{112}$ | 0                          | 0                          |
|                      |           | 0  | $\frac{23\sqrt{3}i}{336}$  | 0                          | $\frac{3\sqrt{6}i}{112}$   | 0                          | $\frac{5\sqrt{15}i}{112}$  | $-\frac{\sqrt{70}i}{112}$  | 0                          | $-\frac{\sqrt{30}i}{42}$  | 0                           | $-\frac{\sqrt{2}i}{112}$    | 0                          | $-\frac{3\sqrt{10}i}{56}$  | 0                          |
|                      |           | $-\frac{5\sqrt{5}i}{112}$                        | 0                          | $-\frac{11\sqrt{2}i}{112}$ | 0                          | $\frac{3i}{112}$           | 0                          | 0                          | $\frac{\sqrt{30}i}{42}$    | 0                         | $\frac{\sqrt{6}i}{336}$     | 0                           | $-\frac{\sqrt{10}i}{56}$   | 0                          | $-\frac{\sqrt{210}i}{112}$ |
|                      |           | 0  | $\frac{13\sqrt{15}i}{336}$ | 0                          | $-\frac{\sqrt{30}i}{336}$  | 0                          | $-\frac{5\sqrt{3}i}{112}$  | $-\frac{\sqrt{14}i}{56}$   | 0                          | $-\frac{\sqrt{6}i}{336}$  | 0                           | $\frac{\sqrt{10}i}{28}$     | 0                          | $-\frac{\sqrt{2}i}{112}$   | 0                          |
|                      |           | $-\frac{5\sqrt{3}i}{112}$                        | 0                          | $-\frac{\sqrt{30}i}{336}$  | 0                          | $\frac{13\sqrt{15}i}{336}$ | 0                          | 0                          | $\frac{\sqrt{2}i}{112}$    | 0                         | $-\frac{\sqrt{10}i}{28}$    | 0                           | $\frac{\sqrt{6}i}{336}$    | 0                          | $\frac{\sqrt{14}i}{56}$    |
|                      |           | 0  | $\frac{3i}{112}$           | 0                          | $-\frac{11\sqrt{2}i}{112}$ | 0                          | $-\frac{5\sqrt{5}i}{112}$  | $\frac{\sqrt{210}i}{112}$  | 0                          | $\frac{\sqrt{10}i}{56}$   | 0                           | $-\frac{\sqrt{6}i}{336}$    | 0                          | $-\frac{\sqrt{30}i}{42}$   | 0                          |
|                      |           | $\frac{5\sqrt{15}i}{112}$                        | 0                          | $\frac{3\sqrt{6}i}{112}$   | 0                          | $\frac{23\sqrt{3}i}{336}$  | 0                          | 0                          | $\frac{3\sqrt{10}i}{56}$   | 0                         | $\frac{\sqrt{2}i}{112}$     | 0                           | $\frac{\sqrt{30}i}{42}$    | 0                          | $\frac{\sqrt{70}i}{112}$   |
|                      |           | 0  | $\frac{5\sqrt{21}i}{112}$  | 0                          | $-\frac{\sqrt{42}i}{112}$  | 0                          | $-\frac{\sqrt{105}i}{336}$ | 0                          | 0                          | $\frac{\sqrt{210}i}{112}$ | 0                           | $-\frac{\sqrt{14}i}{56}$    | 0                          | $-\frac{\sqrt{70}i}{112}$  | 0                          |
| 967                  | symmetry  | $-\frac{\sqrt{105}z(x-y)(x+y)(x^2+y^2-2z^2)}{4}$ |                            |                            |                            |                            |                            |                            |                            |                           |                             |                             |                            |                            |                            |

continued ...

Table 10

| No.                  | multipole | matrix                 |                         |                        |                        |                         |                        |                         |                         |                         |                         |                         |                          |                        |                          |
|----------------------|-----------|------------------------|-------------------------|------------------------|------------------------|-------------------------|------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|--------------------------|------------------------|--------------------------|
| $M_{5,2}^{(a)}(T_2)$ |           | 0                      | 0                       | $\frac{1}{14}$         | 0                      | 0                       | 0                      | 0                       | 0                       | $\frac{5\sqrt{3}}{42}$  | 0                       | 0                       | 0                        | 0                      |                          |
|                      |           | 0                      | 0                       | 0                      | $-\frac{\sqrt{5}}{14}$ | 0                       | 0                      | $-\frac{\sqrt{21}}{42}$ | 0                       | 0                       | 0                       | $-\frac{\sqrt{15}}{21}$ | 0                        | 0                      | 0                        |
|                      |           | $\frac{1}{14}$         | 0                       | 0                      | 0                      | $\frac{\sqrt{5}}{14}$   | 0                      | 0                       | $\frac{2\sqrt{6}}{21}$  | 0                       | 0                       | 0                       | $-\frac{\sqrt{2}}{14}$   | 0                      | 0                        |
|                      |           | 0                      | $-\frac{\sqrt{5}}{14}$  | 0                      | 0                      | 0                       | $-\frac{1}{14}$        | 0                       | 0                       | $-\frac{\sqrt{2}}{14}$  | 0                       | 0                       | 0                        | $\frac{2\sqrt{6}}{21}$ | 0                        |
|                      |           | 0                      | 0                       | $\frac{\sqrt{5}}{14}$  | 0                      | 0                       | 0                      | 0                       | 0                       | $-\frac{\sqrt{15}}{21}$ | 0                       | 0                       | 0                        | 0                      | $-\frac{\sqrt{21}}{42}$  |
|                      |           | 0                      | 0                       | 0                      | $-\frac{1}{14}$        | 0                       | 0                      | 0                       | 0                       | 0                       | 0                       | $\frac{5\sqrt{3}}{42}$  | 0                        | 0                      | 0                        |
|                      |           | 0                      | $-\frac{\sqrt{21}}{42}$ | 0                      | 0                      | 0                       | 0                      | 0                       | 0                       | $\frac{\sqrt{210}}{84}$ | 0                       | 0                       | 0                        | 0                      | 0                        |
|                      |           | 0                      | 0                       | $\frac{2\sqrt{6}}{21}$ | 0                      | 0                       | 0                      | 0                       | 0                       | 0                       | $-\frac{3\sqrt{2}}{28}$ | 0                       | 0                        | 0                      | 0                        |
|                      |           | 0                      | 0                       | 0                      | $-\frac{\sqrt{2}}{14}$ | 0                       | 0                      | $\frac{\sqrt{210}}{84}$ | 0                       | 0                       | 0                       | $-\frac{\sqrt{6}}{21}$  | 0                        | 0                      | 0                        |
|                      |           | $\frac{5\sqrt{3}}{42}$ | 0                       | 0                      | 0                      | $-\frac{\sqrt{15}}{21}$ | 0                      | 0                       | $-\frac{3\sqrt{2}}{28}$ | 0                       | 0                       | 0                       | $\frac{\sqrt{6}}{21}$    | 0                      | 0                        |
|                      |           | 0                      | $-\frac{\sqrt{15}}{21}$ | 0                      | 0                      | 0                       | $\frac{5\sqrt{3}}{42}$ | 0                       | 0                       | $-\frac{\sqrt{6}}{21}$  | 0                       | 0                       | 0                        | $\frac{3\sqrt{2}}{28}$ | 0                        |
|                      |           | 0                      | 0                       | $-\frac{\sqrt{2}}{14}$ | 0                      | 0                       | 0                      | 0                       | 0                       | 0                       | $\frac{\sqrt{6}}{21}$   | 0                       | 0                        | 0                      | $-\frac{\sqrt{210}}{84}$ |
|                      |           | 0                      | 0                       | 0                      | $\frac{2\sqrt{6}}{21}$ | 0                       | 0                      | 0                       | 0                       | 0                       | 0                       | $\frac{3\sqrt{2}}{28}$  | 0                        | 0                      | 0                        |
|                      |           | 0                      | 0                       | 0                      | 0                      | $-\frac{\sqrt{21}}{42}$ | 0                      | 0                       | 0                       | 0                       | 0                       | 0                       | $-\frac{\sqrt{210}}{84}$ | 0                      | 0                        |
| 968                  | symmetry  | $x$                    |                         |                        |                        |                         |                        |                         |                         |                         |                         |                         |                          |                        |                          |

*continued ...*

Table 10

| No.                                | multipole | matrix                  |                         |                          |                          |                          |                         |                       |                         |                         |                         |                         |                         |                          |                       |
|------------------------------------|-----------|-------------------------|-------------------------|--------------------------|--------------------------|--------------------------|-------------------------|-----------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|--------------------------|-----------------------|
| $\mathbb{M}_{1,0}^{(1,-1;a)}(T_1)$ |           | 0                       | $-\frac{\sqrt{70}}{98}$ | 0                        | 0                        | 0                        | 0                       | $\frac{\sqrt{3}}{7}$  | 0                       | $-\frac{\sqrt{7}}{49}$  | 0                       | 0                       | 0                       | 0                        | 0                     |
|                                    |           | $-\frac{\sqrt{70}}{98}$ | 0                       | $-\frac{2\sqrt{7}}{49}$  | 0                        | 0                        | 0                       | 0                     | $\frac{\sqrt{105}}{49}$ | 0                       | $-\frac{\sqrt{21}}{49}$ | 0                       | 0                       | 0                        | 0                     |
|                                    |           | 0                       | $-\frac{2\sqrt{7}}{49}$ | 0                        | $-\frac{3\sqrt{14}}{98}$ | 0                        | 0                       | 0                     | 0                       | $\frac{\sqrt{70}}{49}$  | 0                       | $-\frac{\sqrt{42}}{49}$ | 0                       | 0                        | 0                     |
|                                    |           | 0                       | 0                       | $-\frac{3\sqrt{14}}{98}$ | 0                        | $-\frac{2\sqrt{7}}{49}$  | 0                       | 0                     | 0                       | 0                       | $\frac{\sqrt{42}}{49}$  | 0                       | $-\frac{\sqrt{70}}{49}$ | 0                        | 0                     |
|                                    |           | 0                       | 0                       | 0                        | $-\frac{2\sqrt{7}}{49}$  | 0                        | $-\frac{\sqrt{70}}{98}$ | 0                     | 0                       | 0                       | 0                       | $\frac{\sqrt{21}}{49}$  | 0                       | $-\frac{\sqrt{105}}{49}$ | 0                     |
|                                    |           | 0                       | 0                       | 0                        | 0                        | $-\frac{\sqrt{70}}{98}$  | 0                       | 0                     | 0                       | 0                       | 0                       | 0                       | $\frac{\sqrt{7}}{49}$   | 0                        | $-\frac{\sqrt{3}}{7}$ |
|                                    |           | $\frac{\sqrt{3}}{7}$    | 0                       | 0                        | 0                        | 0                        | 0                       | 0                     | $\frac{\sqrt{2}}{14}$   | 0                       | 0                       | 0                       | 0                       | 0                        | 0                     |
|                                    |           | 0                       | $\frac{\sqrt{105}}{49}$ | 0                        | 0                        | 0                        | 0                       | $\frac{\sqrt{2}}{14}$ | 0                       | $\frac{\sqrt{42}}{49}$  | 0                       | 0                       | 0                       | 0                        | 0                     |
|                                    |           | $-\frac{\sqrt{7}}{49}$  | 0                       | $\frac{\sqrt{70}}{49}$   | 0                        | 0                        | 0                       | 0                     | $\frac{\sqrt{42}}{49}$  | 0                       | $\frac{\sqrt{210}}{98}$ | 0                       | 0                       | 0                        | 0                     |
|                                    |           | 0                       | $-\frac{\sqrt{21}}{49}$ | 0                        | $\frac{\sqrt{42}}{49}$   | 0                        | 0                       | 0                     | 0                       | $\frac{\sqrt{210}}{98}$ | 0                       | $\frac{2\sqrt{14}}{49}$ | 0                       | 0                        | 0                     |
|                                    |           | 0                       | 0                       | $-\frac{\sqrt{42}}{49}$  | 0                        | $\frac{\sqrt{21}}{49}$   | 0                       | 0                     | 0                       | 0                       | $\frac{2\sqrt{14}}{49}$ | 0                       | $\frac{\sqrt{210}}{98}$ | 0                        | 0                     |
|                                    |           | 0                       | 0                       | 0                        | $-\frac{\sqrt{70}}{49}$  | 0                        | $\frac{\sqrt{7}}{49}$   | 0                     | 0                       | 0                       | 0                       | $\frac{\sqrt{210}}{98}$ | 0                       | $\frac{\sqrt{42}}{49}$   | 0                     |
|                                    |           | 0                       | 0                       | 0                        | 0                        | $-\frac{\sqrt{105}}{49}$ | 0                       | 0                     | 0                       | 0                       | 0                       | 0                       | $\frac{\sqrt{42}}{49}$  | 0                        | $\frac{\sqrt{2}}{14}$ |
|                                    |           | 0                       | 0                       | 0                        | 0                        | 0                        | $-\frac{\sqrt{3}}{7}$   | 0                     | 0                       | 0                       | 0                       | 0                       | 0                       | $\frac{\sqrt{2}}{14}$    | 0                     |
| 969                                | symmetry  | $y$                     |                         |                          |                          |                          |                         |                       |                         |                         |                         |                         |                         |                          |                       |

*continued ...*

Table 10

| No.                                | multipole | matrix                   |                           |                           |                          |                           |                         |                        |                          |                          |                           |                           |                           |                          |                         |
|------------------------------------|-----------|--------------------------|---------------------------|---------------------------|--------------------------|---------------------------|-------------------------|------------------------|--------------------------|--------------------------|---------------------------|---------------------------|---------------------------|--------------------------|-------------------------|
| $\mathbb{M}_{1,1}^{(1,-1;a)}(T_1)$ |           | 0                        | $\frac{\sqrt{70}i}{98}$   | 0                         | 0                        | 0                         | 0                       | $\frac{\sqrt{3}i}{7}$  | 0                        | $\frac{\sqrt{7}i}{49}$   | 0                         | 0                         | 0                         | 0                        | 0                       |
|                                    |           | $-\frac{\sqrt{70}i}{98}$ | 0                         | $\frac{2\sqrt{7}i}{49}$   | 0                        | 0                         | 0                       | 0                      | $\frac{\sqrt{105}i}{49}$ | 0                        | $\frac{\sqrt{21}i}{49}$   | 0                         | 0                         | 0                        | 0                       |
|                                    |           | 0                        | $-\frac{2\sqrt{7}i}{49}$  | 0                         | $\frac{3\sqrt{14}i}{98}$ | 0                         | 0                       | 0                      | 0                        | $\frac{\sqrt{70}i}{49}$  | 0                         | $\frac{\sqrt{42}i}{49}$   | 0                         | 0                        | 0                       |
|                                    |           | 0                        | 0                         | $-\frac{3\sqrt{14}i}{98}$ | 0                        | $\frac{2\sqrt{7}i}{49}$   | 0                       | 0                      | 0                        | 0                        | $\frac{\sqrt{42}i}{49}$   | 0                         | $\frac{\sqrt{70}i}{49}$   | 0                        | 0                       |
|                                    |           | 0                        | 0                         | 0                         | $-\frac{2\sqrt{7}i}{49}$ | 0                         | $\frac{\sqrt{70}i}{98}$ | 0                      | 0                        | 0                        | 0                         | $\frac{\sqrt{21}i}{49}$   | 0                         | $\frac{\sqrt{105}i}{49}$ | 0                       |
|                                    |           | 0                        | 0                         | 0                         | 0                        | $-\frac{\sqrt{70}i}{98}$  | 0                       | 0                      | 0                        | 0                        | 0                         | 0                         | $\frac{\sqrt{7}i}{49}$    | 0                        | $\frac{\sqrt{3}i}{7}$   |
|                                    |           | $-\frac{\sqrt{3}i}{7}$   | 0                         | 0                         | 0                        | 0                         | 0                       | 0                      | $-\frac{\sqrt{2}i}{14}$  | 0                        | 0                         | 0                         | 0                         | 0                        | 0                       |
|                                    |           | 0                        | $-\frac{\sqrt{105}i}{49}$ | 0                         | 0                        | 0                         | 0                       | $\frac{\sqrt{2}i}{14}$ | 0                        | $-\frac{\sqrt{42}i}{49}$ | 0                         | 0                         | 0                         | 0                        | 0                       |
|                                    |           | $-\frac{\sqrt{7}i}{49}$  | 0                         | $-\frac{\sqrt{70}i}{49}$  | 0                        | 0                         | 0                       | 0                      | $\frac{\sqrt{42}i}{49}$  | 0                        | $-\frac{\sqrt{210}i}{98}$ | 0                         | 0                         | 0                        | 0                       |
|                                    |           | 0                        | $-\frac{\sqrt{21}i}{49}$  | 0                         | $-\frac{\sqrt{42}i}{49}$ | 0                         | 0                       | 0                      | 0                        | $\frac{\sqrt{210}i}{98}$ | 0                         | $-\frac{2\sqrt{14}i}{49}$ | 0                         | 0                        | 0                       |
|                                    |           | 0                        | 0                         | $-\frac{\sqrt{42}i}{49}$  | 0                        | $-\frac{\sqrt{21}i}{49}$  | 0                       | 0                      | 0                        | 0                        | $\frac{2\sqrt{14}i}{49}$  | 0                         | $-\frac{\sqrt{210}i}{98}$ | 0                        | 0                       |
|                                    |           | 0                        | 0                         | 0                         | $-\frac{\sqrt{70}i}{49}$ | 0                         | $-\frac{\sqrt{7}i}{49}$ | 0                      | 0                        | 0                        | 0                         | $\frac{\sqrt{210}i}{98}$  | 0                         | $-\frac{\sqrt{42}i}{49}$ | 0                       |
|                                    |           | 0                        | 0                         | 0                         | 0                        | $-\frac{\sqrt{105}i}{49}$ | 0                       | 0                      | 0                        | 0                        | 0                         | 0                         | $\frac{\sqrt{42}i}{49}$   | 0                        | $-\frac{\sqrt{2}i}{14}$ |
|                                    |           | 0                        | 0                         | 0                         | 0                        | 0                         | $-\frac{\sqrt{3}i}{7}$  | 0                      | 0                        | 0                        | 0                         | 0                         | 0                         | $\frac{\sqrt{2}i}{14}$   | 0                       |
| 970                                | symmetry  | $z$                      |                           |                           |                          |                           |                         |                        |                          |                          |                           |                           |                           |                          |                         |

*continued ...*

Table 10

| No.                                | multipole | matrix                   |                          |                          |                          |                          |                          |                        |                          |                          |                          |                          |                          |                          |                         |
|------------------------------------|-----------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|
| $\mathbb{M}_{1,2}^{(1,-1;a)}(T_1)$ |           | $-\frac{5\sqrt{14}}{98}$ | 0                        | 0                        | 0                        | 0                        | 0                        | 0                      | $-\frac{2\sqrt{21}}{49}$ | 0                        | 0                        | 0                        | 0                        | 0                        | 0                       |
|                                    |           | 0                        | $-\frac{3\sqrt{14}}{98}$ | 0                        | 0                        | 0                        | 0                        | 0                      | 0                        | $-\frac{2\sqrt{35}}{49}$ | 0                        | 0                        | 0                        | 0                        | 0                       |
|                                    |           | 0                        | 0                        | $-\frac{\sqrt{14}}{98}$  | 0                        | 0                        | 0                        | 0                      | 0                        | 0                        | $-\frac{2\sqrt{42}}{49}$ | 0                        | 0                        | 0                        | 0                       |
|                                    |           | 0                        | 0                        | 0                        | $\frac{\sqrt{14}}{98}$   | 0                        | 0                        | 0                      | 0                        | 0                        | 0                        | $-\frac{2\sqrt{42}}{49}$ | 0                        | 0                        | 0                       |
|                                    |           | 0                        | 0                        | 0                        | 0                        | $\frac{3\sqrt{14}}{98}$  | 0                        | 0                      | 0                        | 0                        | 0                        | 0                        | $-\frac{2\sqrt{35}}{49}$ | 0                        | 0                       |
|                                    |           | 0                        | 0                        | 0                        | 0                        | 0                        | $\frac{5\sqrt{14}}{98}$  | 0                      | 0                        | 0                        | 0                        | 0                        | 0                        | $-\frac{2\sqrt{21}}{49}$ | 0                       |
|                                    |           | 0                        | 0                        | 0                        | 0                        | 0                        | 0                        | $\frac{\sqrt{14}}{14}$ | 0                        | 0                        | 0                        | 0                        | 0                        | 0                        | 0                       |
|                                    |           | $-\frac{2\sqrt{21}}{49}$ | 0                        | 0                        | 0                        | 0                        | 0                        | 0                      | $\frac{5\sqrt{14}}{98}$  | 0                        | 0                        | 0                        | 0                        | 0                        | 0                       |
|                                    |           | 0                        | $-\frac{2\sqrt{35}}{49}$ | 0                        | 0                        | 0                        | 0                        | 0                      | 0                        | $\frac{3\sqrt{14}}{98}$  | 0                        | 0                        | 0                        | 0                        | 0                       |
|                                    |           | 0                        | 0                        | $-\frac{2\sqrt{42}}{49}$ | 0                        | 0                        | 0                        | 0                      | 0                        | 0                        | $\frac{\sqrt{14}}{98}$   | 0                        | 0                        | 0                        | 0                       |
|                                    |           | 0                        | 0                        | 0                        | $-\frac{2\sqrt{42}}{49}$ | 0                        | 0                        | 0                      | 0                        | 0                        | 0                        | $-\frac{\sqrt{14}}{98}$  | 0                        | 0                        | 0                       |
|                                    |           | 0                        | 0                        | 0                        | 0                        | $-\frac{2\sqrt{35}}{49}$ | 0                        | 0                      | 0                        | 0                        | 0                        | 0                        | $-\frac{3\sqrt{14}}{98}$ | 0                        | 0                       |
|                                    |           | 0                        | 0                        | 0                        | 0                        | 0                        | $-\frac{2\sqrt{21}}{49}$ | 0                      | 0                        | 0                        | 0                        | 0                        | 0                        | $-\frac{5\sqrt{14}}{98}$ | 0                       |
|                                    |           | 0                        | 0                        | 0                        | 0                        | 0                        | 0                        | 0                      | 0                        | 0                        | 0                        | 0                        | 0                        | 0                        | $-\frac{\sqrt{14}}{14}$ |
| 971                                | symmetry  | $\sqrt{15}xyz$           |                          |                          |                          |                          |                          |                        |                          |                          |                          |                          |                          |                          |                         |

*continued ...*

Table 10

| No. | multipole             | matrix                    |                           |                               |                            |                            |                            |                          |                             |                           |                            |                            |                            |                             |                          |
|-----|-----------------------|---------------------------|---------------------------|-------------------------------|----------------------------|----------------------------|----------------------------|--------------------------|-----------------------------|---------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|--------------------------|
| 972 | $M_3^{(1,-1;a)}(A_2)$ | 0                         | 0                         | $-\frac{\sqrt{105}i}{98}$     | 0                          | 0                          | 0                          | 0                        | 0                           | 0                         | $-\frac{4\sqrt{35}i}{147}$ | 0                          | 0                          | 0                           | 0                        |
|     |                       | 0                         | 0                         | 0                             | $-\frac{\sqrt{21}i}{98}$   | 0                          | 0                          | $-\frac{2\sqrt{5}i}{21}$ | 0                           | 0                         | 0                          | $-\frac{10\sqrt{7}i}{147}$ | 0                          | 0                           | 0                        |
|     |                       | $\frac{\sqrt{105}i}{98}$  | 0                         | 0                             | 0                          | $\frac{\sqrt{21}i}{98}$    | 0                          | 0                        | $-\frac{\sqrt{70}i}{147}$   | 0                         | 0                          | 0                          | $-\frac{\sqrt{210}i}{147}$ | 0                           | 0                        |
|     |                       | 0                         | $\frac{\sqrt{21}i}{98}$   | 0                             | 0                          | 0                          | $\frac{\sqrt{105}i}{98}$   | 0                        | 0                           | $\frac{\sqrt{210}i}{147}$ | 0                          | 0                          | 0                          | $\frac{\sqrt{70}i}{147}$    | 0                        |
|     |                       | 0                         | 0                         | $-\frac{\sqrt{21}i}{98}$      | 0                          | 0                          | 0                          | 0                        | 0                           | 0                         | $\frac{10\sqrt{7}i}{147}$  | 0                          | 0                          | 0                           | $\frac{2\sqrt{5}i}{21}$  |
|     |                       | 0                         | 0                         | 0                             | $-\frac{\sqrt{105}i}{98}$  | 0                          | 0                          | 0                        | 0                           | 0                         | 0                          | $\frac{4\sqrt{35}i}{147}$  | 0                          | 0                           | 0                        |
|     |                       | 0                         | $\frac{2\sqrt{5}i}{21}$   | 0                             | 0                          | 0                          | 0                          | 0                        | 0                           | $\frac{5\sqrt{2}i}{28}$   | 0                          | 0                          | 0                          | 0                           | 0                        |
|     |                       | 0                         | 0                         | $\frac{\sqrt{70}i}{147}$      | 0                          | 0                          | 0                          | 0                        | 0                           | 0                         | $\frac{3\sqrt{210}i}{196}$ | 0                          | 0                          | 0                           | 0                        |
|     |                       | 0                         | 0                         | 0                             | $-\frac{\sqrt{210}i}{147}$ | 0                          | 0                          | $-\frac{5\sqrt{2}i}{28}$ | 0                           | 0                         | 0                          | $\frac{\sqrt{70}i}{98}$    | 0                          | 0                           | 0                        |
|     |                       | $\frac{4\sqrt{35}i}{147}$ | 0                         | 0                             | 0                          | $-\frac{10\sqrt{7}i}{147}$ | 0                          | 0                        | $-\frac{3\sqrt{210}i}{196}$ | 0                         | 0                          | 0                          | $-\frac{\sqrt{70}i}{98}$   | 0                           | 0                        |
|     |                       | 0                         | $\frac{10\sqrt{7}i}{147}$ | 0                             | 0                          | 0                          | $-\frac{4\sqrt{35}i}{147}$ | 0                        | 0                           | $-\frac{\sqrt{70}i}{98}$  | 0                          | 0                          | 0                          | $-\frac{3\sqrt{210}i}{196}$ | 0                        |
|     |                       | 0                         | 0                         | $\frac{\sqrt{210}i}{147}$     | 0                          | 0                          | 0                          | 0                        | 0                           | 0                         | $\frac{\sqrt{70}i}{98}$    | 0                          | 0                          | 0                           | $-\frac{5\sqrt{2}i}{28}$ |
|     |                       | 0                         | 0                         | 0                             | $-\frac{\sqrt{70}i}{147}$  | 0                          | 0                          | 0                        | 0                           | 0                         | 0                          | $\frac{3\sqrt{210}i}{196}$ | 0                          | 0                           | 0                        |
|     |                       | 0                         | 0                         | 0                             | 0                          | $-\frac{2\sqrt{5}i}{21}$   | 0                          | 0                        | 0                           | 0                         | 0                          | 0                          | $\frac{5\sqrt{2}i}{28}$    | 0                           | 0                        |
|     |                       |                           |                           | $\frac{x(2x^2-3y^2-3z^2)}{2}$ |                            |                            |                            |                          |                             |                           |                            |                            |                            |                             |                          |

continued ...

Table 10

| No. | multipole                          | matrix                         |                           |                           |                           |                           |                           |                         |                           |                           |                           |                           |                           |                          |                         |
|-----|------------------------------------|--------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|-------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|--------------------------|-------------------------|
| 973 | $\mathbb{M}_{3,0}^{(1,-1;a)}(T_1)$ | 0                              | $-\frac{3\sqrt{14}}{196}$ | 0                         | $\frac{5\sqrt{7}}{196}$   | 0                         | 0                         | $\frac{\sqrt{15}}{42}$  | 0                         | $-\frac{\sqrt{35}}{49}$   | 0                         | $\frac{5\sqrt{21}}{294}$  | 0                         | 0                        | 0                       |
|     |                                    | $-\frac{3\sqrt{14}}{196}$      | 0                         | $\frac{3\sqrt{35}}{980}$  | 0                         | $\frac{\sqrt{70}}{98}$    | 0                         | 0                       | $-\frac{5\sqrt{21}}{294}$ | 0                         | $-\frac{\sqrt{105}}{147}$ | 0                         | $\frac{5\sqrt{7}}{98}$    | 0                        | 0                       |
|     |                                    | 0                              | $\frac{3\sqrt{35}}{980}$  | 0                         | $\frac{3\sqrt{70}}{490}$  | 0                         | $\frac{5\sqrt{7}}{196}$   | $-\frac{5\sqrt{6}}{84}$ | 0                         | $-\frac{5\sqrt{14}}{196}$ | 0                         | $\frac{\sqrt{210}}{588}$  | 0                         | $\frac{5\sqrt{42}}{196}$ | 0                       |
|     |                                    | $\frac{5\sqrt{7}}{196}$        | 0                         | $\frac{3\sqrt{70}}{490}$  | 0                         | $\frac{3\sqrt{35}}{980}$  | 0                         | 0                       | $-\frac{5\sqrt{42}}{196}$ | 0                         | $-\frac{\sqrt{210}}{588}$ | 0                         | $\frac{5\sqrt{14}}{196}$  | 0                        | $\frac{5\sqrt{6}}{84}$  |
|     |                                    | 0                              | $\frac{\sqrt{70}}{98}$    | 0                         | $\frac{3\sqrt{35}}{980}$  | 0                         | $-\frac{3\sqrt{14}}{196}$ | 0                       | 0                         | $-\frac{5\sqrt{7}}{98}$   | 0                         | $\frac{\sqrt{105}}{147}$  | 0                         | $\frac{5\sqrt{21}}{294}$ | 0                       |
|     |                                    | 0                              | 0                         | $\frac{5\sqrt{7}}{196}$   | 0                         | $-\frac{3\sqrt{14}}{196}$ | 0                         | 0                       | 0                         | 0                         | $-\frac{5\sqrt{21}}{294}$ | 0                         | $\frac{\sqrt{35}}{49}$    | 0                        | $-\frac{\sqrt{15}}{42}$ |
|     |                                    | $\frac{\sqrt{15}}{42}$         | 0                         | $-\frac{5\sqrt{6}}{84}$   | 0                         | 0                         | 0                         | 0                       | $\frac{3\sqrt{10}}{56}$   | 0                         | $-\frac{5\sqrt{2}}{56}$   | 0                         | 0                         | 0                        | 0                       |
|     |                                    | 0                              | $-\frac{5\sqrt{21}}{294}$ | 0                         | $-\frac{5\sqrt{42}}{196}$ | 0                         | 0                         | $\frac{3\sqrt{10}}{56}$ | 0                         | $\frac{\sqrt{210}}{392}$  | 0                         | $-\frac{5\sqrt{14}}{98}$  | 0                         | 0                        | 0                       |
|     |                                    | $-\frac{\sqrt{35}}{49}$        | 0                         | $-\frac{5\sqrt{14}}{196}$ | 0                         | $-\frac{5\sqrt{7}}{98}$   | 0                         | 0                       | $\frac{\sqrt{210}}{392}$  | 0                         | $-\frac{5\sqrt{42}}{392}$ | 0                         | $-\frac{5\sqrt{70}}{196}$ | 0                        | 0                       |
|     |                                    | 0                              | $-\frac{\sqrt{105}}{147}$ | 0                         | $-\frac{\sqrt{210}}{588}$ | 0                         | $-\frac{5\sqrt{21}}{294}$ | $-\frac{5\sqrt{2}}{56}$ | 0                         | $-\frac{5\sqrt{42}}{392}$ | 0                         | $-\frac{3\sqrt{70}}{196}$ | 0                         | $-\frac{5\sqrt{14}}{98}$ | 0                       |
|     |                                    | $\frac{5\sqrt{21}}{294}$       | 0                         | $\frac{\sqrt{210}}{588}$  | 0                         | $\frac{\sqrt{105}}{147}$  | 0                         | 0                       | $-\frac{5\sqrt{14}}{98}$  | 0                         | $-\frac{3\sqrt{70}}{196}$ | 0                         | $-\frac{5\sqrt{42}}{392}$ | 0                        | $-\frac{5\sqrt{2}}{56}$ |
|     |                                    | 0                              | $\frac{5\sqrt{7}}{98}$    | 0                         | $\frac{5\sqrt{14}}{196}$  | 0                         | $\frac{\sqrt{35}}{49}$    | 0                       | 0                         | $-\frac{5\sqrt{70}}{196}$ | 0                         | $-\frac{5\sqrt{42}}{392}$ | 0                         | $\frac{\sqrt{210}}{392}$ | 0                       |
|     |                                    | 0                              | 0                         | $\frac{5\sqrt{42}}{196}$  | 0                         | $\frac{5\sqrt{21}}{294}$  | 0                         | 0                       | 0                         | 0                         | $-\frac{5\sqrt{14}}{98}$  | 0                         | $\frac{\sqrt{210}}{392}$  | 0                        | $\frac{3\sqrt{10}}{56}$ |
|     |                                    | 0                              | 0                         | 0                         | $\frac{5\sqrt{6}}{84}$    | 0                         | $-\frac{\sqrt{15}}{42}$   | 0                       | 0                         | 0                         | 0                         | $-\frac{5\sqrt{2}}{56}$   | 0                         | $\frac{3\sqrt{10}}{56}$  | 0                       |
| 973 | symmetry                           | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ |                           |                           |                           |                           |                           |                         |                           |                           |                           |                           |                           |                          |                         |

continued ...

Table 10

| No.                                | multipole | matrix                         |                            |                            |                            |                            |                            |                          |                            |                            |                            |                            |                            |                            |                           |
|------------------------------------|-----------|--------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|--------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|
| $\mathbb{M}_{3,1}^{(1,-1;a)}(T_1)$ |           | 0                              | $\frac{3\sqrt{14}i}{196}$  | 0                          | $\frac{5\sqrt{7}i}{196}$   | 0                          | 0                          | $\frac{\sqrt{15}i}{42}$  | 0                          | $\frac{\sqrt{35}i}{49}$    | 0                          | $\frac{5\sqrt{21}i}{294}$  | 0                          | 0                          | 0                         |
|                                    |           | $-\frac{3\sqrt{14}i}{196}$     | 0                          | $-\frac{3\sqrt{35}i}{980}$ | 0                          | $\frac{\sqrt{70}i}{98}$    | 0                          | 0                        | $-\frac{5\sqrt{21}i}{294}$ | 0                          | $\frac{\sqrt{105}i}{147}$  | 0                          | $\frac{5\sqrt{7}i}{98}$    | 0                          | 0                         |
|                                    |           | 0                              | $\frac{3\sqrt{35}i}{980}$  | 0                          | $-\frac{3\sqrt{70}i}{490}$ | 0                          | $\frac{5\sqrt{7}i}{196}$   | $\frac{5\sqrt{6}i}{84}$  | 0                          | $-\frac{5\sqrt{14}i}{196}$ | 0                          | $-\frac{\sqrt{210}i}{588}$ | 0                          | $\frac{5\sqrt{42}i}{196}$  | 0                         |
|                                    |           | $-\frac{5\sqrt{7}i}{196}$      | 0                          | $\frac{3\sqrt{70}i}{490}$  | 0                          | $-\frac{3\sqrt{35}i}{980}$ | 0                          | 0                        | $\frac{5\sqrt{42}i}{196}$  | 0                          | $-\frac{\sqrt{210}i}{588}$ | 0                          | $-\frac{5\sqrt{14}i}{196}$ | 0                          | $\frac{5\sqrt{6}i}{84}$   |
|                                    |           | 0                              | $-\frac{\sqrt{70}i}{98}$   | 0                          | $\frac{3\sqrt{35}i}{980}$  | 0                          | $\frac{3\sqrt{14}i}{196}$  | 0                        | 0                          | $\frac{5\sqrt{7}i}{98}$    | 0                          | $\frac{\sqrt{105}i}{147}$  | 0                          | $-\frac{5\sqrt{21}i}{294}$ | 0                         |
|                                    |           | 0                              | 0                          | $-\frac{5\sqrt{7}i}{196}$  | 0                          | $-\frac{3\sqrt{14}i}{196}$ | 0                          | 0                        | 0                          | 0                          | $\frac{5\sqrt{21}i}{294}$  | 0                          | $\frac{\sqrt{35}i}{49}$    | 0                          | $\frac{\sqrt{15}i}{42}$   |
|                                    |           | $-\frac{\sqrt{15}i}{42}$       | 0                          | $-\frac{5\sqrt{6}i}{84}$   | 0                          | 0                          | 0                          | 0                        | $-\frac{3\sqrt{10}i}{56}$  | 0                          | $-\frac{5\sqrt{2}i}{56}$   | 0                          | 0                          | 0                          | 0                         |
|                                    |           | 0                              | $\frac{5\sqrt{21}i}{294}$  | 0                          | $-\frac{5\sqrt{42}i}{196}$ | 0                          | 0                          | $\frac{3\sqrt{10}i}{56}$ | 0                          | $-\frac{\sqrt{210}i}{392}$ | 0                          | $-\frac{5\sqrt{14}i}{98}$  | 0                          | 0                          | 0                         |
|                                    |           | $-\frac{\sqrt{35}i}{49}$       | 0                          | $\frac{5\sqrt{14}i}{196}$  | 0                          | $-\frac{5\sqrt{7}i}{98}$   | 0                          | 0                        | $\frac{\sqrt{210}i}{392}$  | 0                          | $\frac{5\sqrt{42}i}{392}$  | 0                          | $-\frac{5\sqrt{70}i}{196}$ | 0                          | 0                         |
|                                    |           | 0                              | $-\frac{\sqrt{105}i}{147}$ | 0                          | $\frac{\sqrt{210}i}{588}$  | 0                          | $-\frac{5\sqrt{21}i}{294}$ | $\frac{5\sqrt{2}i}{56}$  | 0                          | $-\frac{5\sqrt{42}i}{392}$ | 0                          | $\frac{3\sqrt{70}i}{196}$  | 0                          | $-\frac{5\sqrt{14}i}{98}$  | 0                         |
|                                    |           | $-\frac{5\sqrt{21}i}{294}$     | 0                          | $\frac{\sqrt{210}i}{588}$  | 0                          | $-\frac{\sqrt{105}i}{147}$ | 0                          | 0                        | $\frac{5\sqrt{14}i}{98}$   | 0                          | $-\frac{3\sqrt{70}i}{196}$ | 0                          | $\frac{5\sqrt{42}i}{392}$  | 0                          | $-\frac{5\sqrt{2}i}{56}$  |
|                                    |           | 0                              | $-\frac{5\sqrt{7}i}{98}$   | 0                          | $\frac{5\sqrt{14}i}{196}$  | 0                          | $-\frac{\sqrt{35}i}{49}$   | 0                        | 0                          | $\frac{5\sqrt{70}i}{196}$  | 0                          | $-\frac{5\sqrt{42}i}{392}$ | 0                          | $-\frac{\sqrt{210}i}{392}$ | 0                         |
|                                    |           | 0                              | 0                          | $-\frac{5\sqrt{42}i}{196}$ | 0                          | $\frac{5\sqrt{21}i}{294}$  | 0                          | 0                        | 0                          | 0                          | $\frac{5\sqrt{14}i}{98}$   | 0                          | $\frac{\sqrt{210}i}{392}$  | 0                          | $-\frac{3\sqrt{10}i}{56}$ |
|                                    |           | 0                              | 0                          | 0                          | $-\frac{5\sqrt{6}i}{84}$   | 0                          | $-\frac{\sqrt{15}i}{42}$   | 0                        | 0                          | 0                          | 0                          | $\frac{5\sqrt{2}i}{56}$    | 0                          | $\frac{3\sqrt{10}i}{56}$   | 0                         |
| 974                                | symmetry  | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ |                            |                            |                            |                            |                            |                          |                            |                            |                            |                            |                            |                            |                           |

continued ...



Table 10

| No.                                | multipole | matrix                           |                         |                            |                            |                        |                           |                         |                           |                        |                            |                            |                         |                           |                        |
|------------------------------------|-----------|----------------------------------|-------------------------|----------------------------|----------------------------|------------------------|---------------------------|-------------------------|---------------------------|------------------------|----------------------------|----------------------------|-------------------------|---------------------------|------------------------|
| $\mathbb{M}_{3,2}^{(1,-1;a)}(T_1)$ |           | $\frac{\sqrt{70}}{98}$           | 0                       | 0                          | 0                          | 0                      | 0                         | 0                       | $\frac{4\sqrt{105}}{147}$ | 0                      | 0                          | 0                          | 0                       | 0                         | 0                      |
|                                    |           | 0                                | $-\frac{\sqrt{70}}{70}$ | 0                          | 0                          | 0                      | 0                         | 0                       | 0                         | 0                      | 0                          | 0                          | 0                       | 0                         | 0                      |
|                                    |           | 0                                | 0                       | $-\frac{2\sqrt{70}}{245}$  | 0                          | 0                      | 0                         | 0                       | 0                         | 0                      | $-\frac{2\sqrt{210}}{147}$ | 0                          | 0                       | 0                         | 0                      |
|                                    |           | 0                                | 0                       | 0                          | $\frac{2\sqrt{70}}{245}$   | 0                      | 0                         | 0                       | 0                         | 0                      | 0                          | $-\frac{2\sqrt{210}}{147}$ | 0                       | 0                         | 0                      |
|                                    |           | 0                                | 0                       | 0                          | 0                          | $\frac{\sqrt{70}}{70}$ | 0                         | 0                       | 0                         | 0                      | 0                          | 0                          | 0                       | 0                         | 0                      |
|                                    |           | 0                                | 0                       | 0                          | 0                          | 0                      | $-\frac{\sqrt{70}}{98}$   | 0                       | 0                         | 0                      | 0                          | 0                          | 0                       | $\frac{4\sqrt{105}}{147}$ | 0                      |
|                                    |           | 0                                | 0                       | 0                          | 0                          | 0                      | 0                         | $-\frac{\sqrt{70}}{28}$ | 0                         | 0                      | 0                          | 0                          | 0                       | 0                         | 0                      |
|                                    |           | $\frac{4\sqrt{105}}{147}$        | 0                       | 0                          | 0                          | 0                      | 0                         | 0                       | $\frac{5\sqrt{70}}{196}$  | 0                      | 0                          | 0                          | 0                       | 0                         | 0                      |
|                                    |           | 0                                | 0                       | 0                          | 0                          | 0                      | 0                         | 0                       | 0                         | $\frac{\sqrt{70}}{28}$ | 0                          | 0                          | 0                       | 0                         | 0                      |
|                                    |           | 0                                | 0                       | $-\frac{2\sqrt{210}}{147}$ | 0                          | 0                      | 0                         | 0                       | 0                         | 0                      | $\frac{3\sqrt{70}}{196}$   | 0                          | 0                       | 0                         | 0                      |
|                                    |           | 0                                | 0                       | 0                          | $-\frac{2\sqrt{210}}{147}$ | 0                      | 0                         | 0                       | 0                         | 0                      | 0                          | $-\frac{3\sqrt{70}}{196}$  | 0                       | 0                         | 0                      |
|                                    |           | 0                                | 0                       | 0                          | 0                          | 0                      | 0                         | 0                       | 0                         | 0                      | 0                          | 0                          | $-\frac{\sqrt{70}}{28}$ | 0                         | 0                      |
|                                    |           | 0                                | 0                       | 0                          | 0                          | 0                      | $\frac{4\sqrt{105}}{147}$ | 0                       | 0                         | 0                      | 0                          | 0                          | 0                       | $-\frac{5\sqrt{70}}{196}$ | 0                      |
|                                    |           | 0                                | 0                       | 0                          | 0                          | 0                      | 0                         | 0                       | 0                         | 0                      | 0                          | 0                          | 0                       | 0                         | $\frac{\sqrt{70}}{28}$ |
| 975                                | symmetry  | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ |                         |                            |                            |                        |                           |                         |                           |                        |                            |                            |                         |                           |                        |

*continued ...*

Table 10

| No.                                | multipole | matrix                            |                           |                            |                           |                           |                           |                        |                           |                            |                           |                           |                           |                           |                         |
|------------------------------------|-----------|-----------------------------------|---------------------------|----------------------------|---------------------------|---------------------------|---------------------------|------------------------|---------------------------|----------------------------|---------------------------|---------------------------|---------------------------|---------------------------|-------------------------|
| $\mathbb{M}_{3,0}^{(1,-1;a)}(T_2)$ |           | 0                                 | $-\frac{\sqrt{210}}{196}$ | 0                          | $-\frac{\sqrt{105}}{196}$ | 0                         | 0                         | $\frac{5}{42}$         | 0                         | $-\frac{5\sqrt{21}}{147}$  | 0                         | $-\frac{\sqrt{35}}{98}$   | 0                         | 0                         | 0                       |
|                                    |           | $-\frac{\sqrt{210}}{196}$         | 0                         | $\frac{\sqrt{21}}{196}$    | 0                         | $-\frac{\sqrt{42}}{98}$   | 0                         | 0                      | $-\frac{5\sqrt{35}}{294}$ | 0                          | $-\frac{5\sqrt{7}}{147}$  | 0                         | $-\frac{\sqrt{105}}{98}$  | 0                         | 0                       |
|                                    |           | 0                                 | $\frac{\sqrt{21}}{196}$   | 0                          | $\frac{\sqrt{42}}{98}$    | 0                         | $-\frac{\sqrt{105}}{196}$ | $\frac{\sqrt{10}}{28}$ | 0                         | $-\frac{5\sqrt{210}}{588}$ | 0                         | $\frac{5\sqrt{14}}{588}$  | 0                         | $-\frac{3\sqrt{70}}{196}$ | 0                       |
|                                    |           | $-\frac{\sqrt{105}}{196}$         | 0                         | $\frac{\sqrt{42}}{98}$     | 0                         | $\frac{\sqrt{21}}{196}$   | 0                         | 0                      | $\frac{3\sqrt{70}}{196}$  | 0                          | $-\frac{5\sqrt{14}}{588}$ | 0                         | $\frac{5\sqrt{210}}{588}$ | 0                         | $-\frac{\sqrt{10}}{28}$ |
|                                    |           | 0                                 | $-\frac{\sqrt{42}}{98}$   | 0                          | $\frac{\sqrt{21}}{196}$   | 0                         | $-\frac{\sqrt{210}}{196}$ | 0                      | 0                         | $\frac{\sqrt{105}}{98}$    | 0                         | $\frac{5\sqrt{7}}{147}$   | 0                         | $\frac{5\sqrt{35}}{294}$  | 0                       |
|                                    |           | 0                                 | 0                         | $-\frac{\sqrt{105}}{196}$  | 0                         | $-\frac{\sqrt{210}}{196}$ | 0                         | 0                      | 0                         | 0                          | $\frac{\sqrt{35}}{98}$    | 0                         | $\frac{5\sqrt{21}}{147}$  | 0                         | $-\frac{5}{42}$         |
|                                    |           | $\frac{5}{42}$                    | 0                         | $\frac{\sqrt{10}}{28}$     | 0                         | 0                         | 0                         | 0                      | $\frac{5\sqrt{6}}{56}$    | 0                          | $\frac{\sqrt{30}}{56}$    | 0                         | 0                         | 0                         | 0                       |
|                                    |           | 0                                 | $-\frac{5\sqrt{35}}{294}$ | 0                          | $\frac{3\sqrt{70}}{196}$  | 0                         | 0                         | $\frac{5\sqrt{6}}{56}$ | 0                         | $\frac{5\sqrt{14}}{392}$   | 0                         | $\frac{\sqrt{210}}{98}$   | 0                         | 0                         | 0                       |
|                                    |           | $-\frac{5\sqrt{21}}{147}$         | 0                         | $-\frac{5\sqrt{210}}{588}$ | 0                         | $\frac{\sqrt{105}}{98}$   | 0                         | 0                      | $\frac{5\sqrt{14}}{392}$  | 0                          | $-\frac{5\sqrt{70}}{392}$ | 0                         | $\frac{5\sqrt{42}}{196}$  | 0                         | 0                       |
|                                    |           | 0                                 | $-\frac{5\sqrt{7}}{147}$  | 0                          | $-\frac{5\sqrt{14}}{588}$ | 0                         | $\frac{\sqrt{35}}{98}$    | $\frac{\sqrt{30}}{56}$ | 0                         | $-\frac{5\sqrt{70}}{392}$  | 0                         | $-\frac{5\sqrt{42}}{196}$ | 0                         | $\frac{\sqrt{210}}{98}$   | 0                       |
|                                    |           | $-\frac{\sqrt{35}}{98}$           | 0                         | $\frac{5\sqrt{14}}{588}$   | 0                         | $\frac{5\sqrt{7}}{147}$   | 0                         | 0                      | $\frac{\sqrt{210}}{98}$   | 0                          | $-\frac{5\sqrt{42}}{196}$ | 0                         | $-\frac{5\sqrt{70}}{392}$ | 0                         | $\frac{\sqrt{30}}{56}$  |
|                                    |           | 0                                 | $-\frac{\sqrt{105}}{98}$  | 0                          | $\frac{5\sqrt{210}}{588}$ | 0                         | $\frac{5\sqrt{21}}{147}$  | 0                      | 0                         | $\frac{5\sqrt{42}}{196}$   | 0                         | $-\frac{5\sqrt{70}}{392}$ | 0                         | $\frac{5\sqrt{14}}{392}$  | 0                       |
|                                    |           | 0                                 | 0                         | $-\frac{3\sqrt{70}}{196}$  | 0                         | $\frac{5\sqrt{35}}{294}$  | 0                         | 0                      | 0                         | 0                          | $\frac{\sqrt{210}}{98}$   | 0                         | $\frac{5\sqrt{14}}{392}$  | 0                         | $\frac{5\sqrt{6}}{56}$  |
|                                    |           | 0                                 | 0                         | 0                          | $-\frac{\sqrt{10}}{28}$   | 0                         | $-\frac{5}{42}$           | 0                      | 0                         | 0                          | 0                         | $\frac{\sqrt{30}}{56}$    | 0                         | $\frac{5\sqrt{6}}{56}$    | 0                       |
| 976                                | symmetry  | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |                           |                            |                           |                           |                           |                        |                           |                            |                           |                           |                           |                           |                         |

*continued ...*

Table 10

| No.                                | multipole | matrix                           |                            |                             |                             |                            |                            |                          |                            |                            |                            |                            |                            |                           |                          |
|------------------------------------|-----------|----------------------------------|----------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|--------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|--------------------------|
| $\mathbb{M}_{3,1}^{(1,-1;a)}(T_2)$ |           | 0                                | $-\frac{\sqrt{210i}}{196}$ | 0                           | $\frac{\sqrt{105i}}{196}$   | 0                          | 0                          | $-\frac{5i}{42}$         | 0                          | $-\frac{5\sqrt{21i}}{147}$ | 0                          | $\frac{\sqrt{35i}}{98}$    | 0                          | 0                         | 0                        |
|                                    |           | $\frac{\sqrt{210i}}{196}$        | 0                          | $\frac{\sqrt{21i}}{196}$    | 0                           | $\frac{\sqrt{42i}}{98}$    | 0                          | 0                        | $\frac{5\sqrt{35i}}{294}$  | 0                          | $-\frac{5\sqrt{7i}}{147}$  | 0                          | $\frac{\sqrt{105i}}{98}$   | 0                         | 0                        |
|                                    |           | 0                                | $-\frac{\sqrt{21i}}{196}$  | 0                           | $\frac{\sqrt{42i}}{98}$     | 0                          | $\frac{\sqrt{105i}}{196}$  | $\frac{\sqrt{10i}}{28}$  | 0                          | $\frac{5\sqrt{210i}}{588}$ | 0                          | $\frac{5\sqrt{14i}}{588}$  | 0                          | $\frac{3\sqrt{70i}}{196}$ | 0                        |
|                                    |           | $-\frac{\sqrt{105i}}{196}$       | 0                          | $-\frac{\sqrt{42i}}{98}$    | 0                           | $\frac{\sqrt{21i}}{196}$   | 0                          | 0                        | $\frac{3\sqrt{70i}}{196}$  | 0                          | $\frac{5\sqrt{14i}}{588}$  | 0                          | $\frac{5\sqrt{210i}}{588}$ | 0                         | $\frac{\sqrt{10i}}{28}$  |
|                                    |           | 0                                | $-\frac{\sqrt{42i}}{98}$   | 0                           | $-\frac{\sqrt{21i}}{196}$   | 0                          | $-\frac{\sqrt{210i}}{196}$ | 0                        | 0                          | $\frac{\sqrt{105i}}{98}$   | 0                          | $-\frac{5\sqrt{7i}}{147}$  | 0                          | $\frac{5\sqrt{35i}}{294}$ | 0                        |
|                                    |           | 0                                | 0                          | $-\frac{\sqrt{105i}}{196}$  | 0                           | $\frac{\sqrt{210i}}{196}$  | 0                          | 0                        | 0                          | 0                          | $\frac{\sqrt{35i}}{98}$    | 0                          | $-\frac{5\sqrt{21i}}{147}$ | 0                         | $-\frac{5i}{42}$         |
|                                    |           | $\frac{5i}{42}$                  | 0                          | $-\frac{\sqrt{10i}}{28}$    | 0                           | 0                          | 0                          | 0                        | $\frac{5\sqrt{6i}}{56}$    | 0                          | $-\frac{\sqrt{30i}}{56}$   | 0                          | 0                          | 0                         | 0                        |
|                                    |           | 0                                | $-\frac{5\sqrt{35i}}{294}$ | 0                           | $-\frac{3\sqrt{70i}}{196}$  | 0                          | 0                          | $-\frac{5\sqrt{6i}}{56}$ | 0                          | $\frac{5\sqrt{14i}}{392}$  | 0                          | $-\frac{\sqrt{210i}}{98}$  | 0                          | 0                         | 0                        |
|                                    |           | $\frac{5\sqrt{210i}}{147}$       | 0                          | $-\frac{5\sqrt{210i}}{588}$ | 0                           | $-\frac{\sqrt{105i}}{98}$  | 0                          | 0                        | $-\frac{5\sqrt{14i}}{392}$ | 0                          | $-\frac{5\sqrt{70i}}{392}$ | 0                          | $-\frac{5\sqrt{42i}}{196}$ | 0                         | 0                        |
|                                    |           | 0                                | $\frac{5\sqrt{7i}}{147}$   | 0                           | $-\frac{5\sqrt{14i}}{588}$  | 0                          | $-\frac{\sqrt{35i}}{98}$   | $\frac{\sqrt{30i}}{56}$  | 0                          | $\frac{5\sqrt{70i}}{392}$  | 0                          | $-\frac{5\sqrt{42i}}{196}$ | 0                          | $-\frac{\sqrt{210i}}{98}$ | 0                        |
|                                    |           | $-\frac{\sqrt{35i}}{98}$         | 0                          | $-\frac{5\sqrt{14i}}{588}$  | 0                           | $\frac{5\sqrt{7i}}{147}$   | 0                          | 0                        | $\frac{\sqrt{210i}}{98}$   | 0                          | $\frac{5\sqrt{42i}}{196}$  | 0                          | $-\frac{5\sqrt{70i}}{392}$ | 0                         | $-\frac{\sqrt{30i}}{56}$ |
|                                    |           | 0                                | $-\frac{\sqrt{105i}}{98}$  | 0                           | $-\frac{5\sqrt{210i}}{588}$ | 0                          | $\frac{5\sqrt{21i}}{147}$  | 0                        | 0                          | $\frac{5\sqrt{42i}}{196}$  | 0                          | $\frac{5\sqrt{70i}}{392}$  | 0                          | $\frac{5\sqrt{14i}}{392}$ | 0                        |
|                                    |           | 0                                | 0                          | $-\frac{3\sqrt{70i}}{196}$  | 0                           | $-\frac{5\sqrt{35i}}{294}$ | 0                          | 0                        | 0                          | 0                          | $\frac{\sqrt{210i}}{98}$   | 0                          | $-\frac{5\sqrt{14i}}{392}$ | 0                         | $\frac{5\sqrt{6i}}{56}$  |
|                                    |           | 0                                | 0                          | 0                           | $-\frac{\sqrt{10i}}{28}$    | 0                          | $\frac{5i}{42}$            | 0                        | 0                          | 0                          | 0                          | $\frac{\sqrt{30i}}{56}$    | 0                          | $-\frac{5\sqrt{6i}}{56}$  | 0                        |
| 977                                | symmetry  | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ |                            |                             |                             |                            |                            |                          |                            |                            |                            |                            |                            |                           |                          |

continued ...

Table 10

| No.                                | multipole | matrix                              |                          |                          |                          |                          |                          |                         |                            |                          |                            |                           |                          |                           |                         |
|------------------------------------|-----------|-------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|----------------------------|--------------------------|----------------------------|---------------------------|--------------------------|---------------------------|-------------------------|
| $\mathbb{M}_{3,2}^{(1,-1;a)}(T_2)$ |           | 0                                   | 0                        | $\frac{\sqrt{105}}{98}$  | 0                        | 0                        | 0                        | 0                       | 0                          | $\frac{4\sqrt{35}}{147}$ | 0                          | 0                         | 0                        | 0                         |                         |
|                                    |           | 0                                   | 0                        | 0                        | $\frac{\sqrt{21}}{98}$   | 0                        | 0                        | $-\frac{2\sqrt{5}}{21}$ | 0                          | 0                        | 0                          | $\frac{10\sqrt{7}}{147}$  | 0                        | 0                         | 0                       |
|                                    |           | $\frac{\sqrt{105}}{98}$             | 0                        | 0                        | 0                        | $-\frac{\sqrt{21}}{98}$  | 0                        | 0                       | $-\frac{\sqrt{70}}{147}$   | 0                        | 0                          | 0                         | $\frac{\sqrt{210}}{147}$ | 0                         | 0                       |
|                                    |           | 0                                   | $\frac{\sqrt{21}}{98}$   | 0                        | 0                        | 0                        | $-\frac{\sqrt{105}}{98}$ | 0                       | 0                          | $\frac{\sqrt{210}}{147}$ | 0                          | 0                         | 0                        | $-\frac{\sqrt{70}}{147}$  | 0                       |
|                                    |           | 0                                   | 0                        | $-\frac{\sqrt{21}}{98}$  | 0                        | 0                        | 0                        | 0                       | 0                          | $\frac{10\sqrt{7}}{147}$ | 0                          | 0                         | 0                        | 0                         | $-\frac{2\sqrt{5}}{21}$ |
|                                    |           | 0                                   | 0                        | 0                        | $-\frac{\sqrt{105}}{98}$ | 0                        | 0                        | 0                       | 0                          | 0                        | 0                          | $\frac{4\sqrt{35}}{147}$  | 0                        | 0                         | 0                       |
|                                    |           | 0                                   | $-\frac{2\sqrt{5}}{21}$  | 0                        | 0                        | 0                        | 0                        | 0                       | 0                          | $-\frac{5\sqrt{2}}{28}$  | 0                          | 0                         | 0                        | 0                         | 0                       |
|                                    |           | 0                                   | 0                        | $-\frac{\sqrt{70}}{147}$ | 0                        | 0                        | 0                        | 0                       | 0                          | 0                        | $-\frac{3\sqrt{210}}{196}$ | 0                         | 0                        | 0                         | 0                       |
|                                    |           | 0                                   | 0                        | 0                        | $\frac{\sqrt{210}}{147}$ | 0                        | 0                        | $-\frac{5\sqrt{2}}{28}$ | 0                          | 0                        | 0                          | $-\frac{\sqrt{70}}{98}$   | 0                        | 0                         | 0                       |
|                                    |           | $\frac{4\sqrt{35}}{147}$            | 0                        | 0                        | 0                        | $\frac{10\sqrt{7}}{147}$ | 0                        | 0                       | $-\frac{3\sqrt{210}}{196}$ | 0                        | 0                          | 0                         | $\frac{\sqrt{70}}{98}$   | 0                         | 0                       |
|                                    |           | 0                                   | $\frac{10\sqrt{7}}{147}$ | 0                        | 0                        | 0                        | $\frac{4\sqrt{35}}{147}$ | 0                       | 0                          | $-\frac{\sqrt{70}}{98}$  | 0                          | 0                         | 0                        | $\frac{3\sqrt{210}}{196}$ | 0                       |
|                                    |           | 0                                   | 0                        | $\frac{\sqrt{210}}{147}$ | 0                        | 0                        | 0                        | 0                       | 0                          | 0                        | $\frac{\sqrt{70}}{98}$     | 0                         | 0                        | 0                         | $\frac{5\sqrt{2}}{28}$  |
|                                    |           | 0                                   | 0                        | 0                        | $-\frac{\sqrt{70}}{147}$ | 0                        | 0                        | 0                       | 0                          | 0                        | 0                          | $\frac{3\sqrt{210}}{196}$ | 0                        | 0                         | 0                       |
|                                    |           | 0                                   | 0                        | 0                        | 0                        | $-\frac{2\sqrt{5}}{21}$  | 0                        | 0                       | 0                          | 0                        | 0                          | 0                         | $\frac{5\sqrt{2}}{28}$   | 0                         | 0                       |
| 978                                | symmetry  | $\frac{3\sqrt{35}xyz(x-y)(x+y)}{2}$ |                          |                          |                          |                          |                          |                         |                            |                          |                            |                           |                          |                           |                         |

*continued ...*

Table 10

| No. | multipole                        | matrix   |                            |                             |                              |                           |                           |                             |                            |                            |                             |                            |                          |                           |                              |
|-----|----------------------------------|--|----------------------------|-----------------------------|------------------------------|---------------------------|---------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------|----------------------------|--------------------------|---------------------------|------------------------------|
| 979 | $\mathbb{M}_{5,0}^{(1,-1;a)}(E)$ | 0  | 0                          | 0                           | 0                            | $\frac{\sqrt{55}i}{154}$  | 0                         | 0                           | 0                          | 0                          | 0                           | 0                          | $\frac{3\sqrt{22}i}{77}$ | 0                         | 0                            |
|     |                                  | 0  | 0                          | 0                           | 0                            | 0                         | $-\frac{\sqrt{55}i}{154}$ | 0                           | 0                          | 0                          | 0                           | 0                          | 0                        | $\frac{\sqrt{330}i}{385}$ | 0                            |
|     |                                  | 0  | 0                          | 0                           | 0                            | 0                         | 0                         | 0                           | 0                          | 0                          | 0                           | 0                          | 0                        | 0                         | $-\frac{2\sqrt{1155}i}{385}$ |
|     |                                  | 0  | 0                          | 0                           | 0                            | 0                         | 0                         | $\frac{2\sqrt{1155}i}{385}$ | 0                          | 0                          | 0                           | 0                          | 0                        | 0                         | 0                            |
|     |                                  | $-\frac{\sqrt{55}i}{154}$                          | 0                          | 0                           | 0                            | 0                         | 0                         | 0                           | $-\frac{\sqrt{330}i}{385}$ | 0                          | 0                           | 0                          | 0                        | 0                         | 0                            |
|     |                                  | 0  | $\frac{\sqrt{55}i}{154}$   | 0                           | 0                            | 0                         | 0                         | 0                           | 0                          | $-\frac{3\sqrt{22}i}{77}$  | 0                           | 0                          | 0                        | 0                         | 0                            |
|     |                                  | 0  | 0                          | 0                           | $-\frac{2\sqrt{1155}i}{385}$ | 0                         | 0                         | 0                           | 0                          | 0                          | $-\frac{3\sqrt{385}i}{154}$ | 0                          | 0                        | 0                         |                              |
|     |                                  | 0  | 0                          | 0                           | 0                            | $\frac{\sqrt{330}i}{385}$ | 0                         | 0                           | 0                          | 0                          | 0                           | $-\frac{5\sqrt{33}i}{154}$ | 0                        | 0                         |                              |
|     |                                  | 0  | 0                          | 0                           | 0                            | 0                         | $\frac{3\sqrt{22}i}{77}$  | 0                           | 0                          | 0                          | 0                           | 0                          | 0                        | $\frac{5\sqrt{33}i}{154}$ | 0                            |
|     |                                  | 0  | 0                          | 0                           | 0                            | 0                         | 0                         | 0                           | 0                          | 0                          | 0                           | 0                          | 0                        | 0                         | $\frac{3\sqrt{385}i}{154}$   |
|     |                                  | 0  | 0                          | 0                           | 0                            | 0                         | 0                         | $\frac{3\sqrt{385}i}{154}$  | 0                          | 0                          | 0                           | 0                          | 0                        | 0                         | 0                            |
|     |                                  | $-\frac{3\sqrt{22}i}{77}$                          | 0                          | 0                           | 0                            | 0                         | 0                         | 0                           | $\frac{5\sqrt{33}i}{154}$  | 0                          | 0                           | 0                          | 0                        | 0                         | 0                            |
|     |                                  | 0  | $-\frac{\sqrt{330}i}{385}$ | 0                           | 0                            | 0                         | 0                         | 0                           | 0                          | $-\frac{5\sqrt{33}i}{154}$ | 0                           | 0                          | 0                        | 0                         | 0                            |
|     |                                  | 0  | 0                          | $\frac{2\sqrt{1155}i}{385}$ | 0                            | 0                         | 0                         | 0                           | 0                          | 0                          | $-\frac{3\sqrt{385}i}{154}$ | 0                          | 0                        | 0                         | 0                            |
|     |                                  | $\frac{\sqrt{105}xyz\left(x^2+y^2-2z^2\right)}{2}$ |                            |                             |                              |                           |                           |                             |                            |                            |                             |                            |                          |                           |                              |

continued ...

Table 10

| No.                              | multipole                 | matrix   |                             |                            |                            |                           |                            |                            |                             |                             |                             |                            |                            |                            |  |
|----------------------------------|---------------------------|--|-----------------------------|----------------------------|----------------------------|---------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|--|
| $\mathbb{M}_{5,1}^{(1,-1;a)}(E)$ | 0                         | 0  | $-\frac{\sqrt{330}i}{924}$  | 0                          | 0                          | 0                         | 0                          | 0                          | 0                           | $-\frac{\sqrt{110}i}{77}$   | 0                           | 0                          | 0                          | 0                          |  |
|                                  | 0                         | 0  | 0                           | $\frac{5\sqrt{66}i}{924}$  | 0                          | 0                         | $-\frac{\sqrt{770}i}{385}$ | 0                          | 0                           | 0                           | $\frac{2\sqrt{22}i}{77}$    | 0                          | 0                          | 0                          |  |
|                                  | $\frac{\sqrt{330}i}{924}$ | 0  | 0                           | 0                          | $-\frac{5\sqrt{66}i}{924}$ | 0                         | 0                          | $\frac{8\sqrt{55}i}{385}$  | 0                           | 0                           | 0                           | $\frac{2\sqrt{165}i}{385}$ | 0                          | 0                          |  |
|                                  | 0                         | $-\frac{5\sqrt{66}i}{924}$                                 | 0                           | 0                          | 0                          | $\frac{\sqrt{330}i}{924}$ | 0                          | 0                          | $-\frac{2\sqrt{165}i}{385}$ | 0                           | 0                           | 0                          | $-\frac{8\sqrt{55}i}{385}$ | 0                          |  |
|                                  | 0                         | 0  | $\frac{5\sqrt{66}i}{924}$   | 0                          | 0                          | 0                         | 0                          | 0                          | 0                           | $-\frac{2\sqrt{22}i}{77}$   | 0                           | 0                          | 0                          | $\frac{\sqrt{770}i}{385}$  |  |
|                                  | 0                         | 0  | 0                           | $-\frac{\sqrt{330}i}{924}$ | 0                          | 0                         | 0                          | 0                          | 0                           | 0                           | $\frac{\sqrt{110}i}{77}$    | 0                          | 0                          | 0                          |  |
|                                  | 0                         | $\frac{\sqrt{770}i}{385}$                                  | 0                           | 0                          | 0                          | 0                         | 0                          | 0                          | $\frac{5\sqrt{77}i}{154}$   | 0                           | 0                           | 0                          | 0                          | 0                          |  |
|                                  | 0                         | 0  | $-\frac{8\sqrt{55}i}{385}$  | 0                          | 0                          | 0                         | 0                          | 0                          | 0                           | $-\frac{3\sqrt{165}i}{154}$ | 0                           | 0                          | 0                          | 0                          |  |
|                                  | 0                         | 0  | 0                           | $\frac{2\sqrt{165}i}{385}$ | 0                          | 0                         | $-\frac{5\sqrt{77}i}{154}$ | 0                          | 0                           | 0                           | $-\frac{2\sqrt{55}i}{77}$   | 0                          | 0                          | 0                          |  |
|                                  | $\frac{\sqrt{110}i}{77}$  | 0  | 0                           | 0                          | $\frac{2\sqrt{22}i}{77}$   | 0                         | 0                          | $\frac{3\sqrt{165}i}{154}$ | 0                           | 0                           | 0                           | $\frac{2\sqrt{55}i}{77}$   | 0                          | 0                          |  |
|                                  | 0                         | $-\frac{2\sqrt{22}i}{77}$                                  | 0                           | 0                          | 0                          | $-\frac{\sqrt{110}i}{77}$ | 0                          | 0                          | $\frac{2\sqrt{55}i}{77}$    | 0                           | 0                           | 0                          | $\frac{3\sqrt{165}i}{154}$ | 0                          |  |
|                                  | 0                         | 0  | $-\frac{2\sqrt{165}i}{385}$ | 0                          | 0                          | 0                         | 0                          | 0                          | 0                           | $-\frac{2\sqrt{55}i}{77}$   | 0                           | 0                          | 0                          | $-\frac{5\sqrt{77}i}{154}$ |  |
|                                  | 0                         | 0  | 0                           | $\frac{8\sqrt{55}i}{385}$  | 0                          | 0                         | 0                          | 0                          | 0                           | 0                           | $-\frac{3\sqrt{165}i}{154}$ | 0                          | 0                          | 0                          |  |
|                                  | 0                         | 0  | 0                           | 0                          | $-\frac{\sqrt{770}i}{385}$ | 0                         | 0                          | 0                          | 0                           | 0                           | 0                           | $\frac{5\sqrt{77}i}{154}$  | 0                          | 0                          |  |
| 980                              | symmetry                  | $\frac{x(8x^4-40x^2y^2-40x^2z^2+15y^4+30y^2z^2+15z^4)}{8}$ |                             |                            |                            |                           |                            |                            |                             |                             |                             |                            |                            |                            |  |

*continued ...*

Table 10

| No. | multipole                             | matrix   |                              |                             |                             |                               |                             |                            |                              |                              |                              |                               |                              |                              |                            |
|-----|---------------------------------------|--|------------------------------|-----------------------------|-----------------------------|-------------------------------|-----------------------------|----------------------------|------------------------------|------------------------------|------------------------------|-------------------------------|------------------------------|------------------------------|----------------------------|
| 981 | $\mathbb{M}_{5,0}^{(1,-1;a)}(T_1, 1)$ | 0  | $-\frac{5\sqrt{77}}{8624}$   | 0                           | $\frac{5\sqrt{154}}{3696}$  | 0                             | $-\frac{3\sqrt{385}}{1232}$ | $\frac{\sqrt{330}}{1232}$  | 0                            | $-\frac{15\sqrt{770}}{8624}$ | 0                            | $\frac{5\sqrt{462}}{1232}$    | 0                            | $-\frac{3\sqrt{2310}}{1232}$ | 0                          |
|     |                                       | $-\frac{5\sqrt{77}}{8624}$   | 0                            | $\frac{5\sqrt{770}}{8624}$  | 0                           | $-\frac{5\sqrt{385}}{3696}$   | 0                           | 0                          | $-\frac{23\sqrt{462}}{8624}$ | 0                            | $\frac{13\sqrt{2310}}{8624}$ | 0                             | $-\frac{3\sqrt{154}}{1232}$  | 0                            | $-\frac{3\sqrt{66}}{176}$  |
|     |                                       | 0  | $\frac{5\sqrt{770}}{8624}$   | 0                           | $-\frac{5\sqrt{385}}{4312}$ | 0                             | $\frac{5\sqrt{154}}{3696}$  | $-\frac{\sqrt{33}}{88}$    | 0                            | $\frac{3\sqrt{77}}{392}$     | 0                            | $-\frac{\sqrt{1155}}{4312}$   | 0                            | $-\frac{3\sqrt{231}}{616}$   | 0                          |
|     |                                       | $\frac{5\sqrt{154}}{3696}$   | 0                            | $-\frac{5\sqrt{385}}{4312}$ | 0                           | $\frac{5\sqrt{770}}{8624}$    | 0                           | 0                          | $\frac{3\sqrt{231}}{616}$    | 0                            | $\frac{\sqrt{1155}}{4312}$   | 0                             | $-\frac{3\sqrt{77}}{392}$    | 0                            | $\frac{\sqrt{33}}{88}$     |
|     |                                       | 0  | $-\frac{5\sqrt{385}}{3696}$  | 0                           | $\frac{5\sqrt{770}}{8624}$  | 0                             | $-\frac{5\sqrt{77}}{8624}$  | $\frac{3\sqrt{66}}{176}$   | 0                            | $\frac{3\sqrt{154}}{1232}$   | 0                            | $-\frac{13\sqrt{2310}}{8624}$ | 0                            | $\frac{23\sqrt{462}}{8624}$  | 0                          |
|     |                                       | $-\frac{3\sqrt{385}}{1232}$  | 0                            | $\frac{5\sqrt{154}}{3696}$  | 0                           | $-\frac{5\sqrt{77}}{8624}$    | 0                           | 0                          | $\frac{3\sqrt{2310}}{1232}$  | 0                            | $-\frac{5\sqrt{462}}{1232}$  | 0                             | $\frac{15\sqrt{770}}{8624}$  | 0                            | $-\frac{\sqrt{330}}{1232}$ |
|     |                                       | $\frac{\sqrt{330}}{1232}$  | 0                            | $-\frac{\sqrt{33}}{88}$     | 0                           | $\frac{3\sqrt{66}}{176}$      | 0                           | 0                          | $\frac{15\sqrt{55}}{1232}$   | 0                            | $-\frac{5\sqrt{11}}{88}$     | 0                             | $\frac{3\sqrt{165}}{176}$    | 0                            | 0                          |
|     |                                       | 0  | $-\frac{23\sqrt{462}}{8624}$ | 0                           | $\frac{3\sqrt{231}}{616}$   | 0                             | $\frac{3\sqrt{2310}}{1232}$ | $\frac{15\sqrt{55}}{1232}$ | 0                            | $-\frac{5\sqrt{1155}}{1078}$ | 0                            | $\frac{5\sqrt{77}}{1232}$     | 0                            | $\frac{9\sqrt{385}}{616}$    | 0                          |
|     |                                       | $-\frac{15\sqrt{770}}{8624}$   | 0                            | $\frac{3\sqrt{77}}{392}$    | 0                           | $\frac{3\sqrt{154}}{1232}$    | 0                           | 0                          | $-\frac{5\sqrt{1155}}{1078}$ | 0                            | $\frac{5\sqrt{231}}{8624}$   | 0                             | $\frac{5\sqrt{385}}{616}$    | 0                            | $\frac{3\sqrt{165}}{176}$  |
|     |                                       | 0  | $\frac{13\sqrt{2310}}{8624}$ | 0                           | $\frac{\sqrt{1155}}{4312}$  | 0                             | $-\frac{5\sqrt{462}}{1232}$ | $-\frac{5\sqrt{11}}{88}$   | 0                            | $\frac{5\sqrt{231}}{8624}$   | 0                            | $\frac{15\sqrt{385}}{2156}$   | 0                            | $\frac{5\sqrt{77}}{1232}$    | 0                          |
|     |                                       | $\frac{5\sqrt{462}}{1232}$   | 0                            | $-\frac{\sqrt{1155}}{4312}$ | 0                           | $-\frac{13\sqrt{2310}}{8624}$ | 0                           | 0                          | $\frac{5\sqrt{77}}{1232}$    | 0                            | $\frac{15\sqrt{385}}{2156}$  | 0                             | $\frac{5\sqrt{231}}{8624}$   | 0                            | $-\frac{5\sqrt{11}}{88}$   |
|     |                                       | 0  | $-\frac{3\sqrt{154}}{1232}$  | 0                           | $-\frac{3\sqrt{77}}{392}$   | 0                             | $\frac{15\sqrt{770}}{8624}$ | $\frac{3\sqrt{165}}{176}$  | 0                            | $\frac{5\sqrt{385}}{616}$    | 0                            | $\frac{5\sqrt{231}}{8624}$    | 0                            | $-\frac{5\sqrt{1155}}{1078}$ | 0                          |
|     |                                       | $-\frac{3\sqrt{2310}}{1232}$   | 0                            | $-\frac{3\sqrt{231}}{616}$  | 0                           | $\frac{23\sqrt{462}}{8624}$   | 0                           | 0                          | $\frac{9\sqrt{385}}{616}$    | 0                            | $\frac{5\sqrt{77}}{1232}$    | 0                             | $-\frac{5\sqrt{1155}}{1078}$ | 0                            | $\frac{15\sqrt{55}}{1232}$ |
|     |                                       | 0  | $-\frac{3\sqrt{66}}{176}$    | 0                           | $\frac{\sqrt{33}}{88}$      | 0                             | $-\frac{\sqrt{330}}{1232}$  | 0                          | 0                            | $\frac{3\sqrt{165}}{176}$    | 0                            | $-\frac{5\sqrt{11}}{88}$      | 0                            | $\frac{15\sqrt{55}}{1232}$   | 0                          |
| 981 | symmetry                              | $\frac{y(15x^4 - 40x^2y^2 + 30x^2z^2 + 8y^4 - 40y^2z^2 + 15z^4)}{8}$ |                              |                             |                             |                               |                             |                            |                              |                              |                              |                               |                              |                              |                            |

*continued ...*

Table 10

| No.                                   | multipole | matrix   |                               |                              |                              |                               |                               |                             |                               |                              |                                |                                |                               |                               |                              |
|---------------------------------------|-----------|--|-------------------------------|------------------------------|------------------------------|-------------------------------|-------------------------------|-----------------------------|-------------------------------|------------------------------|--------------------------------|--------------------------------|-------------------------------|-------------------------------|------------------------------|
| $\mathbb{M}_{5,1}^{(1,-1;a)}(T_1, 1)$ |           | 0  | $\frac{5\sqrt{77}i}{8624}$    | 0                            | $\frac{5\sqrt{154}i}{3696}$  | 0                             | $\frac{3\sqrt{385}i}{1232}$   | $\frac{\sqrt{330}i}{1232}$  | 0                             | $\frac{15\sqrt{770}i}{8624}$ | 0                              | $\frac{5\sqrt{462}i}{1232}$    | 0                             | $\frac{3\sqrt{2310}i}{1232}$  | 0                            |
|                                       |           | $-\frac{5\sqrt{77}i}{8624}$                                | 0                             | $-\frac{5\sqrt{770}i}{8624}$ | 0                            | $-\frac{5\sqrt{385}i}{3696}$  | 0                             | 0                           | $-\frac{23\sqrt{462}i}{8624}$ | 0                            | $-\frac{13\sqrt{2310}i}{8624}$ | 0                              | $-\frac{3\sqrt{154}i}{1232}$  | 0                             | $\frac{3\sqrt{66}i}{176}$    |
|                                       |           | 0  | $\frac{5\sqrt{770}i}{8624}$   | 0                            | $\frac{5\sqrt{385}i}{4312}$  | 0                             | $\frac{5\sqrt{154}i}{3696}$   | $\frac{\sqrt{33}i}{88}$     | 0                             | $\frac{3\sqrt{77}i}{392}$    | 0                              | $\frac{\sqrt{1155}i}{4312}$    | 0                             | $-\frac{3\sqrt{231}i}{616}$   | 0                            |
|                                       |           | $-\frac{5\sqrt{154}i}{3696}$                               | 0                             | $-\frac{5\sqrt{385}i}{4312}$ | 0                            | $-\frac{5\sqrt{770}i}{8624}$  | 0                             | 0                           | $-\frac{3\sqrt{231}i}{616}$   | 0                            | $\frac{\sqrt{1155}i}{4312}$    | 0                              | $\frac{3\sqrt{77}i}{392}$     | 0                             | $\frac{\sqrt{33}i}{88}$      |
|                                       |           | 0  | $\frac{5\sqrt{385}i}{3696}$   | 0                            | $\frac{5\sqrt{770}i}{8624}$  | 0                             | $\frac{5\sqrt{77}i}{8624}$    | $\frac{3\sqrt{66}i}{176}$   | 0                             | $-\frac{3\sqrt{154}i}{1232}$ | 0                              | $-\frac{13\sqrt{2310}i}{8624}$ | 0                             | $-\frac{23\sqrt{462}i}{8624}$ | 0                            |
|                                       |           | $-\frac{3\sqrt{385}i}{1232}$                               | 0                             | $-\frac{5\sqrt{154}i}{3696}$ | 0                            | $-\frac{5\sqrt{77}i}{8624}$   | 0                             | 0                           | $\frac{3\sqrt{2310}i}{1232}$  | 0                            | $\frac{5\sqrt{462}i}{1232}$    | 0                              | $\frac{15\sqrt{770}i}{8624}$  | 0                             | $\frac{\sqrt{330}i}{1232}$   |
|                                       |           | $-\frac{\sqrt{330}i}{1232}$                                | 0                             | $-\frac{\sqrt{33}i}{88}$     | 0                            | $-\frac{3\sqrt{66}i}{176}$    | 0                             | 0                           | $-\frac{15\sqrt{55}i}{1232}$  | 0                            | $-\frac{5\sqrt{11}i}{88}$      | 0                              | $-\frac{3\sqrt{165}i}{176}$   | 0                             | 0                            |
|                                       |           | 0  | $\frac{23\sqrt{462}i}{8624}$  | 0                            | $\frac{3\sqrt{231}i}{616}$   | 0                             | $-\frac{3\sqrt{2310}i}{1232}$ | $\frac{15\sqrt{55}i}{1232}$ | 0                             | $\frac{5\sqrt{1155}i}{1078}$ | 0                              | $\frac{5\sqrt{77}i}{1232}$     | 0                             | $-\frac{9\sqrt{385}i}{616}$   | 0                            |
|                                       |           | $-\frac{15\sqrt{770}i}{8624}$                              | 0                             | $-\frac{3\sqrt{77}i}{392}$   | 0                            | $\frac{3\sqrt{154}i}{1232}$   | 0                             | 0                           | $-\frac{5\sqrt{1155}i}{1078}$ | 0                            | $-\frac{5\sqrt{231}i}{8624}$   | 0                              | $\frac{5\sqrt{385}i}{616}$    | 0                             | $-\frac{3\sqrt{165}i}{176}$  |
|                                       |           | 0  | $\frac{13\sqrt{2310}i}{8624}$ | 0                            | $-\frac{\sqrt{1155}i}{4312}$ | 0                             | $-\frac{5\sqrt{462}i}{1232}$  | $\frac{5\sqrt{11}i}{88}$    | 0                             | $\frac{5\sqrt{231}i}{8624}$  | 0                              | $-\frac{15\sqrt{385}i}{2156}$  | 0                             | $\frac{5\sqrt{77}i}{1232}$    | 0                            |
|                                       |           | $-\frac{5\sqrt{462}i}{1232}$                               | 0                             | $-\frac{\sqrt{1155}i}{4312}$ | 0                            | $\frac{13\sqrt{2310}i}{8624}$ | 0                             | 0                           | $-\frac{5\sqrt{77}i}{1232}$   | 0                            | $\frac{15\sqrt{385}i}{2156}$   | 0                              | $-\frac{5\sqrt{231}i}{8624}$  | 0                             | $-\frac{5\sqrt{11}i}{88}$    |
|                                       |           | 0  | $\frac{3\sqrt{154}i}{1232}$   | 0                            | $-\frac{3\sqrt{77}i}{392}$   | 0                             | $-\frac{15\sqrt{770}i}{8624}$ | $\frac{3\sqrt{165}i}{176}$  | 0                             | $-\frac{5\sqrt{385}i}{616}$  | 0                              | $\frac{5\sqrt{231}i}{8624}$    | 0                             | $\frac{5\sqrt{1155}i}{1078}$  | 0                            |
|                                       |           | $-\frac{3\sqrt{2310}i}{1232}$                              | 0                             | $\frac{3\sqrt{231}i}{616}$   | 0                            | $\frac{23\sqrt{462}i}{8624}$  | 0                             | 0                           | $\frac{9\sqrt{385}i}{616}$    | 0                            | $-\frac{5\sqrt{77}i}{1232}$    | 0                              | $-\frac{5\sqrt{1155}i}{1078}$ | 0                             | $-\frac{15\sqrt{55}i}{1232}$ |
|                                       |           | 0  | $-\frac{3\sqrt{66}i}{176}$    | 0                            | $-\frac{\sqrt{33}i}{88}$     | 0                             | $-\frac{\sqrt{330}i}{1232}$   | 0                           | 0                             | $\frac{3\sqrt{165}i}{176}$   | 0                              | $\frac{5\sqrt{11}i}{88}$       | 0                             | $\frac{15\sqrt{55}i}{1232}$   | 0                            |
| 982                                   | symmetry  | $\frac{z(15x^4+30x^2y^2-40x^2z^2+15y^4-40y^2z^2+8z^4)}{8}$ |                               |                              |                              |                               |                               |                             |                               |                              |                                |                                |                               |                               |                              |

*continued ...*



Table 10

| No. | multipole                             | matrix  |                            |                             |                             |                             |                            |                          |                              |                             |                             |                              |                              |                             |                           |
|-----|---------------------------------------|---|----------------------------|-----------------------------|-----------------------------|-----------------------------|----------------------------|--------------------------|------------------------------|-----------------------------|-----------------------------|------------------------------|------------------------------|-----------------------------|---------------------------|
| 983 | $\mathbb{M}_{5,2}^{(1,-1;a)}(T_1, 1)$ | $-\frac{\sqrt{385}}{3234}$                        | 0                          | 0                           | 0                           | 0                           | 0                          | 0                        | $-\frac{\sqrt{2310}}{539}$   | 0                           | 0                           | 0                            | 0                            | 0                           | 0                         |
|     |                                       | 0   | $\frac{5\sqrt{385}}{3234}$ | 0                           | 0                           | 0                           | 0                          | 0                        | 0                            | $\frac{9\sqrt{154}}{539}$   | 0                           | 0                            | 0                            | 0                           | 0                         |
|     |                                       | 0   | 0                          | $-\frac{5\sqrt{385}}{1617}$ | 0                           | 0                           | 0                          | 0                        | 0                            | 0                           | $-\frac{2\sqrt{1155}}{539}$ | 0                            | 0                            | 0                           | 0                         |
|     |                                       | 0   | 0                          | 0                           | $\frac{5\sqrt{385}}{1617}$  | 0                           | 0                          | 0                        | 0                            | 0                           | 0                           | $-\frac{2\sqrt{1155}}{539}$  | 0                            | 0                           | 0                         |
|     |                                       | 0   | 0                          | 0                           | 0                           | $-\frac{5\sqrt{385}}{3234}$ | 0                          | 0                        | 0                            | 0                           | 0                           | 0                            | $\frac{9\sqrt{154}}{539}$    | 0                           | 0                         |
|     |                                       | 0   | 0                          | 0                           | 0                           | 0                           | $\frac{\sqrt{385}}{3234}$  | 0                        | 0                            | 0                           | 0                           | 0                            | 0                            | $-\frac{\sqrt{2310}}{539}$  | 0                         |
|     |                                       | 0   | 0                          | 0                           | 0                           | 0                           | 0                          | $\frac{\sqrt{385}}{154}$ | 0                            | 0                           | 0                           | 0                            | 0                            | 0                           | 0                         |
|     |                                       | $-\frac{\sqrt{2310}}{539}$                        | 0                          | 0                           | 0                           | 0                           | 0                          | 0                        | $-\frac{23\sqrt{385}}{1078}$ | 0                           | 0                           | 0                            | 0                            | 0                           | 0                         |
|     |                                       | 0   | $\frac{9\sqrt{154}}{539}$  | 0                           | 0                           | 0                           | 0                          | 0                        | 0                            | $\frac{17\sqrt{385}}{1078}$ | 0                           | 0                            | 0                            | 0                           | 0                         |
|     |                                       | 0   | 0                          | $-\frac{2\sqrt{1155}}{539}$ | 0                           | 0                           | 0                          | 0                        | 0                            | 0                           | $\frac{15\sqrt{385}}{1078}$ | 0                            | 0                            | 0                           | 0                         |
|     |                                       | 0   | 0                          | 0                           | $-\frac{2\sqrt{1155}}{539}$ | 0                           | 0                          | 0                        | 0                            | 0                           | 0                           | $-\frac{15\sqrt{385}}{1078}$ | 0                            | 0                           | 0                         |
|     |                                       | 0   | 0                          | 0                           | 0                           | $\frac{9\sqrt{154}}{539}$   | 0                          | 0                        | 0                            | 0                           | 0                           | 0                            | $-\frac{17\sqrt{385}}{1078}$ | 0                           | 0                         |
|     |                                       | 0   | 0                          | 0                           | 0                           | 0                           | $-\frac{\sqrt{2310}}{539}$ | 0                        | 0                            | 0                           | 0                           | 0                            | 0                            | $\frac{23\sqrt{385}}{1078}$ | 0                         |
|     |                                       | 0   | 0                          | 0                           | 0                           | 0                           | 0                          | 0                        | 0                            | 0                           | 0                           | 0                            | 0                            | 0                           | $-\frac{\sqrt{385}}{154}$ |
| 983 | symmetry                              | $\frac{3\sqrt{35}x(y^2-2yz-z^2)(y^2+2yz-z^2)}{8}$ |                            |                             |                             |                             |                            |                          |                              |                             |                             |                              |                              |                             |                           |

*continued ...*

Table 10

| No.                                   | multipole | matrix  |                              |                             |                              |                              |                             |                             |                              |                              |                            |                             |                             |                             |                              |  |
|---------------------------------------|-----------|---|------------------------------|-----------------------------|------------------------------|------------------------------|-----------------------------|-----------------------------|------------------------------|------------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|------------------------------|--|
| $\mathbb{M}_{5,0}^{(1,-1;a)}(T_1, 2)$ |           | 0   | $-\frac{\sqrt{55}}{1232}$    | 0                           | $-\frac{3\sqrt{110}}{1232}$  | 0                            | $-\frac{5\sqrt{11}}{1232}$  | $\frac{\sqrt{462}}{1232}$   | 0                            | $-\frac{15\sqrt{22}}{1232}$  | 0                          | $-\frac{9\sqrt{330}}{1232}$ | 0                           | $-\frac{5\sqrt{66}}{1232}$  | 0                            |  |
|                                       |           | $-\frac{\sqrt{55}}{1232}$                         | 0                            | $\frac{5\sqrt{22}}{1232}$   | 0                            | $\frac{15\sqrt{11}}{1232}$   | 0                           | 0                           | $-\frac{23\sqrt{330}}{6160}$ | 0                            | $\frac{13\sqrt{66}}{1232}$ | 0                           | $\frac{27\sqrt{110}}{6160}$ | 0                           | $-\frac{\sqrt{2310}}{1232}$  |  |
|                                       |           | 0   | $\frac{5\sqrt{22}}{1232}$    | 0                           | $-\frac{5\sqrt{11}}{616}$    | 0                            | $-\frac{3\sqrt{110}}{1232}$ | $\frac{9\sqrt{1155}}{3080}$ | 0                            | $\frac{3\sqrt{55}}{280}$     | 0                          | $-\frac{\sqrt{33}}{616}$    | 0                           | $\frac{27\sqrt{165}}{3080}$ | 0                            |  |
|                                       |           | $-\frac{3\sqrt{110}}{1232}$                       | 0                            | $-\frac{5\sqrt{11}}{616}$   | 0                            | $\frac{5\sqrt{22}}{1232}$    | 0                           | 0                           | $-\frac{27\sqrt{165}}{3080}$ | 0                            | $\frac{\sqrt{33}}{616}$    | 0                           | $-\frac{3\sqrt{55}}{280}$   | 0                           | $-\frac{9\sqrt{1155}}{3080}$ |  |
|                                       |           | 0   | $\frac{15\sqrt{11}}{1232}$   | 0                           | $\frac{5\sqrt{22}}{1232}$    | 0                            | $-\frac{\sqrt{55}}{1232}$   | $\frac{\sqrt{2310}}{1232}$  | 0                            | $-\frac{27\sqrt{110}}{6160}$ | 0                          | $-\frac{13\sqrt{66}}{1232}$ | 0                           | $\frac{23\sqrt{330}}{6160}$ | 0                            |  |
|                                       |           | $-\frac{5\sqrt{11}}{1232}$                        | 0                            | $-\frac{3\sqrt{110}}{1232}$ | 0                            | $-\frac{\sqrt{55}}{1232}$    | 0                           | 0                           | $\frac{5\sqrt{66}}{1232}$    | 0                            | $\frac{9\sqrt{330}}{1232}$ | 0                           | $\frac{15\sqrt{22}}{1232}$  | 0                           | $-\frac{\sqrt{462}}{1232}$   |  |
|                                       |           | $\frac{\sqrt{462}}{1232}$                         | 0                            | $\frac{9\sqrt{1155}}{3080}$ | 0                            | $\frac{\sqrt{2310}}{1232}$   | 0                           | 0                           | $\frac{15\sqrt{77}}{1232}$   | 0                            | $\frac{9\sqrt{385}}{616}$  | 0                           | $\frac{5\sqrt{231}}{1232}$  | 0                           | 0                            |  |
|                                       |           | 0   | $-\frac{23\sqrt{330}}{6160}$ | 0                           | $-\frac{27\sqrt{165}}{3080}$ | 0                            | $\frac{5\sqrt{66}}{1232}$   | $\frac{15\sqrt{77}}{1232}$  | 0                            | $-\frac{5\sqrt{33}}{154}$    | 0                          | $-\frac{9\sqrt{55}}{1232}$  | 0                           | $\frac{15\sqrt{11}}{616}$   | 0                            |  |
|                                       |           | $-\frac{15\sqrt{22}}{1232}$                       | 0                            | $\frac{3\sqrt{55}}{280}$    | 0                            | $-\frac{27\sqrt{110}}{6160}$ | 0                           | 0                           | $-\frac{5\sqrt{33}}{154}$    | 0                            | $\frac{\sqrt{165}}{1232}$  | 0                           | $-\frac{45\sqrt{11}}{616}$  | 0                           | $\frac{5\sqrt{231}}{1232}$   |  |
|                                       |           | 0   | $\frac{13\sqrt{66}}{1232}$   | 0                           | $\frac{\sqrt{33}}{616}$      | 0                            | $\frac{9\sqrt{330}}{1232}$  | $\frac{9\sqrt{385}}{616}$   | 0                            | $\frac{\sqrt{165}}{1232}$    | 0                          | $\frac{15\sqrt{11}}{308}$   | 0                           | $-\frac{9\sqrt{55}}{1232}$  | 0                            |  |
|                                       |           | $-\frac{9\sqrt{330}}{1232}$                       | 0                            | $-\frac{\sqrt{33}}{616}$    | 0                            | $-\frac{13\sqrt{66}}{1232}$  | 0                           | 0                           | $-\frac{9\sqrt{55}}{1232}$   | 0                            | $\frac{15\sqrt{11}}{308}$  | 0                           | $\frac{\sqrt{165}}{1232}$   | 0                           | $\frac{9\sqrt{385}}{616}$    |  |
|                                       |           | 0   | $\frac{27\sqrt{110}}{6160}$  | 0                           | $-\frac{3\sqrt{55}}{280}$    | 0                            | $\frac{15\sqrt{22}}{1232}$  | $\frac{5\sqrt{231}}{1232}$  | 0                            | $-\frac{45\sqrt{11}}{616}$   | 0                          | $\frac{\sqrt{165}}{1232}$   | 0                           | $-\frac{5\sqrt{33}}{154}$   | 0                            |  |
|                                       |           | $-\frac{5\sqrt{66}}{1232}$                        | 0                            | $\frac{27\sqrt{165}}{3080}$ | 0                            | $\frac{23\sqrt{330}}{6160}$  | 0                           | 0                           | $\frac{15\sqrt{11}}{616}$    | 0                            | $-\frac{9\sqrt{55}}{1232}$ | 0                           | $-\frac{5\sqrt{33}}{154}$   | 0                           | $\frac{15\sqrt{77}}{1232}$   |  |
|                                       |           | 0   | $-\frac{\sqrt{2310}}{1232}$  | 0                           | $-\frac{9\sqrt{1155}}{3080}$ | 0                            | $-\frac{\sqrt{462}}{1232}$  | 0                           | 0                            | $\frac{5\sqrt{231}}{1232}$   | 0                          | $\frac{9\sqrt{385}}{616}$   | 0                           | $\frac{15\sqrt{77}}{1232}$  | 0                            |  |
| 984                                   | symmetry  | $\frac{3\sqrt{35}y(x^2-2xz-z^2)(x^2+2xz-z^2)}{8}$ |                              |                             |                              |                              |                             |                             |                              |                              |                            |                             |                             |                             |                              |  |

*continued ...*

Table 10

| No. | multipole                             | matrix  |                               |                               |                               |                               |                              |                               |                               |                              |                              |                              |                              |                               |                               |
|-----|---------------------------------------|---|-------------------------------|-------------------------------|-------------------------------|-------------------------------|------------------------------|-------------------------------|-------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|-------------------------------|-------------------------------|
| 985 | $\mathbb{M}_{5,1}^{(1,-1;a)}(T_1, 2)$ | 0   | $\frac{\sqrt{55}i}{1232}$     | 0                             | $-\frac{3\sqrt{110}i}{1232}$  | 0                             | $\frac{5\sqrt{11}i}{1232}$   | $\frac{\sqrt{462}i}{1232}$    | 0                             | $\frac{15\sqrt{22}i}{1232}$  | 0                            | $-\frac{9\sqrt{330}i}{1232}$ | 0                            | $\frac{5\sqrt{66}i}{1232}$    | 0                             |
|     |                                       | $-\frac{\sqrt{55}i}{1232}$                        | 0                             | $-\frac{5\sqrt{22}i}{1232}$   | 0                             | $\frac{15\sqrt{11}i}{1232}$   | 0                            | 0                             | $-\frac{23\sqrt{330}i}{6160}$ | 0                            | $-\frac{13\sqrt{66}i}{1232}$ | 0                            | $\frac{27\sqrt{110}i}{6160}$ | 0                             | $\frac{\sqrt{2310}i}{1232}$   |
|     |                                       | 0   | $\frac{5\sqrt{22}i}{1232}$    | 0                             | $\frac{5\sqrt{11}i}{616}$     | 0                             | $-\frac{3\sqrt{110}i}{1232}$ | $-\frac{9\sqrt{1155}i}{3080}$ | 0                             | $\frac{3\sqrt{55}i}{280}$    | 0                            | $\frac{\sqrt{33}i}{616}$     | 0                            | $\frac{27\sqrt{165}i}{3080}$  | 0                             |
|     |                                       | $\frac{3\sqrt{110}i}{1232}$                       | 0                             | $-\frac{5\sqrt{11}i}{616}$    | 0                             | $-\frac{5\sqrt{22}i}{1232}$   | 0                            | 0                             | $\frac{27\sqrt{165}i}{3080}$  | 0                            | $\frac{\sqrt{33}i}{616}$     | 0                            | $\frac{3\sqrt{55}i}{280}$    | 0                             | $-\frac{9\sqrt{1155}i}{3080}$ |
|     |                                       | 0   | $-\frac{15\sqrt{11}i}{1232}$  | 0                             | $\frac{5\sqrt{22}i}{1232}$    | 0                             | $\frac{\sqrt{55}i}{1232}$    | $\frac{\sqrt{2310}i}{1232}$   | 0                             | $\frac{27\sqrt{110}i}{6160}$ | 0                            | $-\frac{13\sqrt{66}i}{1232}$ | 0                            | $-\frac{23\sqrt{330}i}{6160}$ | 0                             |
|     |                                       | $-\frac{5\sqrt{11}i}{1232}$                       | 0                             | $\frac{3\sqrt{110}i}{1232}$   | 0                             | $-\frac{\sqrt{55}i}{1232}$    | 0                            | 0                             | $\frac{5\sqrt{66}i}{1232}$    | 0                            | $-\frac{9\sqrt{330}i}{1232}$ | 0                            | $\frac{15\sqrt{22}i}{1232}$  | 0                             | $\frac{\sqrt{462}i}{1232}$    |
|     |                                       | $-\frac{\sqrt{462}i}{1232}$                       | 0                             | $\frac{9\sqrt{1155}i}{3080}$  | 0                             | $-\frac{\sqrt{2310}i}{1232}$  | 0                            | 0                             | $-\frac{15\sqrt{77}i}{1232}$  | 0                            | $\frac{9\sqrt{385}i}{616}$   | 0                            | $-\frac{5\sqrt{231}i}{1232}$ | 0                             | 0                             |
|     |                                       | 0   | $\frac{23\sqrt{330}i}{6160}$  | 0                             | $-\frac{27\sqrt{165}i}{3080}$ | 0                             | $-\frac{5\sqrt{66}i}{1232}$  | $\frac{15\sqrt{77}i}{1232}$   | 0                             | $\frac{5\sqrt{33}i}{154}$    | 0                            | $-\frac{9\sqrt{55}i}{1232}$  | 0                            | $-\frac{15\sqrt{11}i}{616}$   | 0                             |
|     |                                       | $-\frac{15\sqrt{22}i}{1232}$                      | 0                             | $-\frac{3\sqrt{55}i}{280}$    | 0                             | $-\frac{27\sqrt{110}i}{6160}$ | 0                            | 0                             | $-\frac{5\sqrt{33}i}{154}$    | 0                            | $-\frac{\sqrt{165}i}{1232}$  | 0                            | $-\frac{45\sqrt{11}i}{616}$  | 0                             | $-\frac{5\sqrt{231}i}{1232}$  |
|     |                                       | 0   | $\frac{13\sqrt{66}i}{1232}$   | 0                             | $-\frac{\sqrt{33}i}{616}$     | 0                             | $\frac{9\sqrt{330}i}{1232}$  | $-\frac{9\sqrt{385}i}{616}$   | 0                             | $\frac{\sqrt{165}i}{1232}$   | 0                            | $-\frac{15\sqrt{11}i}{308}$  | 0                            | $-\frac{9\sqrt{55}i}{1232}$   | 0                             |
|     |                                       | $\frac{9\sqrt{330}i}{1232}$                       | 0                             | $-\frac{\sqrt{33}i}{616}$     | 0                             | $\frac{13\sqrt{66}i}{1232}$   | 0                            | 0                             | $\frac{9\sqrt{55}i}{1232}$    | 0                            | $\frac{15\sqrt{11}i}{308}$   | 0                            | $-\frac{\sqrt{165}i}{1232}$  | 0                             | $\frac{9\sqrt{385}i}{616}$    |
|     |                                       | 0   | $-\frac{27\sqrt{110}i}{6160}$ | 0                             | $-\frac{3\sqrt{55}i}{280}$    | 0                             | $-\frac{15\sqrt{22}i}{1232}$ | $\frac{5\sqrt{231}i}{1232}$   | 0                             | $\frac{45\sqrt{11}i}{616}$   | 0                            | $\frac{\sqrt{165}i}{1232}$   | 0                            | $\frac{5\sqrt{33}i}{154}$     | 0                             |
|     |                                       | $-\frac{5\sqrt{66}i}{1232}$                       | 0                             | $-\frac{27\sqrt{165}i}{3080}$ | 0                             | $\frac{23\sqrt{330}i}{6160}$  | 0                            | 0                             | $\frac{15\sqrt{11}i}{616}$    | 0                            | $\frac{9\sqrt{55}i}{1232}$   | 0                            | $-\frac{5\sqrt{33}i}{154}$   | 0                             | $-\frac{15\sqrt{77}i}{1232}$  |
|     |                                       | 0   | $-\frac{\sqrt{2310}i}{1232}$  | 0                             | $\frac{9\sqrt{1155}i}{3080}$  | 0                             | $-\frac{\sqrt{462}i}{1232}$  | 0                             | 0                             | $\frac{5\sqrt{231}i}{1232}$  | 0                            | $-\frac{9\sqrt{385}i}{616}$  | 0                            | $\frac{15\sqrt{77}i}{1232}$   | 0                             |
| 985 | symmetry                              | $\frac{3\sqrt{35}z(x^2-2xy-y^2)(x^2+2xy-y^2)}{8}$ |                               |                               |                               |                               |                              |                               |                               |                              |                              |                              |                              |                               |                               |

continued ...

Table 10

| No. | multipole                             | matrix  |                           |                            |                            |                           |                          |                            |                           |                           |                            |                          |                           |                            |   |
|-----|---------------------------------------|---|---------------------------|----------------------------|----------------------------|---------------------------|--------------------------|----------------------------|---------------------------|---------------------------|----------------------------|--------------------------|---------------------------|----------------------------|---|
| 986 | $\mathbb{M}_{5,2}^{(1,-1;a)}(T_1, 2)$ | 0   | 0                         | 0                          | 0                          | $-\frac{\sqrt{55}}{154}$  | 0                        | 0                          | 0                         | 0                         | 0                          | $-\frac{3\sqrt{22}}{77}$ | 0                         | 0                          |   |
|     |                                       | 0   | 0                         | 0                          | 0                          | 0                         | $\frac{\sqrt{55}}{154}$  | 0                          | 0                         | 0                         | 0                          | 0                        | $-\frac{\sqrt{330}}{385}$ | 0                          |   |
|     |                                       | 0   | 0                         | 0                          | 0                          | 0                         | 0                        | 0                          | 0                         | 0                         | 0                          | 0                        | 0                         | $\frac{2\sqrt{1155}}{385}$ |   |
|     |                                       | 0   | 0                         | 0                          | 0                          | 0                         | 0                        | $\frac{2\sqrt{1155}}{385}$ | 0                         | 0                         | 0                          | 0                        | 0                         | 0                          | 0 |
|     |                                       | $-\frac{\sqrt{55}}{154}$                        | 0                         | 0                          | 0                          | 0                         | 0                        | 0                          | $-\frac{\sqrt{330}}{385}$ | 0                         | 0                          | 0                        | 0                         | 0                          | 0 |
|     |                                       | 0   | $\frac{\sqrt{55}}{154}$   | 0                          | 0                          | 0                         | 0                        | 0                          | 0                         | $-\frac{3\sqrt{22}}{77}$  | 0                          | 0                        | 0                         | 0                          | 0 |
|     |                                       | 0   | 0                         | 0                          | $\frac{2\sqrt{1155}}{385}$ | 0                         | 0                        | 0                          | 0                         | 0                         | $\frac{3\sqrt{385}}{154}$  | 0                        | 0                         | 0                          | 0 |
|     |                                       | 0   | 0                         | 0                          | 0                          | $-\frac{\sqrt{330}}{385}$ | 0                        | 0                          | 0                         | 0                         | 0                          | $\frac{5\sqrt{33}}{154}$ | 0                         | 0                          |   |
|     |                                       | 0   | 0                         | 0                          | 0                          | 0                         | $-\frac{3\sqrt{22}}{77}$ | 0                          | 0                         | 0                         | 0                          | 0                        | $-\frac{5\sqrt{33}}{154}$ | 0                          |   |
|     |                                       | 0   | 0                         | 0                          | 0                          | 0                         | 0                        | 0                          | 0                         | 0                         | 0                          | 0                        | 0                         | $-\frac{3\sqrt{385}}{154}$ |   |
|     |                                       | 0   | 0                         | 0                          | 0                          | 0                         | 0                        | $\frac{3\sqrt{385}}{154}$  | 0                         | 0                         | 0                          | 0                        | 0                         | 0                          | 0 |
|     |                                       | $-\frac{3\sqrt{22}}{77}$                        | 0                         | 0                          | 0                          | 0                         | 0                        | 0                          | $\frac{5\sqrt{33}}{154}$  | 0                         | 0                          | 0                        | 0                         | 0                          | 0 |
|     |                                       | 0   | $-\frac{\sqrt{330}}{385}$ | 0                          | 0                          | 0                         | 0                        | 0                          | 0                         | $-\frac{5\sqrt{33}}{154}$ | 0                          | 0                        | 0                         | 0                          | 0 |
|     |                                       | 0   | 0                         | $\frac{2\sqrt{1155}}{385}$ | 0                          | 0                         | 0                        | 0                          | 0                         | 0                         | $-\frac{3\sqrt{385}}{154}$ | 0                        | 0                         | 0                          | 0 |
|     |                                       | $\frac{\sqrt{105}x(y-z)(y+z)(2x^2-y^2-z^2)}{4}$ |                           |                            |                            |                           |                          |                            |                           |                           |                            |                          |                           |                            |   |

continued ...

Table 10

| No.                                | multipole | matrix  |                              |                             |                            |                             |                            |                             |                              |                            |                            |                            |                             |                             |                            |
|------------------------------------|-----------|---|------------------------------|-----------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|------------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|----------------------------|
| $\mathbb{M}_{5,0}^{(1,-1;a)}(T_2)$ |           | 0   | $-\frac{\sqrt{165}}{1848}$   | 0                           | $\frac{\sqrt{330}}{1848}$  | 0                           | $\frac{5\sqrt{33}}{616}$   | $\frac{\sqrt{154}}{616}$    | 0                            | $-\frac{5\sqrt{66}}{616}$  | 0                          | $\frac{3\sqrt{110}}{616}$  | 0                           | $\frac{15\sqrt{22}}{616}$   | 0                          |
|                                    |           | $-\frac{\sqrt{165}}{1848}$                      | 0                            | $\frac{5\sqrt{66}}{1848}$   | 0                          | $-\frac{5\sqrt{33}}{1848}$  | 0                          | 0                           | $-\frac{23\sqrt{110}}{3080}$ | 0                          | $\frac{13\sqrt{22}}{616}$  | 0                          | $-\frac{3\sqrt{330}}{3080}$ | 0                           | $\frac{3\sqrt{770}}{616}$  |
|                                    |           | 0   | $\frac{5\sqrt{66}}{1848}$    | 0                           | $-\frac{5\sqrt{33}}{924}$  | 0                           | $\frac{\sqrt{330}}{1848}$  | $-\frac{3\sqrt{385}}{1540}$ | 0                            | $\frac{\sqrt{165}}{140}$   | 0                          | $-\frac{\sqrt{11}}{308}$   | 0                           | $-\frac{9\sqrt{55}}{1540}$  | 0                          |
|                                    |           | $\frac{\sqrt{330}}{1848}$                       | 0                            | $-\frac{5\sqrt{33}}{924}$   | 0                          | $\frac{5\sqrt{66}}{1848}$   | 0                          | 0                           | $\frac{9\sqrt{55}}{1540}$    | 0                          | $\frac{\sqrt{11}}{308}$    | 0                          | $-\frac{\sqrt{165}}{140}$   | 0                           | $\frac{3\sqrt{385}}{1540}$ |
|                                    |           | 0   | $-\frac{5\sqrt{33}}{1848}$   | 0                           | $\frac{5\sqrt{66}}{1848}$  | 0                           | $-\frac{\sqrt{165}}{1848}$ | $-\frac{3\sqrt{770}}{616}$  | 0                            | $\frac{3\sqrt{330}}{3080}$ | 0                          | $-\frac{13\sqrt{22}}{616}$ | 0                           | $\frac{23\sqrt{110}}{3080}$ | 0                          |
|                                    |           | $\frac{5\sqrt{33}}{616}$                        | 0                            | $\frac{\sqrt{330}}{1848}$   | 0                          | $-\frac{\sqrt{165}}{1848}$  | 0                          | 0                           | $-\frac{15\sqrt{22}}{616}$   | 0                          | $-\frac{3\sqrt{110}}{616}$ | 0                          | $\frac{5\sqrt{66}}{616}$    | 0                           | $-\frac{\sqrt{154}}{616}$  |
|                                    |           | $\frac{\sqrt{154}}{616}$                        | 0                            | $-\frac{3\sqrt{385}}{1540}$ | 0                          | $-\frac{3\sqrt{770}}{616}$  | 0                          | 0                           | $\frac{5\sqrt{231}}{616}$    | 0                          | $-\frac{\sqrt{1155}}{308}$ | 0                          | $-\frac{15\sqrt{77}}{616}$  | 0                           | 0                          |
|                                    |           | 0   | $-\frac{23\sqrt{110}}{3080}$ | 0                           | $\frac{9\sqrt{55}}{1540}$  | 0                           | $-\frac{15\sqrt{22}}{616}$ | $\frac{5\sqrt{231}}{616}$   | 0                            | $-\frac{5\sqrt{11}}{77}$   | 0                          | $\frac{\sqrt{165}}{616}$   | 0                           | $-\frac{15\sqrt{33}}{308}$  | 0                          |
|                                    |           | $-\frac{5\sqrt{66}}{616}$                       | 0                            | $\frac{\sqrt{165}}{140}$    | 0                          | $\frac{3\sqrt{330}}{3080}$  | 0                          | 0                           | $-\frac{5\sqrt{11}}{77}$     | 0                          | $\frac{\sqrt{55}}{616}$    | 0                          | $\frac{5\sqrt{33}}{308}$    | 0                           | $-\frac{15\sqrt{77}}{616}$ |
|                                    |           | 0   | $\frac{13\sqrt{22}}{616}$    | 0                           | $\frac{\sqrt{11}}{308}$    | 0                           | $-\frac{3\sqrt{110}}{616}$ | $-\frac{\sqrt{1155}}{308}$  | 0                            | $\frac{\sqrt{55}}{616}$    | 0                          | $\frac{5\sqrt{33}}{154}$   | 0                           | $\frac{\sqrt{165}}{616}$    | 0                          |
|                                    |           | $\frac{3\sqrt{110}}{616}$                       | 0                            | $-\frac{\sqrt{11}}{308}$    | 0                          | $-\frac{13\sqrt{22}}{616}$  | 0                          | 0                           | $\frac{\sqrt{165}}{616}$     | 0                          | $\frac{5\sqrt{33}}{154}$   | 0                          | $\frac{\sqrt{55}}{616}$     | 0                           | $-\frac{\sqrt{1155}}{308}$ |
|                                    |           | 0   | $-\frac{3\sqrt{330}}{3080}$  | 0                           | $-\frac{\sqrt{165}}{140}$  | 0                           | $\frac{5\sqrt{66}}{616}$   | $-\frac{15\sqrt{77}}{616}$  | 0                            | $\frac{5\sqrt{33}}{308}$   | 0                          | $\frac{\sqrt{55}}{616}$    | 0                           | $-\frac{5\sqrt{11}}{77}$    | 0                          |
|                                    |           | $\frac{15\sqrt{22}}{616}$                       | 0                            | $-\frac{9\sqrt{55}}{1540}$  | 0                          | $\frac{23\sqrt{110}}{3080}$ | 0                          | 0                           | $-\frac{15\sqrt{33}}{308}$   | 0                          | $\frac{\sqrt{165}}{616}$   | 0                          | $-\frac{5\sqrt{11}}{77}$    | 0                           | $\frac{5\sqrt{231}}{616}$  |
|                                    |           | 0   | $\frac{3\sqrt{770}}{616}$    | 0                           | $\frac{3\sqrt{385}}{1540}$ | 0                           | $-\frac{\sqrt{154}}{616}$  | 0                           | 0                            | $-\frac{15\sqrt{77}}{616}$ | 0                          | $-\frac{\sqrt{1155}}{308}$ | 0                           | $\frac{5\sqrt{231}}{616}$   | 0                          |
| 987                                | symmetry  | $\frac{\sqrt{105}y(x-z)(x+z)(x^2-2y^2+z^2)}{4}$ |                              |                             |                            |                             |                            |                             |                              |                            |                            |                            |                             |                             |                            |

*continued ...*

Table 10

| No.                                | multipole | matrix   |                               |                             |                             |                               |                             |                              |                              |                             |                             |                             |                             |                              |                              |
|------------------------------------|-----------|--|-------------------------------|-----------------------------|-----------------------------|-------------------------------|-----------------------------|------------------------------|------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|------------------------------|------------------------------|
| $\mathbb{M}_{5,1}^{(1,-1;a)}(T_2)$ |           | 0  | $-\frac{\sqrt{165}i}{1848}$   | 0                           | $-\frac{\sqrt{330}i}{1848}$ | 0                             | $\frac{5\sqrt{33}i}{616}$   | $-\frac{\sqrt{154}i}{616}$   | 0                            | $-\frac{5\sqrt{66}i}{616}$  | 0                           | $-\frac{3\sqrt{110}i}{616}$ | 0                           | $\frac{15\sqrt{22}i}{616}$   | 0                            |
|                                    |           | $\frac{\sqrt{165}i}{1848}$                       | 0                             | $\frac{5\sqrt{66}i}{1848}$  | 0                           | $\frac{5\sqrt{33}i}{1848}$    | 0                           | 0                            | $\frac{23\sqrt{110}i}{3080}$ | 0                           | $\frac{13\sqrt{22}i}{616}$  | 0                           | $\frac{3\sqrt{330}i}{3080}$ | 0                            | $\frac{3\sqrt{770}i}{616}$   |
|                                    |           | 0  | $-\frac{5\sqrt{66}i}{1848}$   | 0                           | $-\frac{5\sqrt{33}i}{924}$  | 0                             | $-\frac{\sqrt{330}i}{1848}$ | $-\frac{3\sqrt{385}i}{1540}$ | 0                            | $-\frac{\sqrt{165}i}{140}$  | 0                           | $-\frac{\sqrt{11}i}{308}$   | 0                           | $\frac{9\sqrt{55}i}{1540}$   | 0                            |
|                                    |           | $\frac{\sqrt{330}i}{1848}$                       | 0                             | $\frac{5\sqrt{33}i}{924}$   | 0                           | $\frac{5\sqrt{66}i}{1848}$    | 0                           | 0                            | $\frac{9\sqrt{55}i}{1540}$   | 0                           | $-\frac{\sqrt{11}i}{308}$   | 0                           | $-\frac{\sqrt{165}i}{140}$  | 0                            | $-\frac{3\sqrt{385}i}{1540}$ |
|                                    |           | 0  | $-\frac{5\sqrt{33}i}{1848}$   | 0                           | $-\frac{5\sqrt{66}i}{1848}$ | 0                             | $-\frac{\sqrt{165}i}{1848}$ | $\frac{3\sqrt{770}i}{616}$   | 0                            | $\frac{3\sqrt{330}i}{3080}$ | 0                           | $\frac{13\sqrt{22}i}{616}$  | 0                           | $\frac{23\sqrt{110}i}{3080}$ | 0                            |
|                                    |           | $-\frac{5\sqrt{33}i}{616}$                       | 0                             | $\frac{\sqrt{330}i}{1848}$  | 0                           | $\frac{\sqrt{165}i}{1848}$    | 0                           | 0                            | $\frac{15\sqrt{22}i}{616}$   | 0                           | $-\frac{3\sqrt{110}i}{616}$ | 0                           | $-\frac{5\sqrt{66}i}{616}$  | 0                            | $-\frac{\sqrt{154}i}{616}$   |
|                                    |           | $\frac{\sqrt{154}i}{616}$                        | 0                             | $\frac{3\sqrt{385}i}{1540}$ | 0                           | $-\frac{3\sqrt{770}i}{616}$   | 0                           | 0                            | $\frac{5\sqrt{231}i}{616}$   | 0                           | $\frac{\sqrt{1155}i}{308}$  | 0                           | $-\frac{15\sqrt{77}i}{616}$ | 0                            | 0                            |
|                                    |           | 0  | $-\frac{23\sqrt{110}i}{3080}$ | 0                           | $-\frac{9\sqrt{55}i}{1540}$ | 0                             | $-\frac{15\sqrt{22}i}{616}$ | $-\frac{5\sqrt{231}i}{616}$  | 0                            | $-\frac{5\sqrt{11}i}{77}$   | 0                           | $-\frac{\sqrt{165}i}{616}$  | 0                           | $-\frac{15\sqrt{33}i}{308}$  | 0                            |
|                                    |           | $\frac{5\sqrt{66}i}{616}$                        | 0                             | $\frac{\sqrt{165}i}{140}$   | 0                           | $-\frac{3\sqrt{330}i}{3080}$  | 0                           | 0                            | $\frac{5\sqrt{11}i}{77}$     | 0                           | $\frac{\sqrt{55}i}{616}$    | 0                           | $-\frac{5\sqrt{33}i}{308}$  | 0                            | $-\frac{15\sqrt{77}i}{616}$  |
|                                    |           | 0  | $-\frac{13\sqrt{22}i}{616}$   | 0                           | $\frac{\sqrt{11}i}{308}$    | 0                             | $\frac{3\sqrt{110}i}{616}$  | $-\frac{\sqrt{1155}i}{308}$  | 0                            | $-\frac{\sqrt{55}i}{616}$   | 0                           | $\frac{5\sqrt{33}i}{154}$   | 0                           | $-\frac{\sqrt{165}i}{616}$   | 0                            |
|                                    |           | $\frac{3\sqrt{110}i}{616}$                       | 0                             | $\frac{\sqrt{11}i}{308}$    | 0                           | $-\frac{13\sqrt{22}i}{616}$   | 0                           | 0                            | $\frac{\sqrt{165}i}{616}$    | 0                           | $-\frac{5\sqrt{33}i}{154}$  | 0                           | $\frac{\sqrt{55}i}{616}$    | 0                            | $\frac{\sqrt{1155}i}{308}$   |
|                                    |           | 0  | $-\frac{3\sqrt{330}i}{3080}$  | 0                           | $\frac{\sqrt{165}i}{140}$   | 0                             | $\frac{5\sqrt{66}i}{616}$   | $\frac{15\sqrt{77}i}{616}$   | 0                            | $\frac{5\sqrt{33}i}{308}$   | 0                           | $-\frac{\sqrt{55}i}{616}$   | 0                           | $-\frac{5\sqrt{11}i}{77}$    | 0                            |
|                                    |           | $-\frac{15\sqrt{22}i}{616}$                      | 0                             | $-\frac{9\sqrt{55}i}{1540}$ | 0                           | $-\frac{23\sqrt{110}i}{3080}$ | 0                           | 0                            | $\frac{15\sqrt{33}i}{308}$   | 0                           | $\frac{\sqrt{165}i}{616}$   | 0                           | $\frac{5\sqrt{11}i}{77}$    | 0                            | $\frac{5\sqrt{231}i}{616}$   |
|                                    |           | 0  | $-\frac{3\sqrt{770}i}{616}$   | 0                           | $\frac{3\sqrt{385}i}{1540}$ | 0                             | $\frac{\sqrt{154}i}{616}$   | 0                            | 0                            | $\frac{15\sqrt{77}i}{616}$  | 0                           | $-\frac{\sqrt{1155}i}{308}$ | 0                           | $-\frac{5\sqrt{231}i}{616}$  | 0                            |
| 988                                | symmetry  | $-\frac{\sqrt{105}z(x-y)(x+y)(x^2+y^2-2z^2)}{4}$ |                               |                             |                             |                               |                             |                              |                              |                             |                             |                             |                             |                              |                              |

*continued ...*

Table 10

| No. | multipole                          | matrix   |                          |                           |                           |                           |                          |                          |                            |                           |                            |                           |                           |                           |                           |
|-----|------------------------------------|--|--------------------------|---------------------------|---------------------------|---------------------------|--------------------------|--------------------------|----------------------------|---------------------------|----------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| 989 | $\mathbb{M}_{5,2}^{(1,-1;a)}(T_2)$ | 0  | 0                        | $-\frac{\sqrt{330}}{924}$ | 0                         | 0                         | 0                        | 0                        | 0                          | 0                         | $-\frac{\sqrt{110}}{77}$   | 0                         | 0                         | 0                         | 0                         |
|     |                                    | 0  | 0                        | 0                         | $\frac{5\sqrt{66}}{924}$  | 0                         | 0                        | $\frac{\sqrt{770}}{385}$ | 0                          | 0                         | 0                          | $\frac{2\sqrt{22}}{77}$   | 0                         | 0                         | 0                         |
|     |                                    | $-\frac{\sqrt{330}}{924}$  | 0                        | 0                         | 0                         | $-\frac{5\sqrt{66}}{924}$ | 0                        | 0                        | $-\frac{8\sqrt{55}}{385}$  | 0                         | 0                          | 0                         | $\frac{2\sqrt{165}}{385}$ | 0                         | 0                         |
|     |                                    | 0  | $\frac{5\sqrt{66}}{924}$ | 0                         | 0                         | 0                         | $\frac{\sqrt{330}}{924}$ | 0                        | 0                          | $\frac{2\sqrt{165}}{385}$ | 0                          | 0                         | 0                         | $-\frac{8\sqrt{55}}{385}$ | 0                         |
|     |                                    | 0  | 0                        | $-\frac{5\sqrt{66}}{924}$ | 0                         | 0                         | 0                        | 0                        | 0                          | 0                         | $\frac{2\sqrt{22}}{77}$    | 0                         | 0                         | 0                         | $\frac{\sqrt{770}}{385}$  |
|     |                                    | 0  | 0                        | 0                         | $\frac{\sqrt{330}}{924}$  | 0                         | 0                        | 0                        | 0                          | 0                         | 0                          | $-\frac{\sqrt{110}}{77}$  | 0                         | 0                         | 0                         |
|     |                                    | 0  | $\frac{\sqrt{770}}{385}$ | 0                         | 0                         | 0                         | 0                        | 0                        | 0                          | $\frac{5\sqrt{77}}{154}$  | 0                          | 0                         | 0                         | 0                         | 0                         |
|     |                                    | 0  | 0                        | $-\frac{8\sqrt{55}}{385}$ | 0                         | 0                         | 0                        | 0                        | 0                          | 0                         | $-\frac{3\sqrt{165}}{154}$ | 0                         | 0                         | 0                         | 0                         |
|     |                                    | 0  | 0                        | 0                         | $\frac{2\sqrt{165}}{385}$ | 0                         | 0                        | $\frac{5\sqrt{77}}{154}$ | 0                          | 0                         | 0                          | $-\frac{2\sqrt{55}}{77}$  | 0                         | 0                         | 0                         |
|     |                                    | $-\frac{\sqrt{110}}{77}$   | 0                        | 0                         | 0                         | $\frac{2\sqrt{22}}{77}$   | 0                        | 0                        | $-\frac{3\sqrt{165}}{154}$ | 0                         | 0                          | 0                         | $\frac{2\sqrt{55}}{77}$   | 0                         | 0                         |
|     |                                    | 0  | $\frac{2\sqrt{22}}{77}$  | 0                         | 0                         | 0                         | $-\frac{\sqrt{110}}{77}$ | 0                        | 0                          | $-\frac{2\sqrt{55}}{77}$  | 0                          | 0                         | 0                         | $\frac{3\sqrt{165}}{154}$ | 0                         |
|     |                                    | 0  | 0                        | $\frac{2\sqrt{165}}{385}$ | 0                         | 0                         | 0                        | 0                        | 0                          | 0                         | $\frac{2\sqrt{55}}{77}$    | 0                         | 0                         | 0                         | $-\frac{5\sqrt{77}}{154}$ |
|     |                                    | 0  | 0                        | 0                         | $-\frac{8\sqrt{55}}{385}$ | 0                         | 0                        | 0                        | 0                          | 0                         | 0                          | $\frac{3\sqrt{165}}{154}$ | 0                         | 0                         | 0                         |
|     |                                    | 0  | 0                        | 0                         | 0                         | $\frac{\sqrt{770}}{385}$  | 0                        | 0                        | 0                          | 0                         | 0                          | 0                         | $-\frac{5\sqrt{77}}{154}$ | 0                         | 0                         |
|     |                                    | $\frac{\sqrt{91}xyz(3x^4-5x^2y^2-5x^2z^2+3y^4-5y^2z^2+3z^4)}{2}$ |                          |                           |                           |                           |                          |                          |                            |                           |                            |                           |                           |                           |                           |

continued ...

Table 10

| No.                   | multipole | matrix  |   |   |   |   |   |                          |                            |                             |                          |                             |                           |                            |                          |
|-----------------------|-----------|---|---|---|---|---|---|--------------------------|----------------------------|-----------------------------|--------------------------|-----------------------------|---------------------------|----------------------------|--------------------------|
| $M_7^{(1,-1;a)}(A_2)$ |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | 0                          | 0                           | 0                        | 0                           | 0                         | 0                          | 0                        |
|                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | 0                          | 0                           | 0                        | 0                           | 0                         | 0                          | 0                        |
|                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | 0                          | 0                           | 0                        | 0                           | 0                         | 0                          | 0                        |
|                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | 0                          | 0                           | 0                        | 0                           | 0                         | 0                          | 0                        |
|                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | 0                          | 0                           | 0                        | 0                           | 0                         | 0                          | 0                        |
|                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | 0                          | 0                           | 0                        | 0                           | 0                         | 0                          | 0                        |
|                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | $\frac{\sqrt{22}i}{88}$    | 0                           | 0                        | 0                           | $\frac{\sqrt{66}i}{24}$   | 0                          | 0                        |
|                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | 0                          | $-\frac{\sqrt{2310}i}{264}$ | 0                        | 0                           | 0                         | $-\frac{\sqrt{66}i}{24}$   | 0                        |
|                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{22}i}{88}$ | 0                          | 0                           | 0                        | $\frac{\sqrt{770}i}{88}$    | 0                         | 0                          | 0                        |
|                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | $\frac{\sqrt{2310}i}{264}$ | 0                           | 0                        | 0                           | $-\frac{\sqrt{770}i}{88}$ | 0                          | 0                        |
|                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | 0                          | $-\frac{\sqrt{770}i}{88}$   | 0                        | 0                           | 0                         | $\frac{\sqrt{2310}i}{264}$ | 0                        |
|                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | 0                          | 0                           | $\frac{\sqrt{770}i}{88}$ | 0                           | 0                         | 0                          | $-\frac{\sqrt{22}i}{88}$ |
|                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{66}i}{24}$ | 0                          | 0                           | 0                        | $-\frac{\sqrt{2310}i}{264}$ | 0                         | 0                          | 0                        |
|                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | $\frac{\sqrt{66}i}{24}$    | 0                           | 0                        | 0                           | $\frac{\sqrt{22}i}{88}$   | 0                          | 0                        |
| 990                   | symmetry  | $-\frac{\sqrt{231}xyz(x-y)(x+y)(3x^2+3y^2-10z^2)}{4}$ |   |   |   |   |   |                          |                            |                             |                          |                             |                           |                            |                          |

*continued ...*



Table 10

| No.                     | multipole | matrix   |   |   |   |   |   |                           |                          |                           |                           |                          |                           |   |   |
|-------------------------|-----------|--|---|---|---|---|---|---------------------------|--------------------------|---------------------------|---------------------------|--------------------------|---------------------------|---|---|
| $M_{7,0}^{(1,-1;a)}(E)$ |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                         | 0                        | 0                         | 0                         | 0                        | 0                         | 0 | 0 |
|                         |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                         | 0                        | 0                         | 0                         | 0                        | 0                         | 0 | 0 |
|                         |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                         | 0                        | 0                         | 0                         | 0                        | 0                         | 0 | 0 |
|                         |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                         | 0                        | 0                         | 0                         | 0                        | 0                         | 0 | 0 |
|                         |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                         | 0                        | 0                         | 0                         | 0                        | 0                         | 0 | 0 |
|                         |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                         | 0                        | 0                         | 0                         | 0                        | 0                         | 0 | 0 |
|                         |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                         | 0                        | $\frac{\sqrt{130}i}{52}$  | 0                         | 0                        | 0                         | 0 | 0 |
|                         |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                         | 0                        | 0                         | $-\frac{\sqrt{546}i}{52}$ | 0                        | 0                         | 0 | 0 |
|                         |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                         | 0                        | 0                         | 0                         | $\frac{\sqrt{546}i}{52}$ | 0                         | 0 | 0 |
|                         |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                         | 0                        | 0                         | 0                         | 0                        | $-\frac{\sqrt{130}i}{52}$ | 0 | 0 |
|                         |           | 0  | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{130}i}{52}$ | 0                        | 0                         | 0                         | 0                        | 0                         | 0 | 0 |
|                         |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                         | $\frac{\sqrt{546}i}{52}$ | 0                         | 0                         | 0                        | 0                         | 0 | 0 |
|                         |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                         | 0                        | $-\frac{\sqrt{546}i}{52}$ | 0                         | 0                        | 0                         | 0 | 0 |
|                         |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                         | 0                        | $\frac{\sqrt{130}i}{52}$  | 0                         | 0                        | 0                         | 0 | 0 |
| 991                     | symmetry  | $-\frac{\sqrt{77}xyz(3x^4-20x^2y^2+10x^2z^2+3y^4+10y^2z^2-6z^4)}{4}$ |   |   |   |   |   |                           |                          |                           |                           |                          |                           |   |   |

*continued ...*

Table 10

| No.                     | multipole | matrix   |   |   |   |   |   |                            |                            |                             |   |                             |                            |                           |   |
|-------------------------|-----------|--|---|---|---|---|---|----------------------------|----------------------------|-----------------------------|---|-----------------------------|----------------------------|---------------------------|---|
| $M_{7,1}^{(1,-1;a)}(E)$ |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                          | 0                          | 0                           | 0 | 0                           | 0                          | 0                         | 0 |
|                         |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                          | 0                          | 0                           | 0 | 0                           | 0                          | 0                         | 0 |
|                         |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                          | 0                          | 0                           | 0 | 0                           | 0                          | 0                         | 0 |
|                         |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                          | 0                          | 0                           | 0 | 0                           | 0                          | 0                         | 0 |
|                         |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                          | 0                          | 0                           | 0 | 0                           | 0                          | 0                         | 0 |
|                         |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                          | 0                          | 0                           | 0 | 0                           | 0                          | 0                         | 0 |
|                         |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                          | $\frac{\sqrt{26}i}{104}$   | 0                           | 0 | 0                           | $-\frac{\sqrt{78}i}{24}$   | 0                         | 0 |
|                         |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                          | 0                          | $-\frac{\sqrt{2730}i}{312}$ | 0 | 0                           | 0                          | $\frac{\sqrt{78}i}{24}$   | 0 |
|                         |           | 0  | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{26}i}{104}$  | 0                          | 0                           | 0 | $\frac{\sqrt{910}i}{104}$   | 0                          | 0                         | 0 |
|                         |           | 0  | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{2730}i}{312}$ | 0                          | 0                           | 0 | $-\frac{\sqrt{910}i}{104}$  | 0                          | 0                         | 0 |
|                         |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                          | $-\frac{\sqrt{910}i}{104}$ | 0                           | 0 | 0                           | $\frac{\sqrt{2730}i}{312}$ | 0                         | 0 |
|                         |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                          | 0                          | $\frac{\sqrt{910}i}{104}$   | 0 | 0                           | 0                          | $-\frac{\sqrt{26}i}{104}$ | 0 |
|                         |           | 0  | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{78}i}{24}$    | 0                          | 0                           | 0 | $-\frac{\sqrt{2730}i}{312}$ | 0                          | 0                         | 0 |
|                         |           | 0  | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{78}i}{24}$   | 0                          | 0                           | 0 | $\frac{\sqrt{26}i}{104}$    | 0                          | 0                         | 0 |
| 992                     | symmetry  | $\frac{x(16x^6-168x^4y^2-168x^4z^2+210x^2y^4+420x^2y^2z^2+210x^2z^4-35y^6-105y^4z^2-105y^2z^4-35z^6)}{16}$ |   |   |   |   |   |                            |                            |                             |   |                             |                            |                           |   |

*continued ...*

Table 10

| No.                                   | multipole | matrix  |   |   |   |   |   |                               |                            |                                |                              |                                |                              |                               |                              |   |   |
|---------------------------------------|-----------|---|---|---|---|---|---|-------------------------------|----------------------------|--------------------------------|------------------------------|--------------------------------|------------------------------|-------------------------------|------------------------------|---|---|
| $\mathbb{M}_{7,0}^{(1,-1;a)}(T_1, 1)$ |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                             | 0                          | 0                              | 0                            | 0                              | 0                            | 0                             | 0                            | 0 | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                             | 0                          | 0                              | 0                            | 0                              | 0                            | 0                             | 0                            | 0 | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                             | 0                          | 0                              | 0                            | 0                              | 0                            | 0                             | 0                            | 0 | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                             | 0                          | 0                              | 0                            | 0                              | 0                            | 0                             | 0                            | 0 | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                             | 0                          | 0                              | 0                            | 0                              | 0                            | 0                             | 0                            | 0 | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                             | 0                          | 0                              | 0                            | 0                              | 0                            | 0                             | 0                            | 0 | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{6006}}{27456}$  | 0                          | $-\frac{3\sqrt{30030}}{9152}$  | 0                            | $\frac{3\sqrt{2002}}{832}$     | 0                            | $-\frac{\sqrt{858}}{64}$      |                              |   |   |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{6006}}{27456}$  | 0                          | $-\frac{35\sqrt{286}}{9152}$   | 0                            | $\frac{21\sqrt{4290}}{9152}$   | 0                            | $-\frac{7\sqrt{858}}{832}$    | 0                            |   |   |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $-\frac{35\sqrt{286}}{9152}$  | 0                          | $\frac{35\sqrt{1430}}{9152}$   | 0                            | $-\frac{63\sqrt{858}}{9152}$   | 0                            | $\frac{3\sqrt{2002}}{832}$    |                              |   |   |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{30030}}{9152}$ | 0                          | $\frac{35\sqrt{1430}}{9152}$   | 0                            | $-\frac{175\sqrt{858}}{27456}$ | 0                            | $\frac{21\sqrt{4290}}{9152}$  | 0                            |   |   |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $\frac{21\sqrt{4290}}{9152}$  | 0                          | $-\frac{175\sqrt{858}}{27456}$ | 0                            | $\frac{35\sqrt{1430}}{9152}$   | 0                            | $-\frac{3\sqrt{30030}}{9152}$ |                              |   |   |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{2002}}{832}$    | 0                          | $-\frac{63\sqrt{858}}{9152}$   | 0                            | $\frac{35\sqrt{1430}}{9152}$   | 0                            | $-\frac{35\sqrt{286}}{9152}$  | 0                            |   |   |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                             | $-\frac{7\sqrt{858}}{832}$ | 0                              | $\frac{21\sqrt{4290}}{9152}$ | 0                              | $-\frac{35\sqrt{286}}{9152}$ | 0                             | $\frac{5\sqrt{6006}}{27456}$ |   |   |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{858}}{64}$      | 0                          | $\frac{3\sqrt{2002}}{832}$     | 0                            | $-\frac{3\sqrt{30030}}{9152}$  | 0                            | $\frac{5\sqrt{6006}}{27456}$  | 0                            |   |   |
| 993                                   | symmetry  | $-\frac{y(35x^6 - 210x^4y^2 + 105x^4z^2 + 168x^2y^4 - 420x^2y^2z^2 + 105x^2z^4 - 16y^6 + 168y^4z^2 - 210y^2z^4 + 35z^6)}{16}$ |   |   |   |   |   |                               |                            |                                |                              |                                |                              |                               |                              |   |   |

*continued ...*

Table 10

| No.                                   | multipole | matrix  |   |   |   |   |   |                                |   |                                 |   |                                |   |                                |   |   |
|---------------------------------------|-----------|---|---|---|---|---|---|--------------------------------|---|---------------------------------|---|--------------------------------|---|--------------------------------|---|---|
| $\mathbb{M}_{7,1}^{(1,-1;a)}(T_1, 1)$ |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                              | 0 | 0                               | 0 | 0                              | 0 | 0                              | 0 | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                              | 0 | 0                               | 0 | 0                              | 0 | 0                              | 0 | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                              | 0 | 0                               | 0 | 0                              | 0 | 0                              | 0 | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                              | 0 | 0                               | 0 | 0                              | 0 | 0                              | 0 | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                              | 0 | 0                               | 0 | 0                              | 0 | 0                              | 0 | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                              | 0 | 0                               | 0 | 0                              | 0 | 0                              | 0 | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{6006}i}{27456}$ | 0 | $-\frac{3\sqrt{30030}i}{9152}$  | 0 | $-\frac{3\sqrt{2002}i}{832}$   | 0 | $-\frac{\sqrt{858}i}{64}$      |   |   |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{6006}i}{27456}$  | 0 | $\frac{35\sqrt{286}i}{9152}$    | 0 | $\frac{21\sqrt{4290}i}{9152}$  | 0 | $\frac{7\sqrt{858}i}{832}$     | 0 |   |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $-\frac{35\sqrt{286}i}{9152}$  | 0 | $-\frac{35\sqrt{1430}i}{9152}$  | 0 | $-\frac{63\sqrt{858}i}{9152}$  | 0 | $-\frac{3\sqrt{2002}i}{832}$   |   |   |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{30030}i}{9152}$  | 0 | $\frac{35\sqrt{1430}i}{9152}$   | 0 | $\frac{175\sqrt{858}i}{27456}$ | 0 | $\frac{21\sqrt{4290}i}{9152}$  | 0 |   |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $-\frac{21\sqrt{4290}i}{9152}$ | 0 | $-\frac{175\sqrt{858}i}{27456}$ | 0 | $-\frac{35\sqrt{1430}i}{9152}$ | 0 | $-\frac{3\sqrt{30030}i}{9152}$ |   |   |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{2002}i}{832}$    | 0 | $\frac{63\sqrt{858}i}{9152}$    | 0 | $\frac{35\sqrt{1430}i}{9152}$  | 0 | $\frac{35\sqrt{286}i}{9152}$   | 0 |   |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $-\frac{7\sqrt{858}i}{832}$    | 0 | $-\frac{21\sqrt{4290}i}{9152}$  | 0 | $-\frac{35\sqrt{286}i}{9152}$  | 0 | $-\frac{5\sqrt{6006}i}{27456}$ |   |   |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{858}i}{64}$       | 0 | $\frac{3\sqrt{2002}i}{832}$     | 0 | $\frac{3\sqrt{30030}i}{9152}$  | 0 | $\frac{5\sqrt{6006}i}{27456}$  | 0 |   |
| 994                                   | symmetry  | $-\frac{z(35x^6+105x^4y^2-210x^4z^2+105x^2y^4-420x^2y^2z^2+168x^2z^4+35y^6-210y^4z^2+168y^2z^4-16z^6)}{16}$ |   |   |   |   |   |                                |   |                                 |   |                                |   |                                |   |   |

*continued ...*

Table 10

| No.                                   | multipole | matrix  |   |   |   |   |   |                            |                            |                             |                              |                           |                             |                           |   |
|---------------------------------------|-----------|---|---|---|---|---|---|----------------------------|----------------------------|-----------------------------|------------------------------|---------------------------|-----------------------------|---------------------------|---|
| $\mathbb{M}_{7,2}^{(1,-1;a)}(T_1, 1)$ |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                          | 0                          | 0                           | 0                            | 0                         | 0                           | 0                         | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                          | 0                          | 0                           | 0                            | 0                         | 0                           | 0                         | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                          | 0                          | 0                           | 0                            | 0                         | 0                           | 0                         | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                          | 0                          | 0                           | 0                            | 0                         | 0                           | 0                         | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                          | 0                          | 0                           | 0                            | 0                         | 0                           | 0                         | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                          | 0                          | 0                           | 0                            | 0                         | 0                           | 0                         | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                          | 0                          | 0                           | 0                            | 0                         | 0                           | 0                         | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{858}}{1716}$ | 0                          | 0                           | 0                            | 0                         | 0                           | 0                         | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $\frac{7\sqrt{858}}{1716}$ | 0                          | 0                           | 0                            | 0                         | 0                           | 0                         | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                          | $-\frac{7\sqrt{858}}{572}$ | 0                           | 0                            | 0                         | 0                           | 0                         | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                          | 0                          | $\frac{35\sqrt{858}}{1716}$ | 0                            | 0                         | 0                           | 0                         | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                          | 0                          | 0                           | $-\frac{35\sqrt{858}}{1716}$ | 0                         | 0                           | 0                         | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                          | 0                          | 0                           | 0                            | $\frac{7\sqrt{858}}{572}$ | 0                           | 0                         | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                          | 0                          | 0                           | 0                            | 0                         | $-\frac{7\sqrt{858}}{1716}$ | 0                         | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                          | 0                          | 0                           | 0                            | 0                         | 0                           | $\frac{\sqrt{858}}{1716}$ | 0 |
| 995                                   | symmetry  | $\frac{\sqrt{231}x(10x^2-3y^2-3z^2)(y^2-2yz-z^2)(y^2+2yz-z^2)}{16}$ |   |   |   |   |   |                            |                            |                             |                              |                           |                             |                           |   |

*continued ...*

Table 10

| No.                                   | multipole | matrix   |   |   |   |   |   |                            |                            |                             |                           |                             |                            |                            |   |
|---------------------------------------|-----------|--|---|---|---|---|---|----------------------------|----------------------------|-----------------------------|---------------------------|-----------------------------|----------------------------|----------------------------|---|
| $\mathbb{M}_{7,0}^{(1,-1;a)}(T_1, 2)$ |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                          | 0                          | 0                           | 0                         | 0                           | 0                          | 0                          | 0 |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                          | 0                          | 0                           | 0                         | 0                           | 0                          | 0                          | 0 |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                          | 0                          | 0                           | 0                         | 0                           | 0                          | 0                          | 0 |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                          | 0                          | 0                           | 0                         | 0                           | 0                          | 0                          | 0 |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                          | 0                          | 0                           | 0                         | 0                           | 0                          | 0                          | 0 |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                          | 0                          | 0                           | 0                         | 0                           | 0                          | 0                          | 0 |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{26}}{832}$   | 0                          | $\frac{\sqrt{130}}{832}$    | 0                         | $-\frac{25\sqrt{78}}{832}$  | 0                          | $-\frac{\sqrt{182}}{64}$   | 0 |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{26}}{832}$   | $-\frac{3\sqrt{546}}{832}$ | 0                           | $-\frac{\sqrt{910}}{832}$ | 0                           | $\frac{25\sqrt{182}}{832}$ | 0                          | 0 |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{546}}{832}$ | 0                          | $\frac{3\sqrt{2730}}{832}$  | 0                         | $\frac{3\sqrt{182}}{832}$   | 0                          | $-\frac{25\sqrt{78}}{832}$ | 0 |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{130}}{832}$   | 0                          | $\frac{3\sqrt{2730}}{832}$  | 0                         | $-\frac{15\sqrt{182}}{832}$ | 0                          | $-\frac{\sqrt{910}}{832}$  | 0 |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{910}}{832}$  | 0                          | $-\frac{15\sqrt{182}}{832}$ | 0                         | $\frac{3\sqrt{2730}}{832}$  | 0                          | $\frac{\sqrt{130}}{832}$   | 0 |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | $-\frac{25\sqrt{78}}{832}$ | 0                          | $\frac{3\sqrt{182}}{832}$   | 0                         | $\frac{3\sqrt{2730}}{832}$  | 0                          | $-\frac{3\sqrt{546}}{832}$ | 0 |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | $\frac{25\sqrt{182}}{832}$ | 0                          | $-\frac{\sqrt{910}}{832}$   | 0                         | $-\frac{3\sqrt{546}}{832}$  | 0                          | $\frac{3\sqrt{26}}{832}$   | 0 |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{182}}{64}$   | 0                          | $-\frac{25\sqrt{78}}{832}$  | 0                         | $\frac{\sqrt{130}}{832}$    | 0                          | $\frac{3\sqrt{26}}{832}$   | 0 |
| 996                                   | symmetry  | $-\frac{\sqrt{231}y(x^2-2xz-z^2)(x^2+2xz-z^2)(3x^2-10y^2+3z^2)}{16}$ |   |   |   |   |   |                            |                            |                             |                           |                             |                            |                            |   |

*continued ...*

Table 10

| No.                                   | multipole | matrix   |   |   |   |   |   |                             |                             |                              |                              |                             |                              |                              |                            |
|---------------------------------------|-----------|--|---|---|---|---|---|-----------------------------|-----------------------------|------------------------------|------------------------------|-----------------------------|------------------------------|------------------------------|----------------------------|
| $\mathbb{M}_{7,1}^{(1,-1;a)}(T_1, 2)$ |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                           | 0                           | 0                            | 0                            | 0                           | 0                            | 0                            | 0                          |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                           | 0                           | 0                            | 0                            | 0                           | 0                            | 0                            | 0                          |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                           | 0                           | 0                            | 0                            | 0                           | 0                            | 0                            | 0                          |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                           | 0                           | 0                            | 0                            | 0                           | 0                            | 0                            | 0                          |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                           | 0                           | 0                            | 0                            | 0                           | 0                            | 0                            | 0                          |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                           | 0                           | 0                            | 0                            | 0                           | 0                            | 0                            | 0                          |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{26}i}{832}$  | 0                           | $\frac{\sqrt{130}i}{832}$    | 0                            | $\frac{25\sqrt{78}i}{832}$  | 0                            | $-\frac{\sqrt{182}i}{64}$    |                            |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{26}i}{832}$   | 0                           | $\frac{3\sqrt{546}i}{832}$   | 0                            | $-\frac{\sqrt{910}i}{832}$  | 0                            | $-\frac{25\sqrt{182}i}{832}$ | 0                          |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{546}i}{832}$ | 0                           | $-\frac{3\sqrt{2730}i}{832}$ | 0                            | $\frac{3\sqrt{182}i}{832}$  | 0                            | $\frac{25\sqrt{78}i}{832}$   |                            |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{130}i}{832}$  | 0                           | $\frac{3\sqrt{2730}i}{832}$  | 0                            | $\frac{15\sqrt{182}i}{832}$ | 0                            | $-\frac{\sqrt{910}i}{832}$   | 0                          |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                           | $\frac{\sqrt{910}i}{832}$   | 0                            | $-\frac{15\sqrt{182}i}{832}$ | 0                           | $-\frac{3\sqrt{2730}i}{832}$ | 0                            | $\frac{\sqrt{130}i}{832}$  |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | $-\frac{25\sqrt{78}i}{832}$ | 0                           | $-\frac{3\sqrt{182}i}{832}$  | 0                            | $\frac{3\sqrt{2730}i}{832}$ | 0                            | $\frac{3\sqrt{546}i}{832}$   | 0                          |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                           | $\frac{25\sqrt{182}i}{832}$ | 0                            | $\frac{\sqrt{910}i}{832}$    | 0                           | $-\frac{3\sqrt{546}i}{832}$  | 0                            | $-\frac{3\sqrt{26}i}{832}$ |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{182}i}{64}$    | 0                           | $-\frac{25\sqrt{78}i}{832}$  | 0                            | $-\frac{\sqrt{130}i}{832}$  | 0                            | $\frac{3\sqrt{26}i}{832}$    | 0                          |
| 997                                   | symmetry  | $-\frac{\sqrt{231}z(x^2-2xy-y^2)(x^2+2xy-y^2)(3x^2+3y^2-10z^2)}{16}$ |   |   |   |   |   |                             |                             |                              |                              |                             |                              |                              |                            |

*continued ...*

Table 10

| No.                                   | multipole | matrix  |   |   |   |   |   |                          |                         |                          |                          |                         |                          |                         |   |
|---------------------------------------|-----------|---|---|---|---|---|---|--------------------------|-------------------------|--------------------------|--------------------------|-------------------------|--------------------------|-------------------------|---|
| $\mathbb{M}_{7,2}^{(1,-1;a)}(T_1, 2)$ |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        | 0                       | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        | 0                       | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        | 0                       | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        | 0                       | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        | 0                       | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        | 0                       | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        | 0                       | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | 0                       | 0                        | $-\frac{\sqrt{130}}{52}$ | 0                       | 0                        | 0                       | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | 0                       | 0                        | 0                        | $\frac{\sqrt{546}}{52}$ | 0                        | 0                       | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | 0                       | 0                        | 0                        | 0                       | $-\frac{\sqrt{546}}{52}$ | 0                       | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | 0                       | 0                        | 0                        | 0                       | 0                        | $\frac{\sqrt{130}}{52}$ | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{130}}{52}$ | 0                       | 0                        | 0                        | 0                       | 0                        | 0                       | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | $\frac{\sqrt{546}}{52}$ | 0                        | 0                        | 0                       | 0                        | 0                       | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | 0                       | $-\frac{\sqrt{546}}{52}$ | 0                        | 0                       | 0                        | 0                       | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                        | 0                       | 0                        | $\frac{\sqrt{130}}{52}$  | 0                       | 0                        | 0                       | 0 |
| 998                                   | symmetry  | $\frac{\sqrt{6006}x(y-z)(y+z)(y^2-4yz+z^2)(y^2+4yz+z^2)}{32}$ |   |   |   |   |   |                          |                         |                          |                          |                         |                          |                         |   |

*continued ...*



Table 10

| No.                                   | multipole | matrix   |   |   |   |   |   |                          |   |                          |   |                          |   |                          |   |
|---------------------------------------|-----------|--|---|---|---|---|---|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|
| $\mathbb{M}_{7,0}^{(1,-1;a)}(T_2, 1)$ |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                        | 0 | 0                        | 0 | 0                        | 0 | 0                        | 0 |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                        | 0 | 0                        | 0 | 0                        | 0 | 0                        | 0 |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                        | 0 | 0                        | 0 | 0                        | 0 | 0                        | 0 |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                        | 0 | 0                        | 0 | 0                        | 0 | 0                        | 0 |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                        | 0 | 0                        | 0 | 0                        | 0 | 0                        | 0 |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                        | 0 | 0                        | 0 | 0                        | 0 | 0                        | 0 |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | $\frac{1}{64}$           | 0 | $\frac{3\sqrt{5}}{64}$   | 0 | $\frac{5\sqrt{3}}{64}$   | 0 | $\frac{\sqrt{7}}{64}$    | 0 |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | $\frac{1}{64}$           | 0 | $-\frac{\sqrt{21}}{64}$  | 0 | $-\frac{3\sqrt{35}}{64}$ | 0 | $-\frac{5\sqrt{7}}{64}$  | 0 |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{21}}{64}$  | 0 | $\frac{\sqrt{105}}{64}$  | 0 | $\frac{9\sqrt{7}}{64}$   | 0 | $\frac{5\sqrt{3}}{64}$   | 0 |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{5}}{64}$   | 0 | $\frac{\sqrt{105}}{64}$  | 0 | $-\frac{5\sqrt{7}}{64}$  | 0 | $-\frac{3\sqrt{35}}{64}$ | 0 |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{35}}{64}$ | 0 | $-\frac{5\sqrt{7}}{64}$  | 0 | $\frac{\sqrt{105}}{64}$  | 0 | $\frac{3\sqrt{5}}{64}$   | 0 |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{3}}{64}$   | 0 | $\frac{9\sqrt{7}}{64}$   | 0 | $\frac{\sqrt{105}}{64}$  | 0 | $-\frac{\sqrt{21}}{64}$  | 0 |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{7}}{64}$  | 0 | $-\frac{3\sqrt{35}}{64}$ | 0 | $-\frac{\sqrt{21}}{64}$  | 0 | $\frac{1}{64}$           | 0 |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}}{64}$    | 0 | $\frac{5\sqrt{3}}{64}$   | 0 | $\frac{3\sqrt{5}}{64}$   | 0 | $\frac{1}{64}$           | 0 |
| 999                                   | symmetry  | $-\frac{\sqrt{6006}y(x-z)(x+z)(x^2-4xz+z^2)(x^2+4xz+z^2)}{32}$ |   |   |   |   |   |                          |   |                          |   |                          |   |                          |   |

*continued ...*

Table 10

| No.                                   | multipole | matrix  |   |   |   |   |   |                           |   |                           |   |                           |   |                          |   |
|---------------------------------------|-----------|---|---|---|---|---|---|---------------------------|---|---------------------------|---|---------------------------|---|--------------------------|---|
| $\mathbb{M}_{7,1}^{(1,-1;a)}(T_2, 1)$ |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                         | 0 | 0                         | 0 | 0                         | 0 | 0                        | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                         | 0 | 0                         | 0 | 0                         | 0 | 0                        | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                         | 0 | 0                         | 0 | 0                         | 0 | 0                        | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                         | 0 | 0                         | 0 | 0                         | 0 | 0                        | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                         | 0 | 0                         | 0 | 0                         | 0 | 0                        | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                         | 0 | 0                         | 0 | 0                         | 0 | 0                        | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $\frac{i}{64}$            | 0 | $-\frac{3\sqrt{5}i}{64}$  | 0 | $\frac{5\sqrt{3}i}{64}$   | 0 | $-\frac{\sqrt{7}i}{64}$  | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $-\frac{i}{64}$           | 0 | $-\frac{\sqrt{21}i}{64}$  | 0 | $\frac{3\sqrt{35}i}{64}$  | 0 | $-\frac{5\sqrt{7}i}{64}$ | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{21}i}{64}$   | 0 | $\frac{\sqrt{105}i}{64}$  | 0 | $-\frac{9\sqrt{7}i}{64}$  | 0 | $\frac{5\sqrt{3}i}{64}$  | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $\frac{3\sqrt{5}i}{64}$   | 0 | $-\frac{\sqrt{105}i}{64}$ | 0 | $-\frac{5\sqrt{7}i}{64}$  | 0 | $\frac{3\sqrt{35}i}{64}$ | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $-\frac{3\sqrt{35}i}{64}$ | 0 | $\frac{5\sqrt{7}i}{64}$   | 0 | $\frac{\sqrt{105}i}{64}$  | 0 | $-\frac{3\sqrt{5}i}{64}$ | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $-\frac{5\sqrt{3}i}{64}$  | 0 | $\frac{9\sqrt{7}i}{64}$   | 0 | $-\frac{\sqrt{105}i}{64}$ | 0 | $-\frac{\sqrt{21}i}{64}$ | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $\frac{5\sqrt{7}i}{64}$   | 0 | $-\frac{3\sqrt{35}i}{64}$ | 0 | $\frac{\sqrt{21}i}{64}$   | 0 | $\frac{i}{64}$           | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{7}i}{64}$    | 0 | $-\frac{5\sqrt{3}i}{64}$  | 0 | $\frac{3\sqrt{5}i}{64}$   | 0 | $-\frac{i}{64}$          | 0 |
| 1000                                  | symmetry  | $\frac{\sqrt{6006}z(x-y)(x+y)(x^2-4xy+y^2)(x^2+4xy+y^2)}{32}$ |   |   |   |   |   |                           |   |                           |   |                           |   |                          |   |

*continued ...*



Table 10

| No.                                   | multipole | matrix   |   |   |   |   |   |                               |   |                               |   |                               |   |                               |   |   |
|---------------------------------------|-----------|--|---|---|---|---|---|-------------------------------|---|-------------------------------|---|-------------------------------|---|-------------------------------|---|---|
| $\mathbb{M}_{7,0}^{(1,-1;a)}(T_2, 2)$ |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                             | 0 | 0                             | 0 | 0                             | 0 | 0                             | 0 | 0 |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                             | 0 | 0                             | 0 | 0                             | 0 | 0                             | 0 | 0 |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                             | 0 | 0                             | 0 | 0                             | 0 | 0                             | 0 | 0 |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                             | 0 | 0                             | 0 | 0                             | 0 | 0                             | 0 | 0 |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                             | 0 | 0                             | 0 | 0                             | 0 | 0                             | 0 | 0 |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | 0                             | 0 | 0                             | 0 | 0                             | 0 | 0                             | 0 | 0 |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | $\frac{15\sqrt{143}}{9152}$   | 0 | $-\frac{19\sqrt{715}}{9152}$  | 0 | $\frac{\sqrt{429}}{832}$      | 0 | $\frac{\sqrt{1001}}{64}$      |   |   |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | $\frac{15\sqrt{143}}{9152}$   | 0 | $-\frac{15\sqrt{3003}}{9152}$ | 0 | $\frac{19\sqrt{5005}}{9152}$  | 0 | $-\frac{\sqrt{1001}}{832}$    | 0 |   |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | $-\frac{15\sqrt{3003}}{9152}$ | 0 | $\frac{15\sqrt{15015}}{9152}$ | 0 | $-\frac{57\sqrt{1001}}{9152}$ | 0 | $\frac{\sqrt{429}}{832}$      |   |   |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | $-\frac{19\sqrt{715}}{9152}$  | 0 | $\frac{15\sqrt{15015}}{9152}$ | 0 | $-\frac{75\sqrt{1001}}{9152}$ | 0 | $\frac{19\sqrt{5005}}{9152}$  | 0 |   |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | $\frac{19\sqrt{5005}}{9152}$  | 0 | $-\frac{75\sqrt{1001}}{9152}$ | 0 | $\frac{15\sqrt{15015}}{9152}$ | 0 | $-\frac{19\sqrt{715}}{9152}$  |   |   |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{429}}{832}$      | 0 | $-\frac{57\sqrt{1001}}{9152}$ | 0 | $\frac{15\sqrt{15015}}{9152}$ | 0 | $-\frac{15\sqrt{3003}}{9152}$ | 0 |   |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{1001}}{832}$    | 0 | $\frac{19\sqrt{5005}}{9152}$  | 0 | $-\frac{15\sqrt{3003}}{9152}$ | 0 | $\frac{15\sqrt{143}}{9152}$   |   |   |
|                                       |           | 0  | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{1001}}{64}$      | 0 | $\frac{\sqrt{429}}{832}$      | 0 | $-\frac{19\sqrt{715}}{9152}$  | 0 | $\frac{15\sqrt{143}}{9152}$   | 0 |   |
| 1002                                  | symmetry  | $-\frac{\sqrt{42}y(x-z)(x+z)(15x^4-80x^2y^2+30x^2z^2+48y^4-80y^2z^2+15z^4)}{32}$ |   |   |   |   |   |                               |   |                               |   |                               |   |                               |   |   |

*continued ...*

Table 10

| No.                                   | multipole | matrix  |   |   |   |   |   |                               |   |                                 |   |                                 |   |                                |   |
|---------------------------------------|-----------|---|---|---|---|---|---|-------------------------------|---|---------------------------------|---|---------------------------------|---|--------------------------------|---|
| $\mathbb{M}_{7,1}^{(1,-1;a)}(T_2, 2)$ |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                             | 0 | 0                               | 0 | 0                               | 0 | 0                              | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                             | 0 | 0                               | 0 | 0                               | 0 | 0                              | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                             | 0 | 0                               | 0 | 0                               | 0 | 0                              | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                             | 0 | 0                               | 0 | 0                               | 0 | 0                              | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                             | 0 | 0                               | 0 | 0                               | 0 | 0                              | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | 0                             | 0 | 0                               | 0 | 0                               | 0 | 0                              | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $\frac{15\sqrt{143}i}{9152}$  | 0 | $\frac{19\sqrt{715}i}{9152}$    | 0 | $\frac{\sqrt{429}i}{832}$       | 0 | $-\frac{\sqrt{1001}i}{64}$     |   |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $-\frac{15\sqrt{143}i}{9152}$ | 0 | $-\frac{15\sqrt{3003}i}{9152}$  | 0 | $-\frac{19\sqrt{5005}i}{9152}$  | 0 | $-\frac{\sqrt{1001}i}{832}$    | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $\frac{15\sqrt{3003}i}{9152}$ | 0 | $\frac{15\sqrt{15015}i}{9152}$  | 0 | $\frac{57\sqrt{1001}i}{9152}$   | 0 | $\frac{\sqrt{429}i}{832}$      |   |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $-\frac{19\sqrt{715}i}{9152}$ | 0 | $-\frac{15\sqrt{15015}i}{9152}$ | 0 | $-\frac{75\sqrt{1001}i}{9152}$  | 0 | $-\frac{19\sqrt{5005}i}{9152}$ | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $\frac{19\sqrt{5005}i}{9152}$ | 0 | $\frac{75\sqrt{1001}i}{9152}$   | 0 | $\frac{15\sqrt{15015}i}{9152}$  | 0 | $\frac{19\sqrt{715}i}{9152}$   |   |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{429}i}{832}$    | 0 | $-\frac{57\sqrt{1001}i}{9152}$  | 0 | $-\frac{15\sqrt{15015}i}{9152}$ | 0 | $-\frac{15\sqrt{3003}i}{9152}$ | 0 |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{1001}i}{832}$    | 0 | $\frac{19\sqrt{5005}i}{9152}$   | 0 | $\frac{15\sqrt{3003}i}{9152}$   | 0 | $\frac{15\sqrt{143}i}{9152}$   |   |
|                                       |           | 0   | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{1001}i}{64}$     | 0 | $-\frac{\sqrt{429}i}{832}$      | 0 | $-\frac{19\sqrt{715}i}{9152}$   | 0 | $-\frac{15\sqrt{143}i}{9152}$  | 0 |
| 1003                                  | symmetry  | $\frac{\sqrt{42}z(x-y)(x+y)(15x^4+30x^2y^2-80x^2z^2+15y^4-80y^2z^2+48z^4)}{32}$ |   |   |   |   |   |                               |   |                                 |   |                                 |   |                                |   |

*continued ...*

Table 10

| No.                                   | multipole | matrix |   |   |   |   |   |                           |                             |                            |                            |                             |                            |                          |   |
|---------------------------------------|-----------|--------|---|---|---|---|---|---------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------|----------------------------|--------------------------|---|
| $\mathbb{M}_{7,2}^{(1,-1;a)}(T_2, 2)$ |           | 0      | 0 | 0 | 0 | 0 | 0 | 0                         | 0                           | 0                          | 0                          | 0                           | 0                          | 0                        | 0 |
|                                       |           | 0      | 0 | 0 | 0 | 0 | 0 | 0                         | 0                           | 0                          | 0                          | 0                           | 0                          | 0                        | 0 |
|                                       |           | 0      | 0 | 0 | 0 | 0 | 0 | 0                         | 0                           | 0                          | 0                          | 0                           | 0                          | 0                        | 0 |
|                                       |           | 0      | 0 | 0 | 0 | 0 | 0 | 0                         | 0                           | 0                          | 0                          | 0                           | 0                          | 0                        | 0 |
|                                       |           | 0      | 0 | 0 | 0 | 0 | 0 | 0                         | 0                           | 0                          | 0                          | 0                           | 0                          | 0                        | 0 |
|                                       |           | 0      | 0 | 0 | 0 | 0 | 0 | 0                         | 0                           | 0                          | 0                          | 0                           | 0                          | 0                        | 0 |
|                                       |           | 0      | 0 | 0 | 0 | 0 | 0 | 0                         | $-\frac{\sqrt{429}}{286}$   | 0                          | 0                          | 0                           | 0                          | 0                        | 0 |
|                                       |           | 0      | 0 | 0 | 0 | 0 | 0 | 0                         | 0                           | $\frac{\sqrt{5005}}{286}$  | 0                          | 0                           | 0                          | 0                        | 0 |
|                                       |           | 0      | 0 | 0 | 0 | 0 | 0 | $-\frac{\sqrt{429}}{286}$ | 0                           | 0                          | 0                          | $-\frac{\sqrt{15015}}{286}$ | 0                          | 0                        | 0 |
|                                       |           | 0      | 0 | 0 | 0 | 0 | 0 | $\frac{\sqrt{5005}}{286}$ | 0                           | 0                          | 0                          | $\frac{\sqrt{15015}}{286}$  | 0                          | 0                        | 0 |
|                                       |           | 0      | 0 | 0 | 0 | 0 | 0 | 0                         | $-\frac{\sqrt{15015}}{286}$ | 0                          | 0                          | 0                           | $-\frac{\sqrt{5005}}{286}$ | 0                        | 0 |
|                                       |           | 0      | 0 | 0 | 0 | 0 | 0 | 0                         | 0                           | $\frac{\sqrt{15015}}{286}$ | 0                          | 0                           | 0                          | $\frac{\sqrt{429}}{286}$ | 0 |
|                                       |           | 0      | 0 | 0 | 0 | 0 | 0 | 0                         | 0                           | 0                          | $-\frac{\sqrt{5005}}{286}$ | 0                           | 0                          | 0                        | 0 |
|                                       |           | 0      | 0 | 0 | 0 | 0 | 0 | 0                         | 0                           | 0                          | 0                          | $\frac{\sqrt{429}}{286}$    | 0                          | 0                        | 0 |
| 1004                                  | symmetry  | $x$    |   |   |   |   |   |                           |                             |                            |                            |                             |                            |                          |   |

*continued ...*

Table 10

| No.                               | multipole | matrix                    |                           |                           |                           |                            |                          |                         |                           |                           |                            |                            |                           |                            |                          |
|-----------------------------------|-----------|---------------------------|---------------------------|---------------------------|---------------------------|----------------------------|--------------------------|-------------------------|---------------------------|---------------------------|----------------------------|----------------------------|---------------------------|----------------------------|--------------------------|
| $\mathbb{M}_{1,0}^{(1,1;a)}(T_1)$ |           | 0                         | $\frac{2\sqrt{21}}{49}$   | 0                         | 0                         | 0                          | 0                        | $\frac{3\sqrt{10}}{56}$ | 0                         | $-\frac{\sqrt{210}}{392}$ | 0                          | 0                          | 0                         | 0                          | 0                        |
|                                   |           | $\frac{2\sqrt{21}}{49}$   | 0                         | $\frac{4\sqrt{210}}{245}$ | 0                         | 0                          | 0                        | 0                       | $\frac{15\sqrt{14}}{392}$ | 0                         | $-\frac{3\sqrt{70}}{392}$  | 0                          | 0                         | 0                          | 0                        |
|                                   |           | 0                         | $\frac{4\sqrt{210}}{245}$ | 0                         | $\frac{6\sqrt{105}}{245}$ | 0                          | 0                        | 0                       | 0                         | $\frac{5\sqrt{21}}{196}$  | 0                          | $-\frac{3\sqrt{35}}{196}$  | 0                         | 0                          | 0                        |
|                                   |           | 0                         | 0                         | $\frac{6\sqrt{105}}{245}$ | 0                         | $\frac{4\sqrt{210}}{245}$  | 0                        | 0                       | 0                         | 0                         | $\frac{3\sqrt{35}}{196}$   | 0                          | $-\frac{5\sqrt{21}}{196}$ | 0                          | 0                        |
|                                   |           | 0                         | 0                         | 0                         | $\frac{4\sqrt{210}}{245}$ | 0                          | $\frac{2\sqrt{21}}{49}$  | 0                       | 0                         | 0                         | 0                          | $\frac{3\sqrt{70}}{392}$   | 0                         | $-\frac{15\sqrt{14}}{392}$ | 0                        |
|                                   |           | 0                         | 0                         | 0                         | 0                         | $\frac{2\sqrt{21}}{49}$    | 0                        | 0                       | 0                         | 0                         | 0                          | 0                          | $\frac{\sqrt{210}}{392}$  | 0                          | $-\frac{3\sqrt{10}}{56}$ |
|                                   |           | $\frac{3\sqrt{10}}{56}$   | 0                         | 0                         | 0                         | 0                          | 0                        | 0                       | $-\frac{\sqrt{15}}{42}$   | 0                         | 0                          | 0                          | 0                         | 0                          | 0                        |
|                                   |           | 0                         | $\frac{15\sqrt{14}}{392}$ | 0                         | 0                         | 0                          | 0                        | $-\frac{\sqrt{15}}{42}$ | 0                         | $-\frac{\sqrt{35}}{49}$   | 0                          | 0                          | 0                         | 0                          | 0                        |
|                                   |           | $-\frac{\sqrt{210}}{392}$ | 0                         | $\frac{5\sqrt{21}}{196}$  | 0                         | 0                          | 0                        | 0                       | $-\frac{\sqrt{35}}{49}$   | 0                         | $-\frac{5\sqrt{7}}{98}$    | 0                          | 0                         | 0                          | 0                        |
|                                   |           | 0                         | $-\frac{3\sqrt{70}}{392}$ | 0                         | $\frac{3\sqrt{35}}{196}$  | 0                          | 0                        | 0                       | 0                         | $-\frac{5\sqrt{7}}{98}$   | 0                          | $-\frac{2\sqrt{105}}{147}$ | 0                         | 0                          | 0                        |
|                                   |           | 0                         | 0                         | $-\frac{3\sqrt{35}}{196}$ | 0                         | $\frac{3\sqrt{70}}{392}$   | 0                        | 0                       | 0                         | 0                         | $-\frac{2\sqrt{105}}{147}$ | 0                          | $-\frac{5\sqrt{7}}{98}$   | 0                          | 0                        |
|                                   |           | 0                         | 0                         | 0                         | $-\frac{5\sqrt{21}}{196}$ | 0                          | $\frac{\sqrt{210}}{392}$ | 0                       | 0                         | 0                         | 0                          | $-\frac{5\sqrt{7}}{98}$    | 0                         | $-\frac{\sqrt{35}}{49}$    | 0                        |
|                                   |           | 0                         | 0                         | 0                         | 0                         | $-\frac{15\sqrt{14}}{392}$ | 0                        | 0                       | 0                         | 0                         | 0                          | 0                          | $-\frac{\sqrt{35}}{49}$   | 0                          | $-\frac{\sqrt{15}}{42}$  |
|                                   |           | 0                         | 0                         | 0                         | 0                         | 0                          | $-\frac{3\sqrt{10}}{56}$ | 0                       | 0                         | 0                         | 0                          | 0                          | 0                         | $-\frac{\sqrt{15}}{42}$    | 0                        |
| 1005                              | symmetry  | $y$                       |                           |                           |                           |                            |                          |                         |                           |                           |                            |                            |                           |                            |                          |

*continued ...*

Table 10

| No.                               | multipole | matrix                     |                             |                             |                             |                             |                            |                          |                            |                           |                             |                            |                           |                            |                          |
|-----------------------------------|-----------|----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|----------------------------|--------------------------|----------------------------|---------------------------|-----------------------------|----------------------------|---------------------------|----------------------------|--------------------------|
| $\mathbb{M}_{1,1}^{(1,1;a)}(T_1)$ |           | 0                          | $-\frac{2\sqrt{21}i}{49}$   | 0                           | 0                           | 0                           | 0                          | $\frac{3\sqrt{10}i}{56}$ | 0                          | $\frac{\sqrt{210}i}{392}$ | 0                           | 0                          | 0                         | 0                          | 0                        |
|                                   |           | $\frac{2\sqrt{21}i}{49}$   | 0                           | $-\frac{4\sqrt{210}i}{245}$ | 0                           | 0                           | 0                          | 0                        | $\frac{15\sqrt{14}i}{392}$ | 0                         | $\frac{3\sqrt{70}i}{392}$   | 0                          | 0                         | 0                          | 0                        |
|                                   |           | 0                          | $\frac{4\sqrt{210}i}{245}$  | 0                           | $-\frac{6\sqrt{105}i}{245}$ | 0                           | 0                          | 0                        | 0                          | $\frac{5\sqrt{21}i}{196}$ | 0                           | $\frac{3\sqrt{35}i}{196}$  | 0                         | 0                          | 0                        |
|                                   |           | 0                          | 0                           | $\frac{6\sqrt{105}i}{245}$  | 0                           | $-\frac{4\sqrt{210}i}{245}$ | 0                          | 0                        | 0                          | 0                         | $\frac{3\sqrt{35}i}{196}$   | 0                          | $\frac{5\sqrt{21}i}{196}$ | 0                          | 0                        |
|                                   |           | 0                          | 0                           | 0                           | $\frac{4\sqrt{210}i}{245}$  | 0                           | $-\frac{2\sqrt{21}i}{49}$  | 0                        | 0                          | 0                         | 0                           | $\frac{3\sqrt{70}i}{392}$  | 0                         | $\frac{15\sqrt{14}i}{392}$ | 0                        |
|                                   |           | 0                          | 0                           | 0                           | 0                           | $\frac{2\sqrt{21}i}{49}$    | 0                          | 0                        | 0                          | 0                         | 0                           | 0                          | $\frac{\sqrt{210}i}{392}$ | 0                          | $\frac{3\sqrt{10}i}{56}$ |
|                                   |           | $-\frac{3\sqrt{10}i}{56}$  | 0                           | 0                           | 0                           | 0                           | 0                          | 0                        | $\frac{\sqrt{15}i}{42}$    | 0                         | 0                           | 0                          | 0                         | 0                          | 0                        |
|                                   |           | 0                          | $-\frac{15\sqrt{14}i}{392}$ | 0                           | 0                           | 0                           | 0                          | $-\frac{\sqrt{15}i}{42}$ | 0                          | $\frac{\sqrt{35}i}{49}$   | 0                           | 0                          | 0                         | 0                          | 0                        |
|                                   |           | $-\frac{\sqrt{210}i}{392}$ | 0                           | $-\frac{5\sqrt{21}i}{196}$  | 0                           | 0                           | 0                          | 0                        | $-\frac{\sqrt{35}i}{49}$   | 0                         | $\frac{5\sqrt{7}i}{98}$     | 0                          | 0                         | 0                          | 0                        |
|                                   |           | 0                          | $-\frac{3\sqrt{70}i}{392}$  | 0                           | $-\frac{3\sqrt{35}i}{196}$  | 0                           | 0                          | 0                        | 0                          | $-\frac{5\sqrt{7}i}{98}$  | 0                           | $\frac{2\sqrt{105}i}{147}$ | 0                         | 0                          | 0                        |
|                                   |           | 0                          | 0                           | $-\frac{3\sqrt{35}i}{196}$  | 0                           | $-\frac{3\sqrt{70}i}{392}$  | 0                          | 0                        | 0                          | 0                         | $-\frac{2\sqrt{105}i}{147}$ | 0                          | $\frac{5\sqrt{7}i}{98}$   | 0                          | 0                        |
|                                   |           | 0                          | 0                           | 0                           | $-\frac{5\sqrt{21}i}{196}$  | 0                           | $-\frac{\sqrt{210}i}{392}$ | 0                        | 0                          | 0                         | 0                           | $-\frac{5\sqrt{7}i}{98}$   | 0                         | $\frac{\sqrt{35}i}{49}$    | 0                        |
|                                   |           | 0                          | 0                           | 0                           | 0                           | $-\frac{15\sqrt{14}i}{392}$ | 0                          | 0                        | 0                          | 0                         | 0                           | 0                          | $-\frac{\sqrt{35}i}{49}$  | 0                          | $\frac{\sqrt{15}i}{42}$  |
|                                   |           | 0                          | 0                           | 0                           | 0                           | 0                           | $-\frac{3\sqrt{10}i}{56}$  | 0                        | 0                          | 0                         | 0                           | 0                          | 0                         | $-\frac{\sqrt{15}i}{42}$   | 0                        |
| 1006                              | symmetry  | $z$                        |                             |                             |                             |                             |                            |                          |                            |                           |                             |                            |                           |                            |                          |

*continued ...*



Table 10

| No.                               | multipole | matrix                    |                           |                           |                            |                            |                           |                          |                            |                           |                           |                          |                           |                           |                         |
|-----------------------------------|-----------|---------------------------|---------------------------|---------------------------|----------------------------|----------------------------|---------------------------|--------------------------|----------------------------|---------------------------|---------------------------|--------------------------|---------------------------|---------------------------|-------------------------|
| $\mathbb{M}_{1,2}^{(1,1;a)}(T_1)$ |           | $\frac{2\sqrt{105}}{49}$  | 0                         | 0                         | 0                          | 0                          | 0                         | 0                        | $-\frac{3\sqrt{70}}{196}$  | 0                         | 0                         | 0                        | 0                         | 0                         | 0                       |
|                                   |           | 0                         | $\frac{6\sqrt{105}}{245}$ | 0                         | 0                          | 0                          | 0                         | 0                        | 0                          | $-\frac{5\sqrt{42}}{196}$ | 0                         | 0                        | 0                         | 0                         | 0                       |
|                                   |           | 0                         | 0                         | $\frac{2\sqrt{105}}{245}$ | 0                          | 0                          | 0                         | 0                        | 0                          | 0                         | $-\frac{3\sqrt{35}}{98}$  | 0                        | 0                         | 0                         | 0                       |
|                                   |           | 0                         | 0                         | 0                         | $-\frac{2\sqrt{105}}{245}$ | 0                          | 0                         | 0                        | 0                          | 0                         | 0                         | $-\frac{3\sqrt{35}}{98}$ | 0                         | 0                         | 0                       |
|                                   |           | 0                         | 0                         | 0                         | 0                          | $-\frac{6\sqrt{105}}{245}$ | 0                         | 0                        | 0                          | 0                         | 0                         | 0                        | $-\frac{5\sqrt{42}}{196}$ | 0                         | 0                       |
|                                   |           | 0                         | 0                         | 0                         | 0                          | 0                          | $-\frac{2\sqrt{105}}{49}$ | 0                        | 0                          | 0                         | 0                         | 0                        | 0                         | $-\frac{3\sqrt{70}}{196}$ | 0                       |
|                                   |           | 0                         | 0                         | 0                         | 0                          | 0                          | 0                         | $-\frac{\sqrt{105}}{42}$ | 0                          | 0                         | 0                         | 0                        | 0                         | 0                         | 0                       |
|                                   |           | $-\frac{3\sqrt{70}}{196}$ | 0                         | 0                         | 0                          | 0                          | 0                         | 0                        | $-\frac{5\sqrt{105}}{294}$ | 0                         | 0                         | 0                        | 0                         | 0                         | 0                       |
|                                   |           | 0                         | $-\frac{5\sqrt{42}}{196}$ | 0                         | 0                          | 0                          | 0                         | 0                        | 0                          | $-\frac{\sqrt{105}}{98}$  | 0                         | 0                        | 0                         | 0                         | 0                       |
|                                   |           | 0                         | 0                         | $-\frac{3\sqrt{35}}{98}$  | 0                          | 0                          | 0                         | 0                        | 0                          | 0                         | $-\frac{\sqrt{105}}{294}$ | 0                        | 0                         | 0                         | 0                       |
|                                   |           | 0                         | 0                         | 0                         | $-\frac{3\sqrt{35}}{98}$   | 0                          | 0                         | 0                        | 0                          | 0                         | 0                         | $\frac{\sqrt{105}}{294}$ | 0                         | 0                         | 0                       |
|                                   |           | 0                         | 0                         | 0                         | 0                          | $-\frac{5\sqrt{42}}{196}$  | 0                         | 0                        | 0                          | 0                         | 0                         | 0                        | $\frac{\sqrt{105}}{98}$   | 0                         | 0                       |
|                                   |           | 0                         | 0                         | 0                         | 0                          | 0                          | $-\frac{3\sqrt{70}}{196}$ | 0                        | 0                          | 0                         | 0                         | 0                        | 0                         | $\frac{5\sqrt{105}}{294}$ | 0                       |
|                                   |           | 0                         | 0                         | 0                         | 0                          | 0                          | 0                         | 0                        | 0                          | 0                         | 0                         | 0                        | 0                         | 0                         | $\frac{\sqrt{105}}{42}$ |
| 1007                              | symmetry  | $\sqrt{15}xyz$            |                           |                           |                            |                            |                           |                          |                            |                           |                           |                          |                           |                           |                         |

*continued ...*

Table 10

| No.                           | multipole | matrix                        |                             |                            |                            |                             |                             |                          |                            |                           |                             |                             |                            |                            |                         |
|-------------------------------|-----------|-------------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|--------------------------|----------------------------|---------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|-------------------------|
| $\mathbb{M}_3^{(1,1;a)}(A_2)$ |           | 0                             | 0                           | $\frac{5\sqrt{462}i}{294}$ | 0                          | 0                           | 0                           | 0                        | 0                          | 0                         | $-\frac{\sqrt{154}i}{98}$   | 0                           | 0                          | 0                          | 0                       |
|                               |           | 0                             | 0                           | 0                          | $\frac{\sqrt{2310}i}{294}$ | 0                           | 0                           | $-\frac{\sqrt{22}i}{28}$ | 0                          | 0                         | 0                           | $-\frac{\sqrt{770}i}{196}$  | 0                          | 0                          | 0                       |
|                               |           | $-\frac{5\sqrt{462}i}{294}$   | 0                           | 0                          | 0                          | $-\frac{\sqrt{2310}i}{294}$ | 0                           | 0                        | $-\frac{\sqrt{77}i}{196}$  | 0                         | 0                           | 0                           | $-\frac{\sqrt{231}i}{196}$ | 0                          | 0                       |
|                               |           | 0                             | $-\frac{\sqrt{2310}i}{294}$ | 0                          | 0                          | 0                           | $-\frac{5\sqrt{462}i}{294}$ | 0                        | 0                          | $\frac{\sqrt{231}i}{196}$ | 0                           | 0                           | 0                          | $\frac{\sqrt{77}i}{196}$   | 0                       |
|                               |           | 0                             | 0                           | $\frac{\sqrt{2310}i}{294}$ | 0                          | 0                           | 0                           | 0                        | 0                          | 0                         | $\frac{\sqrt{770}i}{196}$   | 0                           | 0                          | 0                          | $\frac{\sqrt{22}i}{28}$ |
|                               |           | 0                             | 0                           | 0                          | $\frac{5\sqrt{462}i}{294}$ | 0                           | 0                           | 0                        | 0                          | 0                         | 0                           | $\frac{\sqrt{154}i}{98}$    | 0                          | 0                          | 0                       |
|                               |           | 0                             | $\frac{\sqrt{22}i}{28}$     | 0                          | 0                          | 0                           | 0                           | 0                        | 0                          | $-\frac{\sqrt{55}i}{77}$  | 0                           | 0                           | 0                          | 0                          | 0                       |
|                               |           | 0                             | 0                           | $\frac{\sqrt{77}i}{196}$   | 0                          | 0                           | 0                           | 0                        | 0                          | 0                         | $-\frac{3\sqrt{231}i}{539}$ | 0                           | 0                          | 0                          | 0                       |
|                               |           | 0                             | 0                           | 0                          | $-\frac{\sqrt{231}i}{196}$ | 0                           | 0                           | $\frac{\sqrt{55}i}{77}$  | 0                          | 0                         | 0                           | $-\frac{2\sqrt{77}i}{539}$  | 0                          | 0                          | 0                       |
|                               |           | $\frac{\sqrt{154}i}{98}$      | 0                           | 0                          | 0                          | $-\frac{\sqrt{770}i}{196}$  | 0                           | 0                        | $\frac{3\sqrt{231}i}{539}$ | 0                         | 0                           | 0                           | $\frac{2\sqrt{77}i}{539}$  | 0                          | 0                       |
|                               |           | 0                             | $\frac{\sqrt{770}i}{196}$   | 0                          | 0                          | 0                           | $-\frac{\sqrt{154}i}{98}$   | 0                        | 0                          | $\frac{2\sqrt{77}i}{539}$ | 0                           | 0                           | 0                          | $\frac{3\sqrt{231}i}{539}$ | 0                       |
|                               |           | 0                             | 0                           | $\frac{\sqrt{231}i}{196}$  | 0                          | 0                           | 0                           | 0                        | 0                          | 0                         | $-\frac{2\sqrt{77}i}{539}$  | 0                           | 0                          | 0                          | $\frac{\sqrt{55}i}{77}$ |
|                               |           | 0                             | 0                           | 0                          | $-\frac{\sqrt{77}i}{196}$  | 0                           | 0                           | 0                        | 0                          | 0                         | 0                           | $-\frac{3\sqrt{231}i}{539}$ | 0                          | 0                          | 0                       |
|                               |           | 0                             | 0                           | 0                          | 0                          | $-\frac{\sqrt{22}i}{28}$    | 0                           | 0                        | 0                          | 0                         | 0                           | 0                           | $-\frac{\sqrt{55}i}{77}$   | 0                          | 0                       |
| 1008                          | symmetry  | $\frac{x(2x^2-3y^2-3z^2)}{2}$ |                             |                            |                            |                             |                             |                          |                            |                           |                             |                             |                            |                            |                         |

*continued ...*

Table 10

| No.                               | multipole | matrix                         |                            |                            |                             |                            |                            |                           |                             |                            |                            |                            |                            |                            |                           |
|-----------------------------------|-----------|--------------------------------|----------------------------|----------------------------|-----------------------------|----------------------------|----------------------------|---------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|
| $\mathbb{M}_{3,0}^{(1,1;a)}(T_1)$ |           | 0                              | $\frac{\sqrt{385}}{98}$    | 0                          | $-\frac{5\sqrt{770}}{588}$  | 0                          | 0                          | $\frac{\sqrt{66}}{112}$   | 0                           | $-\frac{3\sqrt{154}}{392}$ | 0                          | $\frac{\sqrt{2310}}{784}$  | 0                          | 0                          | 0                         |
|                                   |           | $\frac{\sqrt{385}}{98}$        | 0                          | $-\frac{\sqrt{154}}{196}$  | 0                           | $-\frac{5\sqrt{77}}{147}$  | 0                          | 0                         | $-\frac{\sqrt{2310}}{784}$  | 0                          | $-\frac{\sqrt{462}}{392}$  | 0                          | $\frac{3\sqrt{770}}{784}$  | 0                          | 0                         |
|                                   |           | 0                              | $-\frac{\sqrt{154}}{196}$  | 0                          | $-\frac{\sqrt{77}}{49}$     | 0                          | $-\frac{5\sqrt{770}}{588}$ | $-\frac{\sqrt{165}}{112}$ | 0                           | $-\frac{3\sqrt{385}}{784}$ | 0                          | $\frac{\sqrt{231}}{784}$   | 0                          | $\frac{3\sqrt{1155}}{784}$ | 0                         |
|                                   |           | $-\frac{5\sqrt{770}}{588}$     | 0                          | $-\frac{\sqrt{77}}{49}$    | 0                           | $-\frac{\sqrt{154}}{196}$  | 0                          | 0                         | $-\frac{3\sqrt{1155}}{784}$ | 0                          | $-\frac{\sqrt{231}}{784}$  | 0                          | $\frac{3\sqrt{385}}{784}$  | 0                          | $\frac{\sqrt{165}}{112}$  |
|                                   |           | 0                              | $-\frac{5\sqrt{77}}{147}$  | 0                          | $-\frac{\sqrt{154}}{196}$   | 0                          | $\frac{\sqrt{385}}{98}$    | 0                         | 0                           | $-\frac{3\sqrt{770}}{784}$ | 0                          | $\frac{\sqrt{462}}{392}$   | 0                          | $\frac{\sqrt{2310}}{784}$  | 0                         |
|                                   |           | 0                              | 0                          | $-\frac{5\sqrt{770}}{588}$ | 0                           | $\frac{\sqrt{385}}{98}$    | 0                          | 0                         | 0                           | 0                          | $-\frac{\sqrt{2310}}{784}$ | 0                          | $\frac{3\sqrt{154}}{392}$  | 0                          | $-\frac{\sqrt{66}}{112}$  |
|                                   |           | $\frac{\sqrt{66}}{112}$        | 0                          | $-\frac{\sqrt{165}}{112}$  | 0                           | 0                          | 0                          | 0                         | $-\frac{3\sqrt{11}}{154}$   | 0                          | $\frac{\sqrt{55}}{154}$    | 0                          | 0                          | 0                          | 0                         |
|                                   |           | 0                              | $-\frac{\sqrt{2310}}{784}$ | 0                          | $-\frac{3\sqrt{1155}}{784}$ | 0                          | 0                          | $-\frac{3\sqrt{11}}{154}$ | 0                           | $-\frac{\sqrt{231}}{1078}$ | 0                          | $\frac{2\sqrt{385}}{539}$  | 0                          | 0                          | 0                         |
|                                   |           | $-\frac{3\sqrt{154}}{392}$     | 0                          | $-\frac{3\sqrt{385}}{784}$ | 0                           | $-\frac{3\sqrt{770}}{784}$ | 0                          | 0                         | $-\frac{\sqrt{231}}{1078}$  | 0                          | $\frac{\sqrt{1155}}{1078}$ | 0                          | $\frac{5\sqrt{77}}{539}$   | 0                          | 0                         |
|                                   |           | 0                              | $-\frac{\sqrt{462}}{392}$  | 0                          | $-\frac{\sqrt{231}}{784}$   | 0                          | $-\frac{\sqrt{2310}}{784}$ | $\frac{\sqrt{55}}{154}$   | 0                           | $\frac{\sqrt{1155}}{1078}$ | 0                          | $\frac{3\sqrt{77}}{539}$   | 0                          | $\frac{2\sqrt{385}}{539}$  | 0                         |
|                                   |           | $\frac{\sqrt{2310}}{784}$      | 0                          | $\frac{\sqrt{231}}{784}$   | 0                           | $\frac{\sqrt{462}}{392}$   | 0                          | 0                         | $\frac{2\sqrt{385}}{539}$   | 0                          | $\frac{3\sqrt{77}}{539}$   | 0                          | $\frac{\sqrt{1155}}{1078}$ | 0                          | $\frac{\sqrt{55}}{154}$   |
|                                   |           | 0                              | $\frac{3\sqrt{770}}{784}$  | 0                          | $\frac{3\sqrt{385}}{784}$   | 0                          | $\frac{3\sqrt{154}}{392}$  | 0                         | 0                           | $\frac{5\sqrt{77}}{539}$   | 0                          | $\frac{\sqrt{1155}}{1078}$ | 0                          | $-\frac{\sqrt{231}}{1078}$ | 0                         |
|                                   |           | 0                              | 0                          | $\frac{3\sqrt{1155}}{784}$ | 0                           | $\frac{\sqrt{2310}}{784}$  | 0                          | 0                         | 0                           | 0                          | $\frac{2\sqrt{385}}{539}$  | 0                          | $-\frac{\sqrt{231}}{1078}$ | 0                          | $-\frac{3\sqrt{11}}{154}$ |
|                                   |           | 0                              | 0                          | 0                          | $\frac{\sqrt{165}}{112}$    | 0                          | $-\frac{\sqrt{66}}{112}$   | 0                         | 0                           | 0                          | 0                          | $\frac{\sqrt{55}}{154}$    | 0                          | $-\frac{3\sqrt{11}}{154}$  | 0                         |
| 1009                              | symmetry  | $-\frac{y(3x^2-2y^2+3z^2)}{2}$ |                            |                            |                             |                            |                            |                           |                             |                            |                            |                            |                            |                            |                           |

*continued ...*

Table 10

| No.                               | multipole | matrix                         |                             |                              |                              |                             |                             |                            |                             |                             |                              |                             |                              |                             |                           |
|-----------------------------------|-----------|--------------------------------|-----------------------------|------------------------------|------------------------------|-----------------------------|-----------------------------|----------------------------|-----------------------------|-----------------------------|------------------------------|-----------------------------|------------------------------|-----------------------------|---------------------------|
| $\mathbb{M}_{3,1}^{(1,1;a)}(T_1)$ |           | 0                              | $-\frac{\sqrt{385}i}{98}$   | 0                            | $-\frac{5\sqrt{770}i}{588}$  | 0                           | 0                           | $\frac{\sqrt{66}i}{112}$   | 0                           | $\frac{3\sqrt{154}i}{392}$  | 0                            | $\frac{\sqrt{2310}i}{784}$  | 0                            | 0                           | 0                         |
|                                   |           | $\frac{\sqrt{385}i}{98}$       | 0                           | $\frac{\sqrt{154}i}{196}$    | 0                            | $-\frac{5\sqrt{77}i}{147}$  | 0                           | 0                          | $-\frac{\sqrt{2310}i}{784}$ | 0                           | $\frac{\sqrt{462}i}{392}$    | 0                           | $\frac{3\sqrt{770}i}{784}$   | 0                           | 0                         |
|                                   |           | 0                              | $-\frac{\sqrt{154}i}{196}$  | 0                            | $\frac{\sqrt{77}i}{49}$      | 0                           | $-\frac{5\sqrt{770}i}{588}$ | $\frac{\sqrt{165}i}{112}$  | 0                           | $-\frac{3\sqrt{385}i}{784}$ | 0                            | $-\frac{\sqrt{231}i}{784}$  | 0                            | $\frac{3\sqrt{1155}i}{784}$ | 0                         |
|                                   |           | $\frac{5\sqrt{770}i}{588}$     | 0                           | $-\frac{\sqrt{77}i}{49}$     | 0                            | $\frac{\sqrt{154}i}{196}$   | 0                           | 0                          | $\frac{3\sqrt{1155}i}{784}$ | 0                           | $-\frac{\sqrt{231}i}{784}$   | 0                           | $-\frac{3\sqrt{385}i}{784}$  | 0                           | $\frac{\sqrt{165}i}{112}$ |
|                                   |           | 0                              | $\frac{5\sqrt{77}i}{147}$   | 0                            | $-\frac{\sqrt{154}i}{196}$   | 0                           | $-\frac{\sqrt{385}i}{98}$   | 0                          | 0                           | $\frac{3\sqrt{770}i}{784}$  | 0                            | $\frac{\sqrt{462}i}{392}$   | 0                            | $-\frac{\sqrt{2310}i}{784}$ | 0                         |
|                                   |           | 0                              | 0                           | $\frac{5\sqrt{770}i}{588}$   | 0                            | $\frac{\sqrt{385}i}{98}$    | 0                           | 0                          | 0                           | 0                           | $\frac{\sqrt{2310}i}{784}$   | 0                           | $\frac{3\sqrt{154}i}{392}$   | 0                           | $\frac{\sqrt{66}i}{112}$  |
|                                   |           | $-\frac{\sqrt{66}i}{112}$      | 0                           | $-\frac{\sqrt{165}i}{112}$   | 0                            | 0                           | 0                           | 0                          | $\frac{3\sqrt{11}i}{154}$   | 0                           | $\frac{\sqrt{55}i}{154}$     | 0                           | 0                            | 0                           | 0                         |
|                                   |           | 0                              | $\frac{\sqrt{2310}i}{784}$  | 0                            | $-\frac{3\sqrt{1155}i}{784}$ | 0                           | 0                           | $-\frac{3\sqrt{11}i}{154}$ | 0                           | $\frac{\sqrt{231}i}{1078}$  | 0                            | $\frac{2\sqrt{385}i}{539}$  | 0                            | 0                           | 0                         |
|                                   |           | $-\frac{3\sqrt{154}i}{392}$    | 0                           | $\frac{3\sqrt{385}i}{784}$   | 0                            | $-\frac{3\sqrt{770}i}{784}$ | 0                           | 0                          | $-\frac{\sqrt{231}i}{1078}$ | 0                           | $-\frac{\sqrt{1155}i}{1078}$ | 0                           | $\frac{5\sqrt{77}i}{539}$    | 0                           | 0                         |
|                                   |           | 0                              | $-\frac{\sqrt{462}i}{392}$  | 0                            | $\frac{\sqrt{231}i}{784}$    | 0                           | $-\frac{\sqrt{2310}i}{784}$ | $-\frac{\sqrt{55}i}{154}$  | 0                           | $\frac{\sqrt{1155}i}{1078}$ | 0                            | $-\frac{3\sqrt{77}i}{539}$  | 0                            | $\frac{2\sqrt{385}i}{539}$  | 0                         |
|                                   |           | $-\frac{\sqrt{2310}i}{784}$    | 0                           | $\frac{\sqrt{231}i}{784}$    | 0                            | $-\frac{\sqrt{462}i}{392}$  | 0                           | 0                          | $-\frac{2\sqrt{385}i}{539}$ | 0                           | $\frac{3\sqrt{77}i}{539}$    | 0                           | $-\frac{\sqrt{1155}i}{1078}$ | 0                           | $\frac{\sqrt{55}i}{154}$  |
|                                   |           | 0                              | $-\frac{3\sqrt{770}i}{784}$ | 0                            | $\frac{3\sqrt{385}i}{784}$   | 0                           | $-\frac{3\sqrt{154}i}{392}$ | 0                          | 0                           | $-\frac{5\sqrt{77}i}{539}$  | 0                            | $\frac{\sqrt{1155}i}{1078}$ | 0                            | $\frac{\sqrt{231}i}{1078}$  | 0                         |
|                                   |           | 0                              | 0                           | $-\frac{3\sqrt{1155}i}{784}$ | 0                            | $\frac{\sqrt{2310}i}{784}$  | 0                           | 0                          | 0                           | 0                           | $-\frac{2\sqrt{385}i}{539}$  | 0                           | $-\frac{\sqrt{231}i}{1078}$  | 0                           | $\frac{3\sqrt{11}i}{154}$ |
|                                   |           | 0                              | 0                           | 0                            | $-\frac{\sqrt{165}i}{112}$   | 0                           | $-\frac{\sqrt{66}i}{112}$   | 0                          | 0                           | 0                           | 0                            | $-\frac{\sqrt{55}i}{154}$   | 0                            | $-\frac{3\sqrt{11}i}{154}$  | 0                         |
| 1010                              | symmetry  | $-\frac{z(3x^2+3y^2-2z^2)}{2}$ |                             |                              |                              |                             |                             |                            |                             |                             |                              |                             |                              |                             |                           |

continued ...

Table 10

| No.                               | multipole | matrix                           |                        |                          |                           |                         |                          |                        |                           |                         |                           |                          |                        |                          |                         |
|-----------------------------------|-----------|----------------------------------|------------------------|--------------------------|---------------------------|-------------------------|--------------------------|------------------------|---------------------------|-------------------------|---------------------------|--------------------------|------------------------|--------------------------|-------------------------|
| $\mathbb{M}_{3,2}^{(1,1;a)}(T_1)$ |           | $-\frac{5\sqrt{77}}{147}$        | 0                      | 0                        | 0                         | 0                       | 0                        | 0                      | $\frac{\sqrt{462}}{98}$   | 0                       | 0                         | 0                        | 0                      | 0                        | 0                       |
|                                   |           | 0                                | $\frac{\sqrt{77}}{21}$ | 0                        | 0                         | 0                       | 0                        | 0                      | 0                         | 0                       | 0                         | 0                        | 0                      | 0                        | 0                       |
|                                   |           | 0                                | 0                      | $\frac{4\sqrt{77}}{147}$ | 0                         | 0                       | 0                        | 0                      | 0                         | 0                       | $-\frac{\sqrt{231}}{98}$  | 0                        | 0                      | 0                        | 0                       |
|                                   |           | 0                                | 0                      | 0                        | $-\frac{4\sqrt{77}}{147}$ | 0                       | 0                        | 0                      | 0                         | 0                       | 0                         | $-\frac{\sqrt{231}}{98}$ | 0                      | 0                        | 0                       |
|                                   |           | 0                                | 0                      | 0                        | 0                         | $-\frac{\sqrt{77}}{21}$ | 0                        | 0                      | 0                         | 0                       | 0                         | 0                        | 0                      | 0                        | 0                       |
|                                   |           | 0                                | 0                      | 0                        | 0                         | 0                       | $\frac{5\sqrt{77}}{147}$ | 0                      | 0                         | 0                       | 0                         | 0                        | 0                      | $\frac{\sqrt{462}}{98}$  | 0                       |
|                                   |           | 0                                | 0                      | 0                        | 0                         | 0                       | 0                        | $\frac{\sqrt{77}}{77}$ | 0                         | 0                       | 0                         | 0                        | 0                      | 0                        | 0                       |
|                                   |           | $\frac{\sqrt{462}}{98}$          | 0                      | 0                        | 0                         | 0                       | 0                        | 0                      | $-\frac{5\sqrt{77}}{539}$ | 0                       | 0                         | 0                        | 0                      | 0                        | 0                       |
|                                   |           | 0                                | 0                      | 0                        | 0                         | 0                       | 0                        | 0                      | 0                         | $-\frac{\sqrt{77}}{77}$ | 0                         | 0                        | 0                      | 0                        | 0                       |
|                                   |           | 0                                | 0                      | $-\frac{\sqrt{231}}{98}$ | 0                         | 0                       | 0                        | 0                      | 0                         | 0                       | $-\frac{3\sqrt{77}}{539}$ | 0                        | 0                      | 0                        | 0                       |
|                                   |           | 0                                | 0                      | 0                        | $-\frac{\sqrt{231}}{98}$  | 0                       | 0                        | 0                      | 0                         | 0                       | 0                         | $\frac{3\sqrt{77}}{539}$ | 0                      | 0                        | 0                       |
|                                   |           | 0                                | 0                      | 0                        | 0                         | 0                       | 0                        | 0                      | 0                         | 0                       | 0                         | 0                        | $\frac{\sqrt{77}}{77}$ | 0                        | 0                       |
|                                   |           | 0                                | 0                      | 0                        | 0                         | 0                       | $\frac{\sqrt{462}}{98}$  | 0                      | 0                         | 0                       | 0                         | 0                        | 0                      | $\frac{5\sqrt{77}}{539}$ | 0                       |
|                                   |           | 0                                | 0                      | 0                        | 0                         | 0                       | 0                        | 0                      | 0                         | 0                       | 0                         | 0                        | 0                      | 0                        | $-\frac{\sqrt{77}}{77}$ |
| 1011                              | symmetry  | $\frac{\sqrt{15}x(y-z)(y+z)}{2}$ |                        |                          |                           |                         |                          |                        |                           |                         |                           |                          |                        |                          |                         |

*continued ...*

Table 10

| No.                               | multipole | matrix                            |                            |                            |                            |                            |                           |                           |                            |                            |                            |                            |                            |                            |                           |
|-----------------------------------|-----------|-----------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|---------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|
| $\mathbb{M}_{3,0}^{(1,1;a)}(T_2)$ |           | 0                                 | $\frac{5\sqrt{231}}{294}$  | 0                          | $\frac{5\sqrt{462}}{588}$  | 0                          | 0                         | $\frac{\sqrt{110}}{112}$  | 0                          | $-\frac{\sqrt{2310}}{392}$ | 0                          | $-\frac{3\sqrt{154}}{784}$ | 0                          | 0                          | 0                         |
|                                   |           | $\frac{5\sqrt{231}}{294}$         | 0                          | $-\frac{\sqrt{2310}}{588}$ | 0                          | $\frac{\sqrt{1155}}{147}$  | 0                         | 0                         | $-\frac{5\sqrt{154}}{784}$ | 0                          | $-\frac{\sqrt{770}}{392}$  | 0                          | $-\frac{3\sqrt{462}}{784}$ | 0                          | 0                         |
|                                   |           | 0                                 | $-\frac{\sqrt{2310}}{588}$ | 0                          | $-\frac{\sqrt{1155}}{147}$ | 0                          | $\frac{5\sqrt{462}}{588}$ | $\frac{3\sqrt{11}}{112}$  | 0                          | $-\frac{5\sqrt{231}}{784}$ | 0                          | $\frac{\sqrt{385}}{784}$   | 0                          | $-\frac{9\sqrt{77}}{784}$  | 0                         |
|                                   |           | $\frac{5\sqrt{462}}{588}$         | 0                          | $-\frac{\sqrt{1155}}{147}$ | 0                          | $-\frac{\sqrt{2310}}{588}$ | 0                         | 0                         | $\frac{9\sqrt{77}}{784}$   | 0                          | $-\frac{\sqrt{385}}{784}$  | 0                          | $\frac{5\sqrt{231}}{784}$  | 0                          | $-\frac{3\sqrt{11}}{112}$ |
|                                   |           | 0                                 | $\frac{\sqrt{1155}}{147}$  | 0                          | $-\frac{\sqrt{2310}}{588}$ | 0                          | $\frac{5\sqrt{231}}{294}$ | 0                         | 0                          | $\frac{3\sqrt{462}}{784}$  | 0                          | $\frac{\sqrt{770}}{392}$   | 0                          | $\frac{5\sqrt{154}}{784}$  | 0                         |
|                                   |           | 0                                 | 0                          | $\frac{5\sqrt{462}}{588}$  | 0                          | $\frac{5\sqrt{231}}{294}$  | 0                         | 0                         | 0                          | 0                          | $\frac{3\sqrt{154}}{784}$  | 0                          | $\frac{\sqrt{2310}}{392}$  | 0                          | $-\frac{\sqrt{110}}{112}$ |
|                                   |           | $\frac{\sqrt{110}}{112}$          | 0                          | $\frac{3\sqrt{11}}{112}$   | 0                          | 0                          | 0                         | 0                         | $-\frac{\sqrt{165}}{154}$  | 0                          | $-\frac{\sqrt{33}}{154}$   | 0                          | 0                          | 0                          | 0                         |
|                                   |           | 0                                 | $-\frac{5\sqrt{154}}{784}$ | 0                          | $\frac{9\sqrt{77}}{784}$   | 0                          | 0                         | $-\frac{\sqrt{165}}{154}$ | 0                          | $-\frac{\sqrt{385}}{1078}$ | 0                          | $-\frac{2\sqrt{231}}{539}$ | 0                          | 0                          | 0                         |
|                                   |           | $-\frac{\sqrt{2310}}{392}$        | 0                          | $-\frac{5\sqrt{231}}{784}$ | 0                          | $\frac{3\sqrt{462}}{784}$  | 0                         | 0                         | $-\frac{\sqrt{385}}{1078}$ | 0                          | $\frac{5\sqrt{77}}{1078}$  | 0                          | $-\frac{\sqrt{1155}}{539}$ | 0                          | 0                         |
|                                   |           | 0                                 | $-\frac{\sqrt{770}}{392}$  | 0                          | $-\frac{\sqrt{385}}{784}$  | 0                          | $\frac{3\sqrt{154}}{784}$ | $-\frac{\sqrt{33}}{154}$  | 0                          | $\frac{5\sqrt{77}}{1078}$  | 0                          | $\frac{\sqrt{1155}}{539}$  | 0                          | $-\frac{2\sqrt{231}}{539}$ | 0                         |
|                                   |           | $-\frac{3\sqrt{154}}{784}$        | 0                          | $\frac{\sqrt{385}}{784}$   | 0                          | $\frac{\sqrt{770}}{392}$   | 0                         | 0                         | $-\frac{2\sqrt{231}}{539}$ | 0                          | $\frac{\sqrt{1155}}{539}$  | 0                          | $\frac{5\sqrt{77}}{1078}$  | 0                          | $-\frac{\sqrt{33}}{154}$  |
|                                   |           | 0                                 | $-\frac{3\sqrt{462}}{784}$ | 0                          | $\frac{5\sqrt{231}}{784}$  | 0                          | $\frac{\sqrt{2310}}{392}$ | 0                         | 0                          | $-\frac{\sqrt{1155}}{539}$ | 0                          | $\frac{5\sqrt{77}}{1078}$  | 0                          | $-\frac{\sqrt{385}}{1078}$ | 0                         |
|                                   |           | 0                                 | 0                          | $-\frac{9\sqrt{77}}{784}$  | 0                          | $\frac{5\sqrt{154}}{784}$  | 0                         | 0                         | 0                          | 0                          | $-\frac{2\sqrt{231}}{539}$ | 0                          | $-\frac{\sqrt{385}}{1078}$ | 0                          | $-\frac{\sqrt{165}}{154}$ |
|                                   |           | 0                                 | 0                          | 0                          | $-\frac{3\sqrt{11}}{112}$  | 0                          | $-\frac{\sqrt{110}}{112}$ | 0                         | 0                          | 0                          | 0                          | $-\frac{\sqrt{33}}{154}$   | 0                          | $-\frac{\sqrt{165}}{154}$  | 0                         |
| 1012                              | symmetry  | $-\frac{\sqrt{15}y(x-z)(x+z)}{2}$ |                            |                            |                            |                            |                           |                           |                            |                            |                            |                            |                            |                            |                           |

*continued ...*

Table 10

| No.                               | multipole | matrix                           |                             |                             |                             |                             |                             |                            |                             |                             |                             |                             |                             |                             |                            |
|-----------------------------------|-----------|----------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|----------------------------|
| $\mathbb{M}_{3,1}^{(1,1;a)}(T_2)$ |           | 0                                | $\frac{5\sqrt{231}i}{294}$  | 0                           | $-\frac{5\sqrt{462}i}{588}$ | 0                           | 0                           | $-\frac{\sqrt{110}i}{112}$ | 0                           | $-\frac{\sqrt{2310}i}{392}$ | 0                           | $\frac{3\sqrt{154}i}{784}$  | 0                           | 0                           | 0                          |
|                                   |           | $-\frac{5\sqrt{231}i}{294}$      | 0                           | $-\frac{\sqrt{2310}i}{588}$ | 0                           | $-\frac{\sqrt{1155}i}{147}$ | 0                           | 0                          | $\frac{5\sqrt{154}i}{784}$  | 0                           | $-\frac{\sqrt{770}i}{392}$  | 0                           | $\frac{3\sqrt{462}i}{784}$  | 0                           | 0                          |
|                                   |           | 0                                | $\frac{\sqrt{2310}i}{588}$  | 0                           | $-\frac{\sqrt{1155}i}{147}$ | 0                           | $-\frac{5\sqrt{462}i}{588}$ | $\frac{3\sqrt{11}i}{112}$  | 0                           | $\frac{5\sqrt{231}i}{784}$  | 0                           | $\frac{\sqrt{385}i}{784}$   | 0                           | $\frac{9\sqrt{77}i}{784}$   | 0                          |
|                                   |           | $\frac{5\sqrt{462}i}{588}$       | 0                           | $\frac{\sqrt{1155}i}{147}$  | 0                           | $-\frac{\sqrt{2310}i}{588}$ | 0                           | 0                          | $\frac{9\sqrt{77}i}{784}$   | 0                           | $\frac{\sqrt{385}i}{784}$   | 0                           | $\frac{5\sqrt{231}i}{784}$  | 0                           | $\frac{3\sqrt{11}i}{112}$  |
|                                   |           | 0                                | $\frac{\sqrt{1155}i}{147}$  | 0                           | $\frac{\sqrt{2310}i}{588}$  | 0                           | $\frac{5\sqrt{231}i}{294}$  | 0                          | 0                           | $\frac{3\sqrt{462}i}{784}$  | 0                           | $-\frac{\sqrt{770}i}{392}$  | 0                           | $\frac{5\sqrt{154}i}{784}$  | 0                          |
|                                   |           | 0                                | 0                           | $\frac{5\sqrt{462}i}{588}$  | 0                           | $-\frac{5\sqrt{231}i}{294}$ | 0                           | 0                          | 0                           | 0                           | $\frac{3\sqrt{154}i}{784}$  | 0                           | $-\frac{\sqrt{2310}i}{392}$ | 0                           | $-\frac{\sqrt{110}i}{112}$ |
|                                   |           | $\frac{\sqrt{110}i}{112}$        | 0                           | $-\frac{3\sqrt{11}i}{112}$  | 0                           | 0                           | 0                           | 0                          | $-\frac{\sqrt{165}i}{154}$  | 0                           | $\frac{\sqrt{33}i}{154}$    | 0                           | 0                           | 0                           | 0                          |
|                                   |           | 0                                | $-\frac{5\sqrt{154}i}{784}$ | 0                           | $-\frac{9\sqrt{77}i}{784}$  | 0                           | 0                           | $\frac{\sqrt{165}i}{154}$  | 0                           | $-\frac{\sqrt{385}i}{1078}$ | 0                           | $\frac{2\sqrt{231}i}{539}$  | 0                           | 0                           | 0                          |
|                                   |           | $\frac{\sqrt{2310}i}{392}$       | 0                           | $-\frac{5\sqrt{231}i}{784}$ | 0                           | $-\frac{3\sqrt{462}i}{784}$ | 0                           | 0                          | $\frac{\sqrt{385}i}{1078}$  | 0                           | $\frac{5\sqrt{77}i}{1078}$  | 0                           | $\frac{\sqrt{1155}i}{539}$  | 0                           | 0                          |
|                                   |           | 0                                | $\frac{\sqrt{770}i}{392}$   | 0                           | $-\frac{\sqrt{385}i}{784}$  | 0                           | $-\frac{3\sqrt{154}i}{784}$ | $-\frac{\sqrt{33}i}{154}$  | 0                           | $-\frac{5\sqrt{77}i}{1078}$ | 0                           | $\frac{\sqrt{1155}i}{539}$  | 0                           | $\frac{2\sqrt{231}i}{539}$  | 0                          |
|                                   |           | $-\frac{3\sqrt{154}i}{784}$      | 0                           | $-\frac{\sqrt{385}i}{784}$  | 0                           | $\frac{\sqrt{770}i}{392}$   | 0                           | 0                          | $-\frac{2\sqrt{231}i}{539}$ | 0                           | $-\frac{\sqrt{1155}i}{539}$ | 0                           | $\frac{5\sqrt{77}i}{1078}$  | 0                           | $\frac{\sqrt{33}i}{154}$   |
|                                   |           | 0                                | $-\frac{3\sqrt{462}i}{784}$ | 0                           | $-\frac{5\sqrt{231}i}{784}$ | 0                           | $\frac{\sqrt{2310}i}{392}$  | 0                          | 0                           | $-\frac{\sqrt{1155}i}{539}$ | 0                           | $-\frac{5\sqrt{77}i}{1078}$ | 0                           | $-\frac{\sqrt{385}i}{1078}$ | 0                          |
|                                   |           | 0                                | 0                           | $-\frac{9\sqrt{77}i}{784}$  | 0                           | $-\frac{5\sqrt{154}i}{784}$ | 0                           | 0                          | 0                           | 0                           | $-\frac{2\sqrt{231}i}{539}$ | 0                           | $\frac{\sqrt{385}i}{1078}$  | 0                           | $-\frac{\sqrt{165}i}{154}$ |
|                                   |           | 0                                | 0                           | 0                           | $-\frac{3\sqrt{11}i}{112}$  | 0                           | $\frac{\sqrt{110}i}{112}$   | 0                          | 0                           | 0                           | 0                           | $-\frac{\sqrt{33}i}{154}$   | 0                           | $\frac{\sqrt{165}i}{154}$   | 0                          |
| 1013                              | symmetry  | $\frac{\sqrt{15}z(x-y)(x+y)}{2}$ |                             |                             |                             |                             |                             |                            |                             |                             |                             |                             |                             |                             |                            |

continued ...

Table 10

| No.                               | multipole | matrix                              |                            |                            |                            |                           |                           |                         |                           |                          |                           |                            |                           |                            |                         |
|-----------------------------------|-----------|-------------------------------------|----------------------------|----------------------------|----------------------------|---------------------------|---------------------------|-------------------------|---------------------------|--------------------------|---------------------------|----------------------------|---------------------------|----------------------------|-------------------------|
| $\mathbb{M}_{3,2}^{(1,1;a)}(T_2)$ |           | 0                                   | 0                          | $-\frac{5\sqrt{462}}{294}$ | 0                          | 0                         | 0                         | 0                       | 0                         | 0                        | $\frac{\sqrt{154}}{98}$   | 0                          | 0                         | 0                          | 0                       |
|                                   |           | 0                                   | 0                          | 0                          | $-\frac{\sqrt{2310}}{294}$ | 0                         | 0                         | $-\frac{\sqrt{22}}{28}$ | 0                         | 0                        | 0                         | $\frac{\sqrt{770}}{196}$   | 0                         | 0                          | 0                       |
|                                   |           | $-\frac{5\sqrt{462}}{294}$          | 0                          | 0                          | 0                          | $\frac{\sqrt{2310}}{294}$ | 0                         | 0                       | $-\frac{\sqrt{77}}{196}$  | 0                        | 0                         | 0                          | $\frac{\sqrt{231}}{196}$  | 0                          | 0                       |
|                                   |           | 0                                   | $-\frac{\sqrt{2310}}{294}$ | 0                          | 0                          | 0                         | $\frac{5\sqrt{462}}{294}$ | 0                       | 0                         | $\frac{\sqrt{231}}{196}$ | 0                         | 0                          | 0                         | $-\frac{\sqrt{77}}{196}$   | 0                       |
|                                   |           | 0                                   | 0                          | $\frac{\sqrt{2310}}{294}$  | 0                          | 0                         | 0                         | 0                       | 0                         | 0                        | $\frac{\sqrt{770}}{196}$  | 0                          | 0                         | 0                          | $-\frac{\sqrt{22}}{28}$ |
|                                   |           | 0                                   | 0                          | 0                          | $\frac{5\sqrt{462}}{294}$  | 0                         | 0                         | 0                       | 0                         | 0                        | 0                         | $\frac{\sqrt{154}}{98}$    | 0                         | 0                          | 0                       |
|                                   |           | 0                                   | $-\frac{\sqrt{22}}{28}$    | 0                          | 0                          | 0                         | 0                         | 0                       | 0                         | $\frac{\sqrt{55}}{77}$   | 0                         | 0                          | 0                         | 0                          | 0                       |
|                                   |           | 0                                   | 0                          | $-\frac{\sqrt{77}}{196}$   | 0                          | 0                         | 0                         | 0                       | 0                         | 0                        | $\frac{3\sqrt{231}}{539}$ | 0                          | 0                         | 0                          | 0                       |
|                                   |           | 0                                   | 0                          | 0                          | $\frac{\sqrt{231}}{196}$   | 0                         | 0                         | $\frac{\sqrt{55}}{77}$  | 0                         | 0                        | 0                         | $\frac{2\sqrt{77}}{539}$   | 0                         | 0                          | 0                       |
|                                   |           | $\frac{\sqrt{154}}{98}$             | 0                          | 0                          | 0                          | $\frac{\sqrt{770}}{196}$  | 0                         | 0                       | $\frac{3\sqrt{231}}{539}$ | 0                        | 0                         | 0                          | $-\frac{2\sqrt{77}}{539}$ | 0                          | 0                       |
|                                   |           | 0                                   | $\frac{\sqrt{770}}{196}$   | 0                          | 0                          | 0                         | $\frac{\sqrt{154}}{98}$   | 0                       | 0                         | $\frac{2\sqrt{77}}{539}$ | 0                         | 0                          | 0                         | $-\frac{3\sqrt{231}}{539}$ | 0                       |
|                                   |           | 0                                   | 0                          | $\frac{\sqrt{231}}{196}$   | 0                          | 0                         | 0                         | 0                       | 0                         | 0                        | $-\frac{2\sqrt{77}}{539}$ | 0                          | 0                         | 0                          | $-\frac{\sqrt{55}}{77}$ |
|                                   |           | 0                                   | 0                          | 0                          | $-\frac{\sqrt{77}}{196}$   | 0                         | 0                         | 0                       | 0                         | 0                        | 0                         | $-\frac{3\sqrt{231}}{539}$ | 0                         | 0                          | 0                       |
|                                   |           | 0                                   | 0                          | 0                          | 0                          | $-\frac{\sqrt{22}}{28}$   | 0                         | 0                       | 0                         | 0                        | 0                         | 0                          | $-\frac{\sqrt{55}}{77}$   | 0                          | 0                       |
| 1014                              | symmetry  | $\frac{3\sqrt{35}xyz(x-y)(x+y)}{2}$ |                            |                            |                            |                           |                           |                         |                           |                          |                           |                            |                           |                            |                         |

*continued ...*



Table 10

| No.                             | multipole                   | matrix   |                            |                             |                            |                            |                               |                              |                             |                              |   |                             |                              |                               |  |
|---------------------------------|-----------------------------|--|----------------------------|-----------------------------|----------------------------|----------------------------|-------------------------------|------------------------------|-----------------------------|------------------------------|---|-----------------------------|------------------------------|-------------------------------|--|
| $\mathbb{M}_{5,0}^{(1,1;a)}(E)$ | 0                           | 0  | 0                          | 0                           | $-\frac{3\sqrt{143}i}{77}$ | 0                          | 0                             | 0                            | 0                           | 0                            | 0 | $\frac{\sqrt{1430}i}{308}$  | 0                            | 0                             |  |
|                                 | 0                           | 0  | 0                          | 0                           | 0                          | $\frac{3\sqrt{143}i}{77}$  | 0                             | 0                            | 0                           | 0                            | 0 | 0                           | $\frac{\sqrt{858}i}{924}$    | 0                             |  |
|                                 | 0                           | 0  | 0                          | 0                           | 0                          | 0                          | 0                             | 0                            | 0                           | 0                            | 0 | 0                           | 0                            | $-\frac{\sqrt{3003}i}{462}$   |  |
|                                 | 0                           | 0  | 0                          | 0                           | 0                          | 0                          | $\frac{\sqrt{3003}i}{462}$    | 0                            | 0                           | 0                            | 0 | 0                           | 0                            | 0                             |  |
|                                 | $\frac{3\sqrt{143}i}{77}$   | 0  | 0                          | 0                           | 0                          | 0                          | 0                             | $-\frac{\sqrt{858}i}{924}$   | 0                           | 0                            | 0 | 0                           | 0                            | 0                             |  |
|                                 | 0                           | $-\frac{3\sqrt{143}i}{77}$                         | 0                          | 0                           | 0                          | 0                          | 0                             | 0                            | $-\frac{\sqrt{1430}i}{308}$ | 0                            | 0 | 0                           | 0                            | 0                             |  |
|                                 | 0                           | 0  | 0                          | $-\frac{\sqrt{3003}i}{462}$ | 0                          | 0                          | 0                             | 0                            | 0                           | $\frac{3\sqrt{1001}i}{2002}$ | 0 | 0                           | 0                            | 0                             |  |
|                                 | 0                           | 0  | 0                          | 0                           | $\frac{\sqrt{858}i}{924}$  | 0                          | 0                             | 0                            | 0                           | 0                            | 0 | $\frac{\sqrt{2145}i}{2002}$ | 0                            | 0                             |  |
|                                 | 0                           | 0  | 0                          | 0                           | 0                          | $\frac{\sqrt{1430}i}{308}$ | 0                             | 0                            | 0                           | 0                            | 0 | 0                           | $-\frac{\sqrt{2145}i}{2002}$ | 0                             |  |
|                                 | 0                           | 0  | 0                          | 0                           | 0                          | 0                          | 0                             | 0                            | 0                           | 0                            | 0 | 0                           | 0                            | $-\frac{3\sqrt{1001}i}{2002}$ |  |
|                                 | 0                           | 0  | 0                          | 0                           | 0                          | 0                          | $-\frac{3\sqrt{1001}i}{2002}$ | 0                            | 0                           | 0                            | 0 | 0                           | 0                            | 0                             |  |
|                                 | $-\frac{\sqrt{1430}i}{308}$ | 0  | 0                          | 0                           | 0                          | 0                          | 0                             | $-\frac{\sqrt{2145}i}{2002}$ | 0                           | 0                            | 0 | 0                           | 0                            | 0                             |  |
|                                 | 0                           | $-\frac{\sqrt{858}i}{924}$                         | 0                          | 0                           | 0                          | 0                          | 0                             | 0                            | $\frac{\sqrt{2145}i}{2002}$ | 0                            | 0 | 0                           | 0                            | 0                             |  |
|                                 | 0                           | 0  | $\frac{\sqrt{3003}i}{462}$ | 0                           | 0                          | 0                          | 0                             | 0                            | 0                           | $\frac{3\sqrt{1001}i}{2002}$ | 0 | 0                           | 0                            | 0                             |  |
| 1015                            | symmetry                    | $\frac{\sqrt{105}xyz\left(x^2+y^2-2z^2\right)}{2}$ |                            |                             |                            |                            |                               |                              |                             |                              |   |                             |                              |                               |  |

continued ...

Table 10

| No.                             | multipole | matrix   |                             |                             |                             |                             |                             |                             |                              |                              |                             |                             |                              |                              |                             |
|---------------------------------|-----------|--|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|------------------------------|------------------------------|-----------------------------|-----------------------------|------------------------------|------------------------------|-----------------------------|
| $\mathbb{M}_{5,1}^{(1,1;a)}(E)$ |           | 0  | 0                           | $\frac{\sqrt{858i}}{154}$   | 0                           | 0                           | 0                           | 0                           | 0                            | 0                            | $-\frac{5\sqrt{286i}}{924}$ | 0                           | 0                            | 0                            | 0                           |
|                                 |           | 0  | 0                           | 0                           | $-\frac{\sqrt{4290i}}{154}$ | 0                           | 0                           | $-\frac{\sqrt{2002i}}{924}$ | 0                            | 0                            | 0                           | $\frac{\sqrt{1430i}}{462}$  | 0                            | 0                            | 0                           |
|                                 |           | $-\frac{\sqrt{858i}}{154}$                                 | 0                           | 0                           | 0                           | $\frac{\sqrt{4290i}}{154}$  | 0                           | 0                           | $\frac{2\sqrt{143i}}{231}$   | 0                            | 0                           | 0                           | $\frac{\sqrt{429i}}{462}$    | 0                            | 0                           |
|                                 |           | 0  | $\frac{\sqrt{4290i}}{154}$  | 0                           | 0                           | 0                           | $-\frac{\sqrt{858i}}{154}$  | 0                           | 0                            | $-\frac{\sqrt{429i}}{462}$   | 0                           | 0                           | 0                            | $-\frac{2\sqrt{143i}}{231}$  | 0                           |
|                                 |           | 0  | 0                           | $-\frac{\sqrt{4290i}}{154}$ | 0                           | 0                           | 0                           | 0                           | 0                            | 0                            | $-\frac{\sqrt{1430i}}{462}$ | 0                           | 0                            | 0                            | $\frac{\sqrt{2002i}}{924}$  |
|                                 |           | 0  | 0                           | 0                           | $\frac{\sqrt{858i}}{154}$   | 0                           | 0                           | 0                           | 0                            | 0                            | 0                           | $\frac{5\sqrt{286i}}{924}$  | 0                            | 0                            | 0                           |
|                                 |           | 0  | $\frac{\sqrt{2002i}}{924}$  | 0                           | 0                           | 0                           | 0                           | 0                           | 0                            | $-\frac{\sqrt{5005i}}{2002}$ | 0                           | 0                           | 0                            | 0                            | 0                           |
|                                 |           | 0  | 0                           | $-\frac{2\sqrt{143i}}{231}$ | 0                           | 0                           | 0                           | 0                           | 0                            | 0                            | $\frac{3\sqrt{429i}}{2002}$ | 0                           | 0                            | 0                            | 0                           |
|                                 |           | 0  | 0                           | 0                           | $\frac{\sqrt{429i}}{462}$   | 0                           | 0                           | $\frac{\sqrt{5005i}}{2002}$ | 0                            | 0                            | 0                           | $\frac{2\sqrt{143i}}{1001}$ | 0                            | 0                            | 0                           |
|                                 |           | $\frac{5\sqrt{286i}}{924}$                                 | 0                           | 0                           | 0                           | $\frac{\sqrt{1430i}}{462}$  | 0                           | 0                           | $-\frac{3\sqrt{429i}}{2002}$ | 0                            | 0                           | 0                           | $-\frac{2\sqrt{143i}}{1001}$ | 0                            | 0                           |
|                                 |           | 0  | $-\frac{\sqrt{1430i}}{462}$ | 0                           | 0                           | 0                           | $-\frac{5\sqrt{286i}}{924}$ | 0                           | 0                            | $-\frac{2\sqrt{143i}}{1001}$ | 0                           | 0                           | 0                            | $-\frac{3\sqrt{429i}}{2002}$ | 0                           |
|                                 |           | 0  | 0                           | $-\frac{\sqrt{429i}}{462}$  | 0                           | 0                           | 0                           | 0                           | 0                            | 0                            | $\frac{2\sqrt{143i}}{1001}$ | 0                           | 0                            | 0                            | $\frac{\sqrt{5005i}}{2002}$ |
|                                 |           | 0  | 0                           | 0                           | $\frac{2\sqrt{143i}}{231}$  | 0                           | 0                           | 0                           | 0                            | 0                            | 0                           | $\frac{3\sqrt{429i}}{2002}$ | 0                            | 0                            | 0                           |
|                                 |           | 0  | 0                           | 0                           | 0                           | $-\frac{\sqrt{2002i}}{924}$ | 0                           | 0                           | 0                            | 0                            | 0                           | 0                           | $-\frac{\sqrt{5005i}}{2002}$ | 0                            | 0                           |
| 1016                            | symmetry  | $\frac{x(8x^4-40x^2y^2-40x^2z^2+15y^4+30y^2z^2+15z^4)}{8}$ |                             |                             |                             |                             |                             |                             |                              |                              |                             |                             |                              |                              |                             |

*continued ...*

Table 10

| No.                         | multipole                      | matrix   |                               |                               |                                 |                                |                               |                                  |                                |                                |                                 |                                |                                 |                               |  |
|-----------------------------|--------------------------------|--|-------------------------------|-------------------------------|---------------------------------|--------------------------------|-------------------------------|----------------------------------|--------------------------------|--------------------------------|---------------------------------|--------------------------------|---------------------------------|-------------------------------|--|
| $M_{5,0}^{(1,1;a)}(T_1, 1)$ | 0                              | $\frac{3\sqrt{5005}}{4312}$                                | 0                             | $-\frac{\sqrt{10010}}{616}$   | 0                               | $\frac{9\sqrt{1001}}{616}$     | $\frac{5\sqrt{858}}{14784}$   | 0                                | $-\frac{25\sqrt{2002}}{34496}$ | 0                              | $\frac{5\sqrt{30030}}{14784}$   | 0                              | $-\frac{5\sqrt{6006}}{4928}$    | 0                             |  |
|                             | $\frac{3\sqrt{5005}}{4312}$    | 0  | $-\frac{15\sqrt{2002}}{4312}$ | 0                             | $\frac{5\sqrt{1001}}{616}$      | 0                              | 0                             | $-\frac{23\sqrt{30030}}{103488}$ | 0                              | $\frac{65\sqrt{6006}}{103488}$ | 0                               | $-\frac{\sqrt{10010}}{4928}$   | 0                               | $-\frac{\sqrt{4290}}{704}$    |  |
|                             | 0                              | $-\frac{15\sqrt{2002}}{4312}$                              | 0                             | $\frac{15\sqrt{1001}}{2156}$  | 0                               | $-\frac{\sqrt{10010}}{616}$    | $-\frac{\sqrt{2145}}{1056}$   | 0                                | $\frac{\sqrt{5005}}{1568}$     | 0                              | $-\frac{5\sqrt{3003}}{51744}$   | 0                              | $-\frac{\sqrt{15015}}{2464}$    | 0                             |  |
|                             | $-\frac{\sqrt{10010}}{616}$    | 0  | $\frac{15\sqrt{1001}}{2156}$  | 0                             | $-\frac{15\sqrt{2002}}{4312}$   | 0                              | 0                             | $\frac{\sqrt{15015}}{2464}$      | 0                              | $\frac{5\sqrt{3003}}{51744}$   | 0                               | $-\frac{\sqrt{5005}}{1568}$    | 0                               | $\frac{\sqrt{2145}}{1056}$    |  |
|                             | 0                              | $\frac{5\sqrt{1001}}{616}$                                 | 0                             | $-\frac{15\sqrt{2002}}{4312}$ | 0                               | $\frac{3\sqrt{5005}}{4312}$    | $\frac{\sqrt{4290}}{704}$     | 0                                | $\frac{\sqrt{10010}}{4928}$    | 0                              | $-\frac{65\sqrt{6006}}{103488}$ | 0                              | $\frac{23\sqrt{30030}}{103488}$ | 0                             |  |
|                             | $\frac{9\sqrt{1001}}{616}$     | 0  | $-\frac{\sqrt{10010}}{616}$   | 0                             | $\frac{3\sqrt{5005}}{4312}$     | 0                              | 0                             | $\frac{5\sqrt{6006}}{4928}$      | 0                              | $-\frac{5\sqrt{30030}}{14784}$ | 0                               | $\frac{25\sqrt{2002}}{34496}$  | 0                               | $-\frac{5\sqrt{858}}{14784}$  |  |
|                             | $\frac{5\sqrt{858}}{14784}$    | 0  | $-\frac{\sqrt{2145}}{1056}$   | 0                             | $\frac{\sqrt{4290}}{704}$       | 0                              | 0                             | $-\frac{15\sqrt{143}}{16016}$    | 0                              | $\frac{\sqrt{715}}{1144}$      | 0                               | $-\frac{3\sqrt{429}}{2288}$    | 0                               | 0                             |  |
|                             | 0                              | $-\frac{23\sqrt{30030}}{103488}$                           | 0                             | $\frac{\sqrt{15015}}{2464}$   | 0                               | $\frac{5\sqrt{6006}}{4928}$    | $-\frac{15\sqrt{143}}{16016}$ | 0                                | $\frac{5\sqrt{3003}}{14014}$   | 0                              | $-\frac{\sqrt{5005}}{16016}$    | 0                              | $-\frac{9\sqrt{1001}}{8008}$    | 0                             |  |
|                             | $-\frac{25\sqrt{2002}}{34496}$ | 0  | $\frac{\sqrt{5005}}{1568}$    | 0                             | $\frac{\sqrt{10010}}{4928}$     | 0                              | 0                             | $\frac{5\sqrt{3003}}{14014}$     | 0                              | $-\frac{\sqrt{15015}}{112112}$ | 0                               | $-\frac{5\sqrt{1001}}{8008}$   | 0                               | $-\frac{3\sqrt{429}}{2288}$   |  |
|                             | 0                              | $\frac{65\sqrt{6006}}{103488}$                             | 0                             | $\frac{5\sqrt{3003}}{51744}$  | 0                               | $-\frac{5\sqrt{30030}}{14784}$ | $\frac{\sqrt{715}}{1144}$     | 0                                | $-\frac{\sqrt{15015}}{112112}$ | 0                              | $-\frac{15\sqrt{1001}}{28028}$  | 0                              | $-\frac{\sqrt{5005}}{16016}$    | 0                             |  |
|                             | $\frac{5\sqrt{30030}}{14784}$  | 0  | $-\frac{5\sqrt{3003}}{51744}$ | 0                             | $-\frac{65\sqrt{6006}}{103488}$ | 0                              | 0                             | $-\frac{\sqrt{5005}}{16016}$     | 0                              | $-\frac{15\sqrt{1001}}{28028}$ | 0                               | $-\frac{\sqrt{15015}}{112112}$ | 0                               | $\frac{\sqrt{715}}{1144}$     |  |
|                             | 0                              | $-\frac{\sqrt{10010}}{4928}$                               | 0                             | $-\frac{\sqrt{5005}}{1568}$   | 0                               | $\frac{25\sqrt{2002}}{34496}$  | $-\frac{3\sqrt{429}}{2288}$   | 0                                | $-\frac{5\sqrt{1001}}{8008}$   | 0                              | $-\frac{\sqrt{15015}}{112112}$  | 0                              | $\frac{5\sqrt{3003}}{14014}$    | 0                             |  |
|                             | $-\frac{5\sqrt{6006}}{4928}$   | 0  | $-\frac{\sqrt{15015}}{2464}$  | 0                             | $\frac{23\sqrt{30030}}{103488}$ | 0                              | 0                             | $-\frac{9\sqrt{1001}}{8008}$     | 0                              | $-\frac{\sqrt{5005}}{16016}$   | 0                               | $\frac{5\sqrt{3003}}{14014}$   | 0                               | $-\frac{15\sqrt{143}}{16016}$ |  |
|                             | 0                              | $-\frac{\sqrt{4290}}{704}$                                 | 0                             | $\frac{\sqrt{2145}}{1056}$    | 0                               | $-\frac{5\sqrt{858}}{14784}$   | 0                             | 0                                | $-\frac{3\sqrt{429}}{2288}$    | 0                              | $\frac{\sqrt{715}}{1144}$       | 0                              | $-\frac{15\sqrt{143}}{16016}$   | 0                             |  |
| 1017                        | symmetry                       | $\frac{y(15x^4-40x^2y^2+30x^2z^2+8y^4-40y^2z^2+15z^4)}{8}$ |                               |                               |                                 |                                |                               |                                  |                                |                                |                                 |                                |                                 |                               |  |

continued ...

Table 10

| No.                         | multipole | matrix   |                                  |                                |                                |                                  |                                 |                                |                                   |                                 |                                  |                                  |                                |                                   |                               |
|-----------------------------|-----------|--|----------------------------------|--------------------------------|--------------------------------|----------------------------------|---------------------------------|--------------------------------|-----------------------------------|---------------------------------|----------------------------------|----------------------------------|--------------------------------|-----------------------------------|-------------------------------|
| $M_{5,1}^{(1,1;a)}(T_1, 1)$ |           | 0  | $-\frac{3\sqrt{5005}i}{4312}$    | 0                              | $-\frac{\sqrt{10010}i}{616}$   | 0                                | $-\frac{9\sqrt{1001}i}{616}$    | $\frac{5\sqrt{858}i}{14784}$   | 0                                 | $\frac{25\sqrt{2002}i}{34496}$  | 0                                | $\frac{5\sqrt{30030}i}{14784}$   | 0                              | $\frac{5\sqrt{6006}i}{4928}$      | 0                             |
|                             |           | $\frac{3\sqrt{5005}i}{4312}$                               | 0                                | $\frac{15\sqrt{2002}i}{4312}$  | 0                              | $\frac{5\sqrt{1001}i}{616}$      | 0                               | 0                              | $-\frac{23\sqrt{30030}i}{103488}$ | 0                               | $-\frac{65\sqrt{6006}i}{103488}$ | 0                                | $-\frac{\sqrt{10010}i}{4928}$  | 0                                 | $\frac{\sqrt{4290}i}{704}$    |
|                             |           | 0  | $-\frac{15\sqrt{2002}i}{4312}$   | 0                              | $-\frac{15\sqrt{1001}i}{2156}$ | 0                                | $-\frac{\sqrt{10010}i}{616}$    | $\frac{\sqrt{2145}i}{1056}$    | 0                                 | $\frac{\sqrt{5005}i}{1568}$     | 0                                | $\frac{5\sqrt{3003}i}{51744}$    | 0                              | $-\frac{\sqrt{15015}i}{2464}$     | 0                             |
|                             |           | $\frac{\sqrt{10010}i}{616}$                                | 0                                | $\frac{15\sqrt{1001}i}{2156}$  | 0                              | $\frac{15\sqrt{2002}i}{4312}$    | 0                               | 0                              | $-\frac{\sqrt{15015}i}{2464}$     | 0                               | $\frac{5\sqrt{3003}i}{51744}$    | 0                                | $\frac{\sqrt{5005}i}{1568}$    | 0                                 | $\frac{\sqrt{2145}i}{1056}$   |
|                             |           | 0  | $-\frac{5\sqrt{1001}i}{616}$     | 0                              | $-\frac{15\sqrt{2002}i}{4312}$ | 0                                | $-\frac{3\sqrt{5005}i}{4312}$   | $\frac{\sqrt{4290}i}{704}$     | 0                                 | $-\frac{\sqrt{10010}i}{4928}$   | 0                                | $-\frac{65\sqrt{6006}i}{103488}$ | 0                              | $-\frac{23\sqrt{30030}i}{103488}$ | 0                             |
|                             |           | $\frac{9\sqrt{1001}i}{616}$                                | 0                                | $\frac{\sqrt{10010}i}{616}$    | 0                              | $\frac{3\sqrt{5005}i}{4312}$     | 0                               | 0                              | $\frac{5\sqrt{6006}i}{4928}$      | 0                               | $\frac{5\sqrt{30030}i}{14784}$   | 0                                | $\frac{25\sqrt{2002}i}{34496}$ | 0                                 | $\frac{5\sqrt{858}i}{14784}$  |
|                             |           | $-\frac{5\sqrt{858}i}{14784}$                              | 0                                | $-\frac{\sqrt{2145}i}{1056}$   | 0                              | $-\frac{\sqrt{4290}i}{704}$      | 0                               | 0                              | $\frac{15\sqrt{143}i}{16016}$     | 0                               | $\frac{\sqrt{715}i}{1144}$       | 0                                | $\frac{3\sqrt{429}i}{2288}$    | 0                                 | 0                             |
|                             |           | 0  | $\frac{23\sqrt{30030}i}{103488}$ | 0                              | $\frac{\sqrt{15015}i}{2464}$   | 0                                | $-\frac{5\sqrt{6006}i}{4928}$   | $-\frac{15\sqrt{143}i}{16016}$ | 0                                 | $-\frac{5\sqrt{3003}i}{14014}$  | 0                                | $-\frac{\sqrt{5005}i}{16016}$    | 0                              | $\frac{9\sqrt{1001}i}{8008}$      | 0                             |
|                             |           | $-\frac{25\sqrt{2002}i}{34496}$                            | 0                                | $-\frac{\sqrt{5005}i}{1568}$   | 0                              | $\frac{\sqrt{10010}i}{4928}$     | 0                               | 0                              | $\frac{5\sqrt{3003}i}{14014}$     | 0                               | $\frac{\sqrt{15015}i}{112112}$   | 0                                | $-\frac{5\sqrt{1001}i}{8008}$  | 0                                 | $\frac{3\sqrt{429}i}{2288}$   |
|                             |           | 0  | $\frac{65\sqrt{6006}i}{103488}$  | 0                              | $-\frac{5\sqrt{3003}i}{51744}$ | 0                                | $-\frac{5\sqrt{30030}i}{14784}$ | $-\frac{\sqrt{715}i}{1144}$    | 0                                 | $-\frac{\sqrt{15015}i}{112112}$ | 0                                | $\frac{15\sqrt{1001}i}{28028}$   | 0                              | $-\frac{\sqrt{5005}i}{16016}$     | 0                             |
|                             |           | $-\frac{5\sqrt{30030}i}{14784}$                            | 0                                | $-\frac{5\sqrt{3003}i}{51744}$ | 0                              | $\frac{65\sqrt{6006}i}{103488}$  | 0                               | 0                              | $\frac{\sqrt{5005}i}{16016}$      | 0                               | $-\frac{15\sqrt{1001}i}{28028}$  | 0                                | $\frac{\sqrt{15015}i}{112112}$ | 0                                 | $\frac{\sqrt{715}i}{1144}$    |
|                             |           | 0  | $\frac{\sqrt{10010}i}{4928}$     | 0                              | $-\frac{\sqrt{5005}i}{1568}$   | 0                                | $-\frac{25\sqrt{2002}i}{34496}$ | $-\frac{3\sqrt{429}i}{2288}$   | 0                                 | $\frac{5\sqrt{1001}i}{8008}$    | 0                                | $-\frac{\sqrt{15015}i}{112112}$  | 0                              | $-\frac{5\sqrt{3003}i}{14014}$    | 0                             |
|                             |           | $-\frac{5\sqrt{6006}i}{4928}$                              | 0                                | $\frac{\sqrt{15015}i}{2464}$   | 0                              | $\frac{23\sqrt{30030}i}{103488}$ | 0                               | 0                              | $-\frac{9\sqrt{1001}i}{8008}$     | 0                               | $\frac{\sqrt{5005}i}{16016}$     | 0                                | $\frac{5\sqrt{3003}i}{14014}$  | 0                                 | $\frac{15\sqrt{143}i}{16016}$ |
|                             |           | 0  | $-\frac{\sqrt{4290}i}{704}$      | 0                              | $-\frac{\sqrt{2145}i}{1056}$   | 0                                | $-\frac{5\sqrt{858}i}{14784}$   | 0                              | 0                                 | $-\frac{3\sqrt{429}i}{2288}$    | 0                                | $-\frac{\sqrt{715}i}{1144}$      | 0                              | $-\frac{15\sqrt{143}i}{16016}$    | 0                             |
| 1018                        | symmetry  | $\frac{z(15x^4+30x^2y^2-40x^2z^2+15y^4-40y^2z^2+8z^4)}{8}$ |                                  |                                |                                |                                  |                                 |                                |                                   |                                 |                                  |                                  |                                |                                   |                               |

continued ...

Table 10

| No.  | multipole                   | matrix  |                              |                              |                              |                              |                              |                             |                               |                                |                                |                               |                               |                                |                            |
|------|-----------------------------|---|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|-----------------------------|-------------------------------|--------------------------------|--------------------------------|-------------------------------|-------------------------------|--------------------------------|----------------------------|
| 1019 | $M_{5,2}^{(1,1;a)}(T_1, 1)$ | $\frac{\sqrt{1001}}{539}$                         | 0                            | 0                            | 0                            | 0                            | 0                            | 0                           | $-\frac{5\sqrt{6006}}{6468}$  | 0                              | 0                              | 0                             | 0                             | 0                              | 0                          |
|      |                             | 0   | $-\frac{5\sqrt{1001}}{539}$  | 0                            | 0                            | 0                            | 0                            | 0                           | 0                             | $\frac{3\sqrt{10010}}{2156}$   | 0                              | 0                             | 0                             | 0                              | 0                          |
|      |                             | 0   | 0                            | $\frac{10\sqrt{1001}}{539}$  | 0                            | 0                            | 0                            | 0                           | 0                             | 0                              | $-\frac{5\sqrt{3003}}{3234}$   | 0                             | 0                             | 0                              | 0                          |
|      |                             | 0   | 0                            | 0                            | $-\frac{10\sqrt{1001}}{539}$ | 0                            | 0                            | 0                           | 0                             | 0                              | 0                              | $-\frac{5\sqrt{3003}}{3234}$  | 0                             | 0                              | 0                          |
|      |                             | 0   | 0                            | 0                            | 0                            | $\frac{5\sqrt{1001}}{539}$   | 0                            | 0                           | 0                             | 0                              | 0                              | 0                             | $\frac{3\sqrt{10010}}{2156}$  | 0                              | 0                          |
|      |                             | 0   | 0                            | 0                            | 0                            | 0                            | $-\frac{\sqrt{1001}}{539}$   | 0                           | 0                             | 0                              | 0                              | 0                             | 0                             | $-\frac{5\sqrt{6006}}{6468}$   | 0                          |
|      |                             | 0   | 0                            | 0                            | 0                            | 0                            | 0                            | $-\frac{\sqrt{1001}}{2002}$ | 0                             | 0                              | 0                              | 0                             | 0                             | 0                              | 0                          |
|      |                             | $-\frac{5\sqrt{6006}}{6468}$                      | 0                            | 0                            | 0                            | 0                            | 0                            | 0                           | $\frac{23\sqrt{1001}}{14014}$ | 0                              | 0                              | 0                             | 0                             | 0                              | 0                          |
|      |                             | 0   | $\frac{3\sqrt{10010}}{2156}$ | 0                            | 0                            | 0                            | 0                            | 0                           | 0                             | $-\frac{17\sqrt{1001}}{14014}$ | 0                              | 0                             | 0                             | 0                              | 0                          |
|      |                             | 0   | 0                            | $-\frac{5\sqrt{3003}}{3234}$ | 0                            | 0                            | 0                            | 0                           | 0                             | 0                              | $-\frac{15\sqrt{1001}}{14014}$ | 0                             | 0                             | 0                              | 0                          |
|      |                             | 0   | 0                            | 0                            | $-\frac{5\sqrt{3003}}{3234}$ | 0                            | 0                            | 0                           | 0                             | 0                              | 0                              | $\frac{15\sqrt{1001}}{14014}$ | 0                             | 0                              | 0                          |
|      |                             | 0   | 0                            | 0                            | 0                            | $\frac{3\sqrt{10010}}{2156}$ | 0                            | 0                           | 0                             | 0                              | 0                              | 0                             | $\frac{17\sqrt{1001}}{14014}$ | 0                              | 0                          |
|      |                             | 0   | 0                            | 0                            | 0                            | 0                            | $-\frac{5\sqrt{6006}}{6468}$ | 0                           | 0                             | 0                              | 0                              | 0                             | 0                             | $-\frac{23\sqrt{1001}}{14014}$ | 0                          |
|      |                             | 0   | 0                            | 0                            | 0                            | 0                            | 0                            | 0                           | 0                             | 0                              | 0                              | 0                             | 0                             | 0                              | $\frac{\sqrt{1001}}{2002}$ |
| 1019 | symmetry                    | $\frac{3\sqrt{35}x(y^2-2yz-z^2)(y^2+2yz-z^2)}{8}$ |                              |                              |                              |                              |                              |                             |                               |                                |                                |                               |                               |                                |                            |

*continued ...*

Table 10

| No.                         | multipole | matrix  |                               |                             |                              |                                |                               |                               |                               |                               |                               |                                |                               |                               |                               |
|-----------------------------|-----------|---|-------------------------------|-----------------------------|------------------------------|--------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|--------------------------------|-------------------------------|-------------------------------|-------------------------------|
| $M_{5,0}^{(1,1;a)}(T_1, 2)$ |           | 0   | $\frac{3\sqrt{143}}{616}$     | 0                           | $\frac{9\sqrt{286}}{616}$    | 0                              | $\frac{3\sqrt{715}}{616}$     | $\frac{\sqrt{30030}}{14784}$  | 0                             | $-\frac{5\sqrt{1430}}{4928}$  | 0                             | $-\frac{15\sqrt{858}}{4928}$   | 0                             | $-\frac{5\sqrt{4290}}{14784}$ | 0                             |
|                             |           | $\frac{3\sqrt{143}}{616}$                         | 0                             | $-\frac{3\sqrt{1430}}{616}$ | 0                            | $-\frac{9\sqrt{715}}{616}$     | 0                             | 0                             | $-\frac{23\sqrt{858}}{14784}$ | 0                             | $\frac{13\sqrt{4290}}{14784}$ | 0                              | $\frac{9\sqrt{286}}{4928}$    | 0                             | $-\frac{5\sqrt{6006}}{14784}$ |
|                             |           | 0   | $-\frac{3\sqrt{1430}}{616}$   | 0                           | $\frac{3\sqrt{715}}{308}$    | 0                              | $\frac{9\sqrt{286}}{616}$     | $\frac{3\sqrt{3003}}{2464}$   | 0                             | $\frac{\sqrt{143}}{224}$      | 0                             | $-\frac{\sqrt{2145}}{7392}$    | 0                             | $\frac{9\sqrt{429}}{2464}$    | 0                             |
|                             |           | $\frac{9\sqrt{286}}{616}$                         | 0                             | $\frac{3\sqrt{715}}{308}$   | 0                            | $-\frac{3\sqrt{1430}}{616}$    | 0                             | 0                             | $-\frac{9\sqrt{429}}{2464}$   | 0                             | $\frac{\sqrt{2145}}{7392}$    | 0                              | $-\frac{\sqrt{143}}{224}$     | 0                             | $-\frac{3\sqrt{3003}}{2464}$  |
|                             |           | 0   | $-\frac{9\sqrt{715}}{616}$    | 0                           | $-\frac{3\sqrt{1430}}{616}$  | 0                              | $\frac{3\sqrt{143}}{616}$     | $\frac{5\sqrt{6006}}{14784}$  | 0                             | $-\frac{9\sqrt{286}}{4928}$   | 0                             | $-\frac{13\sqrt{4290}}{14784}$ | 0                             | $\frac{23\sqrt{858}}{14784}$  | 0                             |
|                             |           | $\frac{3\sqrt{715}}{616}$                         | 0                             | $\frac{9\sqrt{286}}{616}$   | 0                            | $\frac{3\sqrt{143}}{616}$      | 0                             | 0                             | $\frac{5\sqrt{4290}}{14784}$  | 0                             | $\frac{15\sqrt{858}}{4928}$   | 0                              | $\frac{5\sqrt{1430}}{4928}$   | 0                             | $-\frac{\sqrt{30030}}{14784}$ |
|                             |           | $\frac{\sqrt{30030}}{14784}$                      | 0                             | $\frac{3\sqrt{3003}}{2464}$ | 0                            | $\frac{5\sqrt{6006}}{14784}$   | 0                             | 0                             | $-\frac{3\sqrt{5005}}{16016}$ | 0                             | $-\frac{9\sqrt{1001}}{8008}$  | 0                              | $-\frac{\sqrt{15015}}{16016}$ | 0                             | 0                             |
|                             |           | 0   | $-\frac{23\sqrt{858}}{14784}$ | 0                           | $-\frac{9\sqrt{429}}{2464}$  | 0                              | $\frac{5\sqrt{4290}}{14784}$  | $-\frac{3\sqrt{5005}}{16016}$ | 0                             | $\frac{\sqrt{2145}}{2002}$    | 0                             | $\frac{9\sqrt{143}}{16016}$    | 0                             | $-\frac{3\sqrt{715}}{8008}$   | 0                             |
|                             |           | $-\frac{5\sqrt{1430}}{4928}$                      | 0                             | $\frac{\sqrt{143}}{224}$    | 0                            | $-\frac{9\sqrt{286}}{4928}$    | 0                             | 0                             | $\frac{\sqrt{2145}}{2002}$    | 0                             | $-\frac{\sqrt{429}}{16016}$   | 0                              | $\frac{9\sqrt{715}}{8008}$    | 0                             | $-\frac{\sqrt{15015}}{16016}$ |
|                             |           | 0   | $\frac{13\sqrt{4290}}{14784}$ | 0                           | $\frac{\sqrt{2145}}{7392}$   | 0                              | $\frac{15\sqrt{858}}{4928}$   | $-\frac{9\sqrt{1001}}{8008}$  | 0                             | $-\frac{\sqrt{429}}{16016}$   | 0                             | $-\frac{3\sqrt{715}}{4004}$    | 0                             | $\frac{9\sqrt{143}}{16016}$   | 0                             |
|                             |           | $-\frac{15\sqrt{858}}{4928}$                      | 0                             | $-\frac{\sqrt{2145}}{7392}$ | 0                            | $-\frac{13\sqrt{4290}}{14784}$ | 0                             | 0                             | $\frac{9\sqrt{143}}{16016}$   | 0                             | $-\frac{3\sqrt{715}}{4004}$   | 0                              | $-\frac{\sqrt{429}}{16016}$   | 0                             | $-\frac{9\sqrt{1001}}{8008}$  |
|                             |           | 0   | $\frac{9\sqrt{286}}{4928}$    | 0                           | $-\frac{\sqrt{143}}{224}$    | 0                              | $\frac{5\sqrt{1430}}{4928}$   | $-\frac{\sqrt{15015}}{16016}$ | 0                             | $\frac{9\sqrt{715}}{8008}$    | 0                             | $-\frac{\sqrt{429}}{16016}$    | 0                             | $\frac{\sqrt{2145}}{2002}$    | 0                             |
|                             |           | $-\frac{5\sqrt{4290}}{14784}$                     | 0                             | $\frac{9\sqrt{429}}{2464}$  | 0                            | $\frac{23\sqrt{858}}{14784}$   | 0                             | 0                             | $-\frac{3\sqrt{715}}{8008}$   | 0                             | $\frac{9\sqrt{143}}{16016}$   | 0                              | $\frac{\sqrt{2145}}{2002}$    | 0                             | $-\frac{3\sqrt{5005}}{16016}$ |
|                             |           | 0   | $-\frac{5\sqrt{6006}}{14784}$ | 0                           | $-\frac{3\sqrt{3003}}{2464}$ | 0                              | $-\frac{\sqrt{30030}}{14784}$ | 0                             | 0                             | $-\frac{\sqrt{15015}}{16016}$ | 0                             | $-\frac{9\sqrt{1001}}{8008}$   | 0                             | $-\frac{3\sqrt{5005}}{16016}$ | 0                             |
| 1020                        | symmetry  | $\frac{3\sqrt{35}y(x^2-2xz-z^2)(x^2+2xz-z^2)}{8}$ |                               |                             |                              |                                |                               |                               |                               |                               |                               |                                |                               |                               |                               |

*continued ...*

Table 10

| No.  | multipole | matrix  |                                |                              |                              |                                |                                |                                |                                |                                |                                 |                                 |                               |                                |                               |
|--|-----------|---|--------------------------------|------------------------------|------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|---------------------------------|---------------------------------|-------------------------------|--------------------------------|-------------------------------|
| M <sub>5,1</sub> <sup>(1,1;a)</sup> (T <sub>1</sub> , 2) |           | 0   | $-\frac{3\sqrt{143}i}{616}$    | 0                            | $\frac{9\sqrt{286}i}{616}$   | 0                              | $-\frac{3\sqrt{715}i}{616}$    | $\frac{\sqrt{30030}i}{14784}$  | 0                              | $\frac{5\sqrt{1430}i}{4928}$   | 0                               | $-\frac{15\sqrt{858}i}{4928}$   | 0                             | $\frac{5\sqrt{4290}i}{14784}$  | 0                             |
|  |           | $\frac{3\sqrt{143}i}{616}$                        | 0                              | $\frac{3\sqrt{1430}i}{616}$  | 0                            | $-\frac{9\sqrt{715}i}{616}$    | 0                              | 0                              | $-\frac{23\sqrt{858}i}{14784}$ | 0                              | $-\frac{13\sqrt{4290}i}{14784}$ | 0                               | $\frac{9\sqrt{286}i}{4928}$   | 0                              | $\frac{5\sqrt{6006}i}{14784}$ |
|  |           | 0   | $-\frac{3\sqrt{1430}i}{616}$   | 0                            | $-\frac{3\sqrt{715}i}{308}$  | 0                              | $\frac{9\sqrt{286}i}{616}$     | $-\frac{3\sqrt{3003}i}{2464}$  | 0                              | $\frac{\sqrt{143}i}{224}$      | 0                               | $\frac{\sqrt{2145}i}{7392}$     | 0                             | $\frac{9\sqrt{429}i}{2464}$    | 0                             |
|  |           | $-\frac{9\sqrt{286}i}{616}$                       | 0                              | $\frac{3\sqrt{715}i}{308}$   | 0                            | $\frac{3\sqrt{1430}i}{616}$    | 0                              | 0                              | $\frac{9\sqrt{429}i}{2464}$    | 0                              | $\frac{\sqrt{2145}i}{7392}$     | 0                               | $\frac{\sqrt{143}i}{224}$     | 0                              | $-\frac{3\sqrt{3003}i}{2464}$ |
|  |           | 0   | $\frac{9\sqrt{715}i}{616}$     | 0                            | $-\frac{3\sqrt{1430}i}{616}$ | 0                              | $-\frac{3\sqrt{143}i}{616}$    | $\frac{5\sqrt{6006}i}{14784}$  | 0                              | $\frac{9\sqrt{286}i}{4928}$    | 0                               | $-\frac{13\sqrt{4290}i}{14784}$ | 0                             | $-\frac{23\sqrt{858}i}{14784}$ | 0                             |
|  |           | $\frac{3\sqrt{715}i}{616}$                        | 0                              | $-\frac{9\sqrt{286}i}{616}$  | 0                            | $\frac{3\sqrt{143}i}{616}$     | 0                              | 0                              | $\frac{5\sqrt{4290}i}{14784}$  | 0                              | $-\frac{15\sqrt{858}i}{4928}$   | 0                               | $\frac{5\sqrt{1430}i}{4928}$  | 0                              | $\frac{\sqrt{30030}i}{14784}$ |
|  |           | $-\frac{\sqrt{30030}i}{14784}$                    | 0                              | $\frac{3\sqrt{3003}i}{2464}$ | 0                            | $-\frac{5\sqrt{6006}i}{14784}$ | 0                              | 0                              | $\frac{3\sqrt{5005}i}{16016}$  | 0                              | $-\frac{9\sqrt{1001}i}{8008}$   | 0                               | $\frac{\sqrt{15015}i}{16016}$ | 0                              | 0                             |
|  |           | 0   | $\frac{23\sqrt{858}i}{14784}$  | 0                            | $-\frac{9\sqrt{429}i}{2464}$ | 0                              | $-\frac{5\sqrt{4290}i}{14784}$ | $-\frac{3\sqrt{5005}i}{16016}$ | 0                              | $-\frac{\sqrt{2145}i}{2002}$   | 0                               | $\frac{9\sqrt{143}i}{16016}$    | 0                             | $\frac{3\sqrt{715}i}{8008}$    | 0                             |
|  |           | $-\frac{5\sqrt{1430}i}{4928}$                     | 0                              | $-\frac{\sqrt{143}i}{224}$   | 0                            | $-\frac{9\sqrt{286}i}{4928}$   | 0                              | 0                              | $\frac{\sqrt{2145}i}{2002}$    | 0                              | $\frac{\sqrt{429}i}{16016}$     | 0                               | $\frac{9\sqrt{715}i}{8008}$   | 0                              | $\frac{\sqrt{15015}i}{16016}$ |
|  |           | 0   | $\frac{13\sqrt{4290}i}{14784}$ | 0                            | $-\frac{\sqrt{2145}i}{7392}$ | 0                              | $\frac{15\sqrt{858}i}{4928}$   | $\frac{9\sqrt{1001}i}{8008}$   | 0                              | $-\frac{\sqrt{429}i}{16016}$   | 0                               | $\frac{3\sqrt{715}i}{4004}$     | 0                             | $\frac{9\sqrt{143}i}{16016}$   | 0                             |
|  |           | $\frac{15\sqrt{858}i}{4928}$                      | 0                              | $-\frac{\sqrt{2145}i}{7392}$ | 0                            | $\frac{13\sqrt{4290}i}{14784}$ | 0                              | 0                              | $-\frac{9\sqrt{143}i}{16016}$  | 0                              | $-\frac{3\sqrt{715}i}{4004}$    | 0                               | $\frac{\sqrt{429}i}{16016}$   | 0                              | $-\frac{9\sqrt{1001}i}{8008}$ |
|  |           | 0   | $-\frac{9\sqrt{286}i}{4928}$   | 0                            | $-\frac{\sqrt{143}i}{224}$   | 0                              | $-\frac{5\sqrt{1430}i}{4928}$  | $-\frac{\sqrt{15015}i}{16016}$ | 0                              | $-\frac{9\sqrt{715}i}{8008}$   | 0                               | $-\frac{\sqrt{429}i}{16016}$    | 0                             | $-\frac{\sqrt{2145}i}{2002}$   | 0                             |
|  |           | $-\frac{5\sqrt{4290}i}{14784}$                    | 0                              | $-\frac{9\sqrt{429}i}{2464}$ | 0                            | $\frac{23\sqrt{858}i}{14784}$  | 0                              | 0                              | $-\frac{3\sqrt{715}i}{8008}$   | 0                              | $-\frac{9\sqrt{143}i}{16016}$   | 0                               | $\frac{\sqrt{2145}i}{2002}$   | 0                              | $\frac{3\sqrt{5005}i}{16016}$ |
|  |           | 0   | $-\frac{5\sqrt{6006}i}{14784}$ | 0                            | $\frac{3\sqrt{3003}i}{2464}$ | 0                              | $-\frac{\sqrt{30030}i}{14784}$ | 0                              | 0                              | $-\frac{\sqrt{15015}i}{16016}$ | 0                               | $\frac{9\sqrt{1001}i}{8008}$    | 0                             | $-\frac{3\sqrt{5005}i}{16016}$ | 0                             |
| 1021   | symmetry  | $\frac{3\sqrt{35}z(x^2-2xy-y^2)(x^2+2xy-y^2)}{8}$ |                                |                              |                              |                                |                                |                                |                                |                                |                                 |                                 |                               |                                |                               |

continued ...

Table 10

| No.   | multipole                   | matrix                     |                           |                           |                           |                           |                            |                              |                             |                            |                              |                             |                            |                             |   |
|---|-----------------------------|----------------------------|---------------------------|---------------------------|---------------------------|---------------------------|----------------------------|------------------------------|-----------------------------|----------------------------|------------------------------|-----------------------------|----------------------------|-----------------------------|---|
| 1022  | $M_{5,2}^{(1,1;a)}(T_1, 2)$ | 0                          | 0                         | 0                         | 0                         | $\frac{3\sqrt{143}}{77}$  | 0                          | 0                            | 0                           | 0                          | 0                            | $-\frac{\sqrt{1430}}{308}$  | 0                          | 0                           |   |
|   |                             | 0                          | 0                         | 0                         | 0                         | 0                         | $-\frac{3\sqrt{143}}{77}$  | 0                            | 0                           | 0                          | 0                            | 0                           | $-\frac{\sqrt{858}}{924}$  | 0                           |   |
|   |                             | 0                          | 0                         | 0                         | 0                         | 0                         | 0                          | 0                            | 0                           | 0                          | 0                            | 0                           | 0                          | $\frac{\sqrt{3003}}{462}$   |   |
|   |                             | 0                          | 0                         | 0                         | 0                         | 0                         | 0                          | $\frac{\sqrt{3003}}{462}$    | 0                           | 0                          | 0                            | 0                           | 0                          | 0                           | 0 |
|   |                             | $\frac{3\sqrt{143}}{77}$   | 0                         | 0                         | 0                         | 0                         | 0                          | 0                            | $-\frac{\sqrt{858}}{924}$   | 0                          | 0                            | 0                           | 0                          | 0                           | 0 |
|   |                             | 0                          | $-\frac{3\sqrt{143}}{77}$ | 0                         | 0                         | 0                         | 0                          | 0                            | 0                           | $-\frac{\sqrt{1430}}{308}$ | 0                            | 0                           | 0                          | 0                           | 0 |
|   |                             | 0                          | 0                         | 0                         | $\frac{\sqrt{3003}}{462}$ | 0                         | 0                          | 0                            | 0                           | 0                          | $-\frac{3\sqrt{1001}}{2002}$ | 0                           | 0                          | 0                           |   |
|   |                             | 0                          | 0                         | 0                         | 0                         | $-\frac{\sqrt{858}}{924}$ | 0                          | 0                            | 0                           | 0                          | 0                            | $-\frac{\sqrt{2145}}{2002}$ | 0                          | 0                           |   |
|   |                             | 0                          | 0                         | 0                         | 0                         | 0                         | $-\frac{\sqrt{1430}}{308}$ | 0                            | 0                           | 0                          | 0                            | 0                           | $\frac{\sqrt{2145}}{2002}$ | 0                           |   |
|   |                             | 0                          | 0                         | 0                         | 0                         | 0                         | 0                          | 0                            | 0                           | 0                          | 0                            | 0                           | 0                          | $\frac{3\sqrt{1001}}{2002}$ |   |
|   |                             | 0                          | 0                         | 0                         | 0                         | 0                         | 0                          | $-\frac{3\sqrt{1001}}{2002}$ | 0                           | 0                          | 0                            | 0                           | 0                          | 0                           |   |
|   |                             | $-\frac{\sqrt{1430}}{308}$ | 0                         | 0                         | 0                         | 0                         | 0                          | 0                            | $-\frac{\sqrt{2145}}{2002}$ | 0                          | 0                            | 0                           | 0                          | 0                           |   |
|   |                             | 0                          | $-\frac{\sqrt{858}}{924}$ | 0                         | 0                         | 0                         | 0                          | 0                            | 0                           | $\frac{\sqrt{2145}}{2002}$ | 0                            | 0                           | 0                          | 0                           |   |
|   |                             | 0                          | 0                         | $\frac{\sqrt{3003}}{462}$ | 0                         | 0                         | 0                          | 0                            | 0                           | 0                          | $\frac{3\sqrt{1001}}{2002}$  | 0                           | 0                          | 0                           |   |
| $\frac{\sqrt{105}x(y-z)(y+z)(2x^2-y^2-z^2)}{4}$ |                             |                            |                           |                           |                           |                           |                            |                              |                             |                            |                              |                             |                            |                             |   |

continued ...



Table 10

| No.                               | multipole | matrix  |                              |                             |                            |                               |                              |                              |                              |                              |                              |                               |                             |                              |                              |
|-----------------------------------|-----------|---|------------------------------|-----------------------------|----------------------------|-------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|-------------------------------|-----------------------------|------------------------------|------------------------------|
| $\mathbb{M}_{5,0}^{(1,1;a)}(T_2)$ |           | 0   | $\frac{\sqrt{429}}{308}$     | 0                           | $-\frac{\sqrt{858}}{308}$  | 0                             | $-\frac{3\sqrt{2145}}{308}$  | $\frac{\sqrt{10010}}{7392}$  | 0                            | $-\frac{5\sqrt{4290}}{7392}$ | 0                            | $\frac{5\sqrt{286}}{2464}$    | 0                           | $\frac{5\sqrt{1430}}{2464}$  | 0                            |
|                                   |           | $\frac{\sqrt{429}}{308}$                        | 0                            | $-\frac{\sqrt{4290}}{308}$  | 0                          | $\frac{\sqrt{2145}}{308}$     | 0                            | 0                            | $-\frac{23\sqrt{286}}{7392}$ | 0                            | $\frac{13\sqrt{1430}}{7392}$ | 0                             | $-\frac{\sqrt{858}}{2464}$  | 0                            | $\frac{5\sqrt{2002}}{2464}$  |
|                                   |           | 0   | $-\frac{\sqrt{4290}}{308}$   | 0                           | $\frac{\sqrt{2145}}{154}$  | 0                             | $-\frac{\sqrt{858}}{308}$    | $-\frac{\sqrt{1001}}{1232}$  | 0                            | $\frac{\sqrt{429}}{336}$     | 0                            | $-\frac{\sqrt{715}}{3696}$    | 0                           | $-\frac{3\sqrt{143}}{1232}$  | 0                            |
|                                   |           | $-\frac{\sqrt{858}}{308}$                       | 0                            | $\frac{\sqrt{2145}}{154}$   | 0                          | $-\frac{\sqrt{4290}}{308}$    | 0                            | 0                            | $\frac{3\sqrt{143}}{1232}$   | 0                            | $\frac{\sqrt{715}}{3696}$    | 0                             | $-\frac{\sqrt{429}}{336}$   | 0                            | $\frac{\sqrt{1001}}{1232}$   |
|                                   |           | 0   | $\frac{\sqrt{2145}}{308}$    | 0                           | $-\frac{\sqrt{4290}}{308}$ | 0                             | $\frac{\sqrt{429}}{308}$     | $-\frac{5\sqrt{2002}}{2464}$ | 0                            | $\frac{\sqrt{858}}{2464}$    | 0                            | $-\frac{13\sqrt{1430}}{7392}$ | 0                           | $\frac{23\sqrt{286}}{7392}$  | 0                            |
|                                   |           | $-\frac{3\sqrt{2145}}{308}$                     | 0                            | $-\frac{\sqrt{858}}{308}$   | 0                          | $\frac{\sqrt{429}}{308}$      | 0                            | 0                            | $-\frac{5\sqrt{1430}}{2464}$ | 0                            | $-\frac{5\sqrt{286}}{2464}$  | 0                             | $\frac{5\sqrt{4290}}{7392}$ | 0                            | $-\frac{\sqrt{10010}}{7392}$ |
|                                   |           | $\frac{\sqrt{10010}}{7392}$                     | 0                            | $-\frac{\sqrt{1001}}{1232}$ | 0                          | $-\frac{5\sqrt{2002}}{2464}$  | 0                            | 0                            | $-\frac{\sqrt{15015}}{8008}$ | 0                            | $\frac{\sqrt{3003}}{4004}$   | 0                             | $\frac{3\sqrt{5005}}{8008}$ | 0                            | 0                            |
|                                   |           | 0   | $-\frac{23\sqrt{286}}{7392}$ | 0                           | $\frac{3\sqrt{143}}{1232}$ | 0                             | $-\frac{5\sqrt{1430}}{2464}$ | $-\frac{\sqrt{15015}}{8008}$ | 0                            | $\frac{\sqrt{715}}{1001}$    | 0                            | $-\frac{\sqrt{429}}{8008}$    | 0                           | $\frac{3\sqrt{2145}}{4004}$  | 0                            |
|                                   |           | $-\frac{5\sqrt{4290}}{7392}$                    | 0                            | $\frac{\sqrt{429}}{336}$    | 0                          | $\frac{\sqrt{858}}{2464}$     | 0                            | 0                            | $\frac{\sqrt{715}}{1001}$    | 0                            | $-\frac{\sqrt{143}}{8008}$   | 0                             | $-\frac{\sqrt{2145}}{4004}$ | 0                            | $\frac{3\sqrt{5005}}{8008}$  |
|                                   |           | 0   | $\frac{13\sqrt{1430}}{7392}$ | 0                           | $\frac{\sqrt{715}}{3696}$  | 0                             | $-\frac{5\sqrt{286}}{2464}$  | $\frac{\sqrt{3003}}{4004}$   | 0                            | $-\frac{\sqrt{143}}{8008}$   | 0                            | $-\frac{\sqrt{2145}}{2002}$   | 0                           | $-\frac{\sqrt{429}}{8008}$   | 0                            |
|                                   |           | $\frac{5\sqrt{286}}{2464}$                      | 0                            | $-\frac{\sqrt{715}}{3696}$  | 0                          | $-\frac{13\sqrt{1430}}{7392}$ | 0                            | 0                            | $-\frac{\sqrt{429}}{8008}$   | 0                            | $-\frac{\sqrt{2145}}{2002}$  | 0                             | $-\frac{\sqrt{143}}{8008}$  | 0                            | $\frac{\sqrt{3003}}{4004}$   |
|                                   |           | 0   | $-\frac{\sqrt{858}}{2464}$   | 0                           | $-\frac{\sqrt{429}}{336}$  | 0                             | $\frac{5\sqrt{4290}}{7392}$  | $\frac{3\sqrt{5005}}{8008}$  | 0                            | $-\frac{\sqrt{2145}}{4004}$  | 0                            | $-\frac{\sqrt{143}}{8008}$    | 0                           | $\frac{\sqrt{715}}{1001}$    | 0                            |
|                                   |           | $\frac{5\sqrt{1430}}{2464}$                     | 0                            | $-\frac{3\sqrt{143}}{1232}$ | 0                          | $\frac{23\sqrt{286}}{7392}$   | 0                            | 0                            | $\frac{3\sqrt{2145}}{4004}$  | 0                            | $-\frac{\sqrt{429}}{8008}$   | 0                             | $\frac{\sqrt{715}}{1001}$   | 0                            | $-\frac{\sqrt{15015}}{8008}$ |
|                                   |           | 0   | $\frac{5\sqrt{2002}}{2464}$  | 0                           | $\frac{\sqrt{1001}}{1232}$ | 0                             | $-\frac{\sqrt{10010}}{7392}$ | 0                            | 0                            | $\frac{3\sqrt{5005}}{8008}$  | 0                            | $\frac{\sqrt{3003}}{4004}$    | 0                           | $-\frac{\sqrt{15015}}{8008}$ | 0                            |
| 1023                              | symmetry  | $\frac{\sqrt{105}y(x-z)(x+z)(x^2-2y^2+z^2)}{4}$ |                              |                             |                            |                               |                              |                              |                              |                              |                              |                               |                             |                              |                              |

*continued ...*

Table 10

| No.                      | multipole | matrix   |                                |                              |                              |                                |                               |                               |                               |                               |                               |                               |                               |                              |                               |
|--------------------------|-----------|--|--------------------------------|------------------------------|------------------------------|--------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|------------------------------|-------------------------------|
| $M_{5,1}^{(1,1;a)}(T_2)$ |           | 0  | $\frac{\sqrt{429i}}{308}$      | 0                            | $\frac{\sqrt{858i}}{308}$    | 0                              | $-\frac{3\sqrt{2145i}}{308}$  | $-\frac{\sqrt{10010i}}{7392}$ | 0                             | $-\frac{5\sqrt{4290i}}{7392}$ | 0                             | $-\frac{5\sqrt{286i}}{2464}$  | 0                             | $\frac{5\sqrt{1430i}}{2464}$ | 0                             |
|                          |           | $-\frac{\sqrt{429i}}{308}$                       | 0                              | $-\frac{\sqrt{4290i}}{308}$  | 0                            | $-\frac{\sqrt{2145i}}{308}$    | 0                             | 0                             | $\frac{23\sqrt{286i}}{7392}$  | 0                             | $\frac{13\sqrt{1430i}}{7392}$ | 0                             | $\frac{\sqrt{858i}}{2464}$    | 0                            | $\frac{5\sqrt{2002i}}{2464}$  |
|                          |           | 0  | $\frac{\sqrt{4290i}}{308}$     | 0                            | $\frac{\sqrt{2145i}}{154}$   | 0                              | $\frac{\sqrt{858i}}{308}$     | $-\frac{\sqrt{1001i}}{1232}$  | 0                             | $-\frac{\sqrt{429i}}{336}$    | 0                             | $-\frac{\sqrt{715i}}{3696}$   | 0                             | $\frac{3\sqrt{143i}}{1232}$  | 0                             |
|                          |           | $-\frac{\sqrt{858i}}{308}$                       | 0                              | $-\frac{\sqrt{2145i}}{154}$  | 0                            | $-\frac{\sqrt{4290i}}{308}$    | 0                             | 0                             | $\frac{3\sqrt{143i}}{1232}$   | 0                             | $-\frac{\sqrt{715i}}{3696}$   | 0                             | $-\frac{\sqrt{429i}}{336}$    | 0                            | $-\frac{\sqrt{1001i}}{1232}$  |
|                          |           | 0  | $\frac{\sqrt{2145i}}{308}$     | 0                            | $\frac{\sqrt{4290i}}{308}$   | 0                              | $\frac{\sqrt{429i}}{308}$     | $\frac{5\sqrt{2002i}}{2464}$  | 0                             | $\frac{\sqrt{858i}}{2464}$    | 0                             | $\frac{13\sqrt{1430i}}{7392}$ | 0                             | $\frac{23\sqrt{286i}}{7392}$ | 0                             |
|                          |           | $\frac{3\sqrt{2145i}}{308}$                      | 0                              | $-\frac{\sqrt{858i}}{308}$   | 0                            | $-\frac{\sqrt{429i}}{308}$     | 0                             | 0                             | $\frac{5\sqrt{1430i}}{2464}$  | 0                             | $-\frac{5\sqrt{286i}}{2464}$  | 0                             | $-\frac{5\sqrt{4290i}}{7392}$ | 0                            | $-\frac{\sqrt{10010i}}{7392}$ |
|                          |           | $\frac{\sqrt{10010i}}{7392}$                     | 0                              | $\frac{\sqrt{1001i}}{1232}$  | 0                            | $-\frac{5\sqrt{2002i}}{2464}$  | 0                             | 0                             | $-\frac{\sqrt{15015i}}{8008}$ | 0                             | $-\frac{\sqrt{3003i}}{4004}$  | 0                             | $\frac{3\sqrt{5005i}}{8008}$  | 0                            | 0                             |
|                          |           | 0  | $-\frac{23\sqrt{286i}}{7392}$  | 0                            | $-\frac{3\sqrt{143i}}{1232}$ | 0                              | $-\frac{5\sqrt{1430i}}{2464}$ | $\frac{\sqrt{15015i}}{8008}$  | 0                             | $\frac{\sqrt{715i}}{1001}$    | 0                             | $\frac{\sqrt{429i}}{8008}$    | 0                             | $\frac{3\sqrt{2145i}}{4004}$ | 0                             |
|                          |           | $\frac{5\sqrt{4290i}}{7392}$                     | 0                              | $\frac{\sqrt{429i}}{336}$    | 0                            | $-\frac{\sqrt{858i}}{2464}$    | 0                             | 0                             | $-\frac{\sqrt{715i}}{1001}$   | 0                             | $-\frac{\sqrt{143i}}{8008}$   | 0                             | $\frac{\sqrt{2145i}}{4004}$   | 0                            | $\frac{3\sqrt{5005i}}{8008}$  |
|                          |           | 0  | $-\frac{13\sqrt{1430i}}{7392}$ | 0                            | $\frac{\sqrt{715i}}{3696}$   | 0                              | $\frac{5\sqrt{286i}}{2464}$   | $\frac{\sqrt{3003i}}{4004}$   | 0                             | $\frac{\sqrt{143i}}{8008}$    | 0                             | $-\frac{\sqrt{2145i}}{2002}$  | 0                             | $\frac{\sqrt{429i}}{8008}$   | 0                             |
|                          |           | $\frac{5\sqrt{286i}}{2464}$                      | 0                              | $\frac{\sqrt{715i}}{3696}$   | 0                            | $-\frac{13\sqrt{1430i}}{7392}$ | 0                             | 0                             | $-\frac{\sqrt{429i}}{8008}$   | 0                             | $\frac{\sqrt{2145i}}{2002}$   | 0                             | $-\frac{\sqrt{143i}}{8008}$   | 0                            | $-\frac{\sqrt{3003i}}{4004}$  |
|                          |           | 0  | $-\frac{\sqrt{858i}}{2464}$    | 0                            | $\frac{\sqrt{429i}}{336}$    | 0                              | $\frac{5\sqrt{4290i}}{7392}$  | $-\frac{3\sqrt{5005i}}{8008}$ | 0                             | $-\frac{\sqrt{2145i}}{4004}$  | 0                             | $\frac{\sqrt{143i}}{8008}$    | 0                             | $\frac{\sqrt{715i}}{1001}$   | 0                             |
|                          |           | $-\frac{5\sqrt{1430i}}{2464}$                    | 0                              | $-\frac{3\sqrt{143i}}{1232}$ | 0                            | $-\frac{23\sqrt{286i}}{7392}$  | 0                             | 0                             | $-\frac{3\sqrt{2145i}}{4004}$ | 0                             | $-\frac{\sqrt{429i}}{8008}$   | 0                             | $-\frac{\sqrt{715i}}{1001}$   | 0                            | $-\frac{\sqrt{15015i}}{8008}$ |
|                          |           | 0  | $-\frac{5\sqrt{2002i}}{2464}$  | 0                            | $\frac{\sqrt{1001i}}{1232}$  | 0                              | $\frac{\sqrt{10010i}}{7392}$  | 0                             | 0                             | $-\frac{3\sqrt{5005i}}{8008}$ | 0                             | $\frac{\sqrt{3003i}}{4004}$   | 0                             | $\frac{\sqrt{15015i}}{8008}$ | 0                             |
| 1024                     | symmetry  | $-\frac{\sqrt{105}z(x-y)(x+y)(x^2+y^2-2z^2)}{4}$ |                                |                              |                              |                                |                               |                               |                               |                               |                               |                               |                               |                              |                               |

continued ...

Table 10

| No.                      | multipole | matrix                     |                            |                            |                            |                           |                            |                             |                             |                            |                             |                             |                             |                             |                            |
|--------------------------|-----------|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|----------------------------|-----------------------------|-----------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|----------------------------|
| $M_{5,2}^{(1,1;a)}(T_2)$ |           | 0                          | 0                          | $\frac{\sqrt{858}}{154}$   | 0                          | 0                         | 0                          | 0                           | 0                           | $-\frac{5\sqrt{286}}{924}$ | 0                           | 0                           | 0                           | 0                           |                            |
|                          |           | 0                          | 0                          | 0                          | $-\frac{\sqrt{4290}}{154}$ | 0                         | 0                          | $\frac{\sqrt{2002}}{924}$   | 0                           | 0                          | 0                           | $\frac{\sqrt{1430}}{462}$   | 0                           | 0                           | 0                          |
|                          |           | $\frac{\sqrt{858}}{154}$   | 0                          | 0                          | 0                          | $\frac{\sqrt{4290}}{154}$ | 0                          | 0                           | $-\frac{2\sqrt{143}}{231}$  | 0                          | 0                           | 0                           | $\frac{\sqrt{429}}{462}$    | 0                           | 0                          |
|                          |           | 0                          | $-\frac{\sqrt{4290}}{154}$ | 0                          | 0                          | 0                         | $-\frac{\sqrt{858}}{154}$  | 0                           | 0                           | $\frac{\sqrt{429}}{462}$   | 0                           | 0                           | 0                           | $-\frac{2\sqrt{143}}{231}$  | 0                          |
|                          |           | 0                          | 0                          | $\frac{\sqrt{4290}}{154}$  | 0                          | 0                         | 0                          | 0                           | 0                           | 0                          | $\frac{\sqrt{1430}}{462}$   | 0                           | 0                           | 0                           | $\frac{\sqrt{2002}}{924}$  |
|                          |           | 0                          | 0                          | 0                          | $-\frac{\sqrt{858}}{154}$  | 0                         | 0                          | 0                           | 0                           | 0                          | 0                           | $-\frac{5\sqrt{286}}{924}$  | 0                           | 0                           | 0                          |
|                          |           | 0                          | $\frac{\sqrt{2002}}{924}$  | 0                          | 0                          | 0                         | 0                          | 0                           | $-\frac{\sqrt{5005}}{2002}$ | 0                          | 0                           | 0                           | 0                           | 0                           | 0                          |
|                          |           | 0                          | 0                          | $-\frac{2\sqrt{143}}{231}$ | 0                          | 0                         | 0                          | 0                           | 0                           | 0                          | $\frac{3\sqrt{429}}{2002}$  | 0                           | 0                           | 0                           | 0                          |
|                          |           | 0                          | 0                          | 0                          | $\frac{\sqrt{429}}{462}$   | 0                         | 0                          | $-\frac{\sqrt{5005}}{2002}$ | 0                           | 0                          | 0                           | $\frac{2\sqrt{143}}{1001}$  | 0                           | 0                           | 0                          |
|                          |           | $-\frac{5\sqrt{286}}{924}$ | 0                          | 0                          | 0                          | $\frac{\sqrt{1430}}{462}$ | 0                          | 0                           | $\frac{3\sqrt{429}}{2002}$  | 0                          | 0                           | 0                           | $-\frac{2\sqrt{143}}{1001}$ | 0                           | 0                          |
|                          |           | 0                          | $\frac{\sqrt{1430}}{462}$  | 0                          | 0                          | 0                         | $-\frac{5\sqrt{286}}{924}$ | 0                           | 0                           | $\frac{2\sqrt{143}}{1001}$ | 0                           | 0                           | 0                           | $-\frac{3\sqrt{429}}{2002}$ | 0                          |
|                          |           | 0                          | 0                          | $\frac{\sqrt{429}}{462}$   | 0                          | 0                         | 0                          | 0                           | 0                           | 0                          | $-\frac{2\sqrt{143}}{1001}$ | 0                           | 0                           | 0                           | $\frac{\sqrt{5005}}{2002}$ |
|                          |           | 0                          | 0                          | 0                          | $-\frac{2\sqrt{143}}{231}$ | 0                         | 0                          | 0                           | 0                           | 0                          | 0                           | $-\frac{3\sqrt{429}}{2002}$ | 0                           | 0                           | 0                          |
|                          |           | 0                          | 0                          | 0                          | 0                          | $\frac{\sqrt{2002}}{924}$ | 0                          | 0                           | 0                           | 0                          | 0                           | 0                           | $\frac{\sqrt{5005}}{2002}$  | 0                           | 0                          |