

No. 4    $C_s$     $m$    (b-axis setting)   [ monoclinic ]   (axial)

| 表 1   rank 0 |            |
|--------------|------------|
| No.          | expression |
| 1            | 1          |

| 表 2   rank 1 |            |
|--------------|------------|
| No.          | expression |
| 2            | $Y$        |
| 3            | $X$        |
| 4            | $Z$        |

| 表 3   rank 2 |  |
|--------------|--|
| No.          | expression                             |
| 5            | $\sqrt{3}YZ$                           |
| 6            | $\sqrt{3}XY$                           |
| 7            | $-\frac{X^2}{2} - \frac{Y^2}{2} + Z^2$ |
| 8            | $\frac{\sqrt{3}(X-Y)(X+Y)}{2}$         |
| 9            | $\sqrt{3}XZ$                           |

| 表 4   rank 3 |                                   |
|--------------|-----------------------------------|
| No.          | expression                        |
| 10           | $\sqrt{15}XYZ$                    |
| 11           | $-\frac{Y(3X^2-2Y^2+3Z^2)}{2}$    |
| 12           | $-\frac{\sqrt{15}Y(X-Z)(X+Z)}{2}$ |
| 13           | $\frac{X(2X^2-3Y^2-3Z^2)}{2}$     |
| 14           | $-\frac{Z(3X^2+3Y^2-2Z^2)}{2}$    |
| 15           | $\frac{\sqrt{15}X(Y-Z)(Y+Z)}{2}$  |
| 16           | $\frac{\sqrt{15}Z(X-Y)(X+Y)}{2}$  |

表 5 rank 4

| No. | expression   |
|-----|--|
| 17  | $\frac{\sqrt{35}YZ(Y-Z)(Y+Z)}{2}$                              |
| 18  | $\frac{\sqrt{35}XY(X-Y)(X+Y)}{2}$                              |
| 19  | $\frac{\sqrt{5}YZ(6X^2-Y^2-Z^2)}{2}$                           |
| 20  | $-\frac{\sqrt{5}XY(X^2+Y^2-6Z^2)}{2}$                          |
| 21  | $\frac{\sqrt{21}(X^4-3X^2Y^2-3X^2Z^2+Y^4-3Y^2Z^2+Z^4)}{6}$     |
| 22  | $-\frac{\sqrt{15}(X^4-12X^2Y^2+6X^2Z^2+Y^4+6Y^2Z^2-2Z^4)}{12}$ |
| 23  | $\frac{\sqrt{5}(X-Y)(X+Y)(X^2+Y^2-6Z^2)}{4}$                   |
| 24  | $-\frac{\sqrt{35}XZ(X-Z)(X+Z)}{2}$                             |
| 25  | $-\frac{\sqrt{5}XZ(X^2-6Y^2+Z^2)}{2}$                          |

表 6 rank 5

| No. | expression   |
|-----|--|
| 26  | $\frac{3\sqrt{35}XYZ(X-Y)(X+Y)}{2}$                        |
| 27  | $\frac{\sqrt{105}XYZ(X^2+Y^2-2Z^2)}{2}$                    |
| 28  | $\frac{Y(15X^4-40X^2Y^2+30X^2Z^2+8Y^4-40Y^2Z^2+15Z^4)}{8}$ |
| 29  | $\frac{3\sqrt{35}Y(X^2-2XZ-Z^2)(X^2+2XZ-Z^2)}{8}$          |
| 30  | $\frac{\sqrt{105}Y(X-Z)(X+Z)(X^2-2Y^2+Z^2)}{4}$            |
| 31  | $\frac{X(8X^4-40X^2Y^2-40X^2Z^2+15Y^4+30Y^2Z^2+15Z^4)}{8}$ |
| 32  | $\frac{Z(15X^4+30X^2Y^2-40X^2Z^2+15Y^4-40Y^2Z^2+8Z^4)}{8}$ |
| 33  | $\frac{3\sqrt{35}X(Y^2-2YZ-Z^2)(Y^2+2YZ-Z^2)}{8}$          |
| 34  | $\frac{3\sqrt{35}Z(X^2-2XY-Y^2)(X^2+2XY-Y^2)}{8}$          |
| 35  | $\frac{\sqrt{105}X(Y-Z)(Y+Z)(2X^2-Y^2-Z^2)}{4}$            |
| 36  | $-\frac{\sqrt{105}Z(X-Y)(X+Y)(X^2+Y^2-2Z^2)}{4}$           |

表 7 rank 6

| No. | expression   |
|-----|--|
| 37  | $\frac{3\sqrt{7}YZ(Y-Z)(Y+Z)(10X^2-Y^2-Z^2)}{4}$   |
| 38  | $-\frac{3\sqrt{7}XY(X-Y)(X+Y)(X^2+Y^2-10Z^2)}{4}$  |
| 39  | $\frac{\sqrt{462}YZ(Y^2-3Z^2)(3Y^2-Z^2)}{16}$  |
| 40  | $\frac{\sqrt{462}XY(X^2-3Y^2)(3X^2-Y^2)}{16}$  |
| 41  | $\frac{\sqrt{210}YZ(16X^4-16X^2Y^2-16X^2Z^2+Y^4+2Y^2Z^2+Z^4)}{16}$   |
| 42  | $\frac{\sqrt{210}XY(X^4+2X^2Y^2-16X^2Z^2+Y^4-16Y^2Z^2+16Z^4)}{16}$   |
| 43  | $\frac{\sqrt{2}\cdot(2X^6-15X^4Y^2-15X^4Z^2-15X^2Y^4+180X^2Y^2Z^2-15X^2Z^4+2Y^6-15Y^4Z^2-15Y^2Z^4+2Z^6)}{8}$ |
| 44  | $\frac{\sqrt{2310}(X-Y)(X+Y)(X-Z)(X+Z)(Y-Z)(Y+Z)}{8}$  |
| 45  | $-\frac{\sqrt{14}(X^6-15X^4Z^2+15X^2Z^4+Y^6-15Y^4Z^2+15Y^2Z^4-2Z^6)}{8}$                                     |
| 46  | $\frac{\sqrt{42}(X-Y)(X+Y)(X^4-9X^2Y^2-5X^2Z^2+Y^4-5Y^2Z^2+5Z^4)}{8}$  |
| 47  | $\frac{3\sqrt{7}XZ(X-Z)(X+Z)(X^2-10Y^2+Z^2)}{4}$   |
| 48  | $\frac{\sqrt{462}XZ(X^2-3Z^2)(3X^2-Z^2)}{16}$  |
| 49  | $\frac{\sqrt{210}XZ(X^4-16X^2Y^2+2X^2Z^2+16Y^4-16Y^2Z^2+Z^4)}{16}$   |

表 8 rank 7

| No. | expression  |
|-----|---|
| 50  | $\frac{\sqrt{91}XYZ(3X^4-5X^2Y^2-5X^2Z^2+3Y^4-5Y^2Z^2+3Z^4)}{2}$  |
| 51  | $-\frac{\sqrt{231}XYZ(X-Y)(X+Y)(3X^2+3Y^2-10Z^2)}{4}$   |
| 52  | $-\frac{\sqrt{77}XYZ(3X^4-20X^2Y^2+10X^2Z^2+3Y^4+10Y^2Z^2-6Z^4)}{4}$  |
| 53  | $-\frac{Y(35X^6-210X^4Y^2+105X^4Z^2+168X^2Y^4-420X^2Y^2Z^2+105X^2Z^4-16Y^6+168Y^4Z^2-210Y^2Z^4+35Z^6)}{16}$ |
| 54  | $-\frac{\sqrt{231}Y(X^2-2XZ-Z^2)(X^2+2XZ-Z^2)(3X^2-10Y^2+3Z^2)}{16}$  |
| 55  | $-\frac{\sqrt{6006}Y(X-Z)(X+Z)(X^2-4XZ+Z^2)(X^2+4XZ+Z^2)}{32}$  |
| 56  | $-\frac{\sqrt{42}Y(X-Z)(X+Z)(15X^4-80X^2Y^2+30X^2Z^2+48Y^4-80Y^2Z^2+15Z^4)}{32}$                            |
| 57  | $\frac{X(16X^6-168X^4Y^2-168X^4Z^2+210X^2Y^4+420X^2Y^2Z^2+210X^2Z^4-35Y^6-105Y^4Z^2-105Y^2Z^4-35Z^6)}{16}$  |
| 58  | $-\frac{Z(35X^6+105X^4Y^2-210X^4Z^2+105X^2Y^4-420X^2Y^2Z^2+168X^2Z^4+35Y^6-210Y^4Z^2+168Y^2Z^4-16Z^6)}{16}$ |
| 59  | $\frac{\sqrt{231}X(10X^2-3Y^2-3Z^2)(Y^2-2YZ-Z^2)(Y^2+2YZ-Z^2)}{16}$   |
| 60  | $-\frac{\sqrt{231}Z(X^2-2XY-Y^2)(X^2+2XY-Y^2)(3X^2+3Y^2-10Z^2)}{16}$  |
| 61  | $\frac{\sqrt{6006}X(Y-Z)(Y+Z)(Y^2-4YZ+Z^2)(Y^2+4YZ+Z^2)}{32}$   |
| 62  | $\frac{\sqrt{6006}Z(X-Y)(X+Y)(X^2-4XY+Y^2)(X^2+4XY+Y^2)}{32}$   |
| 63  | $\frac{\sqrt{42}X(Y-Z)(Y+Z)(48X^4-80X^2Y^2-80X^2Z^2+15Y^4+30Y^2Z^2+15Z^4)}{32}$                             |
| 64  | $\frac{\sqrt{42}Z(X-Y)(X+Y)(15X^4+30X^2Y^2-80X^2Z^2+15Y^4-80Y^2Z^2+48Z^4)}{32}$                             |

表 9 rank 8

| No. | expression  |
|-----|---|
| 65  | $\frac{3\sqrt{715}YZ(Y-Z)(Y+Z)(Y^2-2YZ-Z^2)(Y^2+2YZ-Z^2)}{16}$  |
| 66  | $\frac{3\sqrt{715}XY(X-Y)(X+Y)(X^2-2XY-Y^2)(X^2+2XY-Y^2)}{16}$  |
| 67  | $\frac{3\sqrt{77}YZ(Y-Z)(Y+Z)(40X^4-24X^2Y^2-24X^2Z^2+Y^4+2Y^2Z^2+Z^4)}{16}$  |
| 68  | $\frac{3\sqrt{77}XY(X-Y)(X+Y)(X^4+2X^2Y^2-24X^2Z^2+Y^4-24Y^2Z^2+40Z^4)}{16}$  |
| 69  | $\frac{\sqrt{858}YZ(Y^2-3Z^2)(3Y^2-Z^2)(14X^2-Y^2-Z^2)}{32}$  |
| 70  | $-\frac{\sqrt{858}XY(X^2-3Y^2)(3X^2-Y^2)(X^2+Y^2-14Z^2)}{32}$   |
| 71  | $\frac{3\sqrt{70}YZ(32X^6-80X^4Y^2-80X^4Z^2+30X^2Y^4+60X^2Y^2Z^2+30X^2Z^4-Y^6-3Y^4Z^2-3Y^2Z^4-Z^6)}{32}$  |
| 72  | $-\frac{3\sqrt{70}XY(X^6+3X^4Y^2-30X^4Z^2+3X^2Y^4-60X^2Y^2Z^2+80X^2Z^4+Y^6-30Y^4Z^2+80Y^2Z^4-32Z^6)}{32}$   |
| 73  | $\frac{\sqrt{33}(X^8-14X^6Y^2-14X^6Z^2+35X^4Y^4+35X^4Z^4-14X^2Y^6-14X^2Z^6+Y^8-14Y^6Z^2+35Y^4Z^4-14Y^2Z^6+Z^8)}{8}$   |
| 74  | $\frac{\sqrt{286}(X^8-14X^6Y^2-14X^6Z^2+210X^4Y^2Z^2-14X^2Y^6+210X^2Y^4Z^2-420X^2Y^2Z^4+28X^2Z^6+Y^8-14Y^6Z^2+28Y^2Z^6-2Z^8)}{64}$                          |
| 75  | $-\frac{\sqrt{858}(X-Y)(X+Y)(X^2+Y^2-14Z^2)(X^2-4XY+Y^2)(X^2+4XY+Y^2)}{64}$   |
| 76  | $\frac{\sqrt{210}(X^8-62X^6Y^2+34X^6Z^2+160X^4Y^4-30X^4Y^2Z^2-80X^4Z^4-62X^2Y^6-30X^2Y^4Z^2+60X^2Y^2Z^4+28X^2Z^6+Y^8+34Y^6Z^2-80Y^4Z^4+28Y^2Z^6-2Z^8)}{64}$ |
| 77  | $-\frac{3\sqrt{70}(X-Y)(X+Y)(X^6+3X^4Y^2-30X^4Z^2+3X^2Y^4-60X^2Y^2Z^2+80X^2Z^4+Y^6-30Y^4Z^2+80Y^2Z^4-32Z^6)}{64}$   |
| 78  | $-\frac{3\sqrt{715}XZ(X-Z)(X+Z)(X^2-2XZ-Z^2)(X^2+2XZ-Z^2)}{16}$   |
| 79  | $-\frac{3\sqrt{77}XZ(X-Z)(X+Z)(X^4-24X^2Y^2+2X^2Z^2+40Y^4-24Y^2Z^2+Z^4)}{16}$   |
| 80  | $-\frac{\sqrt{858}XZ(X^2-3Z^2)(3X^2-Z^2)(X^2-14Y^2+Z^2)}{32}$   |
| 81  | $-\frac{3\sqrt{70}XZ(X^6-30X^4Y^2+3X^4Z^2+80X^2Y^4-60X^2Y^2Z^2+3X^2Z^4-32Y^6+80Y^4Z^2-30Y^2Z^4+Z^6)}{32}$   |

表 10 rank 9

| No. | expression  |
|-----|---|
| 82  | $\frac{\sqrt{510510}XYZ(X-Y)(X+Y)(X-Z)(X+Z)(Y-Z)(Y+Z)}{8}$  |
| 83  | $\frac{\sqrt{330}XYZ(6X^6-21X^4Y^2-21X^4Z^2-21X^2Y^4+140X^2Y^2Z^2-21X^2Z^4+6Y^6-21Y^4Z^2-21Y^2Z^4+6Z^6)}{8}$  |
| 84  | $\frac{\sqrt{4290}XYZ(X-Y)(X+Y)(3X^4-11X^2Y^2-7X^2Z^2+3Y^4-7Y^2Z^2+7Z^4)}{8}$   |
| 85  | $\frac{3\sqrt{1430}XYZ(X^6-7X^4Z^2+7X^2Z^4+Y^6-7Y^4Z^2+7Y^2Z^4-2Z^6)}{8}$   |
| 86  | $\frac{Y(315X^8-3360X^6Y^2+1260X^6Z^2+6048X^4Y^4-10080X^4Y^2Z^2+1890X^4Z^4-2304X^2Y^6+12096X^2Y^4Z^2-10080X^2Y^2Z^4+1260X^2Z^6+128Y^8-2304Y^6Z^2+6048Y^4Z^4-3360Y^2Z^6+315Z^8)}{128}$ |
| 87  | $\frac{3\sqrt{12155}Y(X^4-4X^3Z-6X^2Z^2+4XZ^3+Z^4)(X^4+4X^3Z-6X^2Z^2-4XZ^3+Z^4)}{128}$  |
| 88  | $\frac{3\sqrt{5005}Y(X^2-2XZ-Z^2)(X^2+2XZ-Z^2)(X^4-8X^2Y^2+2X^2Z^2+8Y^4-8Y^2Z^2+Z^4)}{128}$   |
| 89  | $\frac{\sqrt{4290}Y(X-Z)(X+Z)(X^2-4XZ+Z^2)(X^2+4XZ+Z^2)(3X^2-14Y^2+3Z^2)}{64}$  |
| 90  | $\frac{3\sqrt{110}Y(X-Z)(X+Z)(7X^6-70X^4Y^2+21X^4Z^2+112X^2Y^4-140X^2Y^2Z^2+21X^2Z^4-32Y^6+112Y^4Z^2-70Y^2Z^4+7Z^6)}{64}$   |
| 91  | $\frac{X(128X^8-2304X^6Y^2-2304X^6Z^2+6048X^4Y^4+12096X^4Y^2Z^2+6048X^4Z^4-3360X^2Y^6-10080X^2Y^4Z^2-10080X^2Y^2Z^4-3360X^2Z^6+315Y^8+1260Y^6Z^2+1890Y^4Z^4+1260Y^2Z^6+315Z^8)}{128}$ |
| 92  | $\frac{Z(315X^8+1260X^6Y^2-3360X^6Z^2+1890X^4Y^4-10080X^4Y^2Z^2+6048X^4Z^4+1260X^2Y^6-10080X^2Y^4Z^2+12096X^2Y^2Z^4-2304X^2Z^6+315Y^8-3360Y^6Z^2+6048Y^4Z^4-2304Y^2Z^6+128Z^8)}{128}$ |
| 93  | $\frac{3\sqrt{12155}X(Y^4-4Y^3Z-6Y^2Z^2+4YZ^3+Z^4)(Y^4+4Y^3Z-6Y^2Z^2-4YZ^3+Z^4)}{128}$  |
| 94  | $\frac{3\sqrt{12155}Z(X^4-4X^3Y-6X^2Y^2+4XY^3+Y^4)(X^4+4X^3Y-6X^2Y^2-4XY^3+Y^4)}{128}$  |
| 95  | $\frac{3\sqrt{5005}X(Y^2-2YZ-Z^2)(Y^2+2YZ-Z^2)(8X^4-8X^2Y^2-8X^2Z^2+Y^4+2Y^2Z^2+Z^4)}{128}$   |
| 96  | $\frac{3\sqrt{5005}Z(X^2-2XY-Y^2)(X^2+2XY-Y^2)(X^4+2X^2Y^2-8X^2Z^2+Y^4-8Y^2Z^2+8Z^4)}{64}$  |
| 97  | $\frac{\sqrt{4290}X(Y-Z)(Y+Z)(14X^2-3Y^2-3Z^2)(Y^2-4YZ+Z^2)(Y^2+4YZ+Z^2)}{64}$  |
| 98  | $-\frac{\sqrt{4290}Z(X-Y)(X+Y)(X^2-4XY+Y^2)(X^2+4XY+Y^2)(3X^2+3Y^2-14Z^2)}{64}$   |
| 99  | $\frac{3\sqrt{110}X(Y-Z)(Y+Z)(32X^6-112X^4Y^2-112X^4Z^2+70X^2Y^4+140X^2Y^2Z^2+70X^2Z^4-7Y^6-21Y^4Z^2-21Y^2Z^4-7Z^6)}{64}$   |
| 100 | $-\frac{3\sqrt{110}Z(X-Y)(X+Y)(7X^6+21X^4Y^2-70X^4Z^2+21X^2Y^4-140X^2Y^2Z^2+112X^2Z^4+7Y^6-70Y^4Z^2+112Y^2Z^4-32Z^6)}{64}$  |

表 11 rank 10

| No. | expression  |
|-----|---|
| 101 | $\frac{\sqrt{12155}YZ(Y-Z)(Y+Z)(18X^2-Y^2-Z^2)(Y^2-2YZ-Z^2)(Y^2+2YZ-Z^2)}{32}$  |
| 102 | $-\frac{\sqrt{12155}XY(X-Y)(X+Y)(X^2+Y^2-18Z^2)(X^2-2XY-Y^2)(X^2+2XY-Y^2)}{32}$   |
| 103 | $\frac{\sqrt{2145}YZ(Y-Z)(Y+Z)(112X^6-168X^4Y^2-168X^4Z^2+42X^2Y^4+84X^2Y^2Z^2+42X^2Z^4-Y^6-3Y^4Z^2-3Y^2Z^4-Z^6)}{32}$  |
| 104 | $-\frac{\sqrt{2145}XY(X-Y)(X+Y)(X^6+3X^4Y^2-42X^4Z^2+3X^2Y^4-84X^2Y^2Z^2+168X^2Z^4+Y^6-42Y^4Z^2+168Y^2Z^4-112Z^6)}{32}$   |
| 105 | $\frac{\sqrt{92378}YZ(Y^4-10Y^2Z^2+5Z^4)(5Y^4-10Y^2Z^2+Z^4)}{256}$  |
| 106 | $\frac{\sqrt{92378}XY(X^4-10X^2Y^2+5Y^4)(5X^4-10X^2Y^2+Y^4)}{256}$  |
| 107 | $\frac{\sqrt{4290}YZ(Y^2-3Z^2)(3Y^2-Z^2)(224X^4-96X^2Y^2-96X^2Z^2+3Y^4+6Y^2Z^2+3Z^4)}{256}$   |
| 108 | $\frac{\sqrt{4290}XY(X^2-3Y^2)(3X^2-Y^2)(3X^4+6X^2Y^2-96X^2Z^2+3Y^4-96Y^2Z^2+224Z^4)}{256}$   |
| 109 | $\frac{\sqrt{165}YZ(384X^8-1792X^6Y^2-1792X^6Z^2+1680X^4Y^4+3360X^4Y^2Z^2+1680X^4Z^4-336X^2Y^6-1008X^2Y^4Z^2-1008X^2Y^2Z^4-336X^2Z^6+7Y^8+28Y^6Z^2+42Y^4Z^4+28Y^2Z^6+7Z^8)}{128}$   |
| 110 | $\frac{\sqrt{165}XY(7X^8+28X^6Y^2-336X^6Z^2+42X^4Y^4-1008X^4Y^2Z^2+1680X^4Z^4+28X^2Y^6-1008X^2Y^4Z^2+3360X^2Y^2Z^4-1792X^2Z^6+7Y^8-336Y^6Z^2+1680Y^4Z^4-1792Y^2Z^6+384Z^8)}{128}$   |
| 111 | $\frac{\sqrt{390} \cdot (2X^{10}-45X^8Y^2-45X^8Z^2+42X^6Y^4+1008X^6Y^2Z^2+42X^6Z^4+42X^4Y^6-1260X^4Y^4Z^2-1260X^4Y^2Z^4+42X^4Z^6-45X^2Y^8+1008X^2Y^6Z^2-1260X^2Y^4Z^4+1008X^2Y^2Z^6-45X^2Z^8+2Y^{10}-45Y^8Z^2+42Y^6Z^4+42Y^4Z^6-45Y^2Z^8+2Z^{10})}{96}$                         |
| 112 | $\frac{\sqrt{27170}(X-Y)(X+Y)(X-Z)(X+Z)(Y-Z)(Y+Z)(3X^4-11X^2Y^2-11X^2Z^2+3Y^4-11Y^2Z^2+3Z^4)}{32}$  |
| 113 | $-\frac{\sqrt{420189} \cdot (22X^{10}+45X^8Y^2-1035X^8Z^2-105X^6Y^4-630X^6Y^2Z^2+4935X^6Z^4-105X^4Y^6+3150X^4Y^4Z^2-1575X^4Y^2Z^4-4830X^4Z^6+45X^2Y^8-630X^2Y^6Z^2-1575X^2Y^4Z^4+1260X^2Y^2Z^6+990X^2Z^8+22Y^{10}-1035Y^8Z^2+4935Y^6Z^4-4830Y^4Z^6+990Y^2Z^8-44Z^{10})}{35952}$ |
| 114 | $\frac{\sqrt{140063}(X-Y)(X+Y)(22X^8-653X^6Y^2-315X^6Z^2+2602X^4Y^4-945X^4Y^2Z^2+1575X^4Z^4-653X^2Y^6-945X^2Y^4Z^2+3150X^2Y^2Z^4-1680X^2Z^6+22Y^8-315Y^6Z^2+1575Y^4Z^4-1680Y^2Z^6+360Z^8)}{11984}$  |
| 115 | $-\frac{\sqrt{3213210} \cdot (3X^{10}-96X^8Y^2-39X^8Z^2+224X^6Y^4+1344X^6Y^2Z^2-42X^6Z^4+224X^4Y^6-6720X^4Y^4Z^2+3360X^4Y^2Z^4-182X^4Z^6-96X^2Y^8+1344X^2Y^6Z^2+3360X^2Y^4Z^4-2688X^2Y^2Z^6+135X^2Z^8+3Y^{10}-39Y^8Z^2-42Y^6Z^4-182Y^4Z^6+135Y^2Z^8-6Z^{10})}{23968}$           |
| 116 | $\frac{\sqrt{1071070}(X-Y)(X+Y)(9X^8-165X^6Y^2-231X^6Z^2-25X^4Y^4+3801X^4Y^2Z^2+406X^4Z^4-165X^2Y^6+3801X^2Y^4Z^2-9674X^2Y^2Z^4+266X^2Z^6+9Y^8-231Y^6Z^2+406Y^4Z^4+266Y^2Z^6-57Z^8)}{23968}$  |
| 117 | $\frac{\sqrt{12155}XZ(X-Z)(X+Z)(X^2-18Y^2+Z^2)(X^2-2XZ-Z^2)(X^2+2XZ-Z^2)}{32}$  |
| 118 | $\frac{\sqrt{2145}XZ(X-Z)(X+Z)(X^6-42X^4Y^2+3X^4Z^2+168X^2Y^4-84X^2Y^2Z^2+3X^2Z^4-112Y^6+168Y^4Z^2-42Y^2Z^4+Z^6)}{32}$  |
| 119 | $\frac{\sqrt{92378}XZ(X^4-10X^2Z^2+5Z^4)(5X^4-10X^2Z^2+Z^4)}{256}$  |
| 120 | $\frac{\sqrt{4290}XZ(X^2-3Z^2)(3X^2-Z^2)(3X^4-96X^2Y^2+6X^2Z^2+224Y^4-96Y^2Z^2+3Z^4)}{256}$   |
| 121 | $\frac{\sqrt{165}XZ(7X^8-336X^6Y^2+28X^6Z^2+1680X^4Y^4-1008X^4Y^2Z^2+42X^4Z^4-1792X^2Y^6+3360X^2Y^4Z^2-1008X^2Y^2Z^4+28X^2Z^6+384Y^8-1792Y^6Z^2+1680Y^4Z^4-336Y^2Z^6+7Z^8)}{128}$   |

表 12 rank 11

| No. | expression  |
|-----|---|
| 122 | $\frac{\sqrt{2431XYZ(5X^8-30X^6Y^2-30X^6Z^2+63X^4Y^4+63X^4Z^4-30X^2Y^6-30X^2Z^6+5Y^8-30Y^6Z^2+63Y^4Z^4-30Y^2Z^6+5Z^8)}}{8}$   |
| 123 | $-\frac{\sqrt{692835XYZ(X-Y)(X+Y)(X^2+Y^2-6Z^2)(X^2-2XY-Y^2)(X^2+2XY-Y^2)}}{32}$  |
| 124 | $-\frac{\sqrt{230945XYZ(X^8-6X^6Y^2-6X^6Z^2+42X^4Y^2Z^2-6X^2Y^6+42X^2Y^4Z^2-84X^2Y^2Z^4+12X^2Z^6+Y^8-6Y^6Z^2+12Y^2Z^6-2Z^8)}}{32}$  |
| 125 | $-\frac{3\sqrt{1001XYZ(X-Y)(X+Y)(5X^6+15X^4Y^2-70X^4Z^2+15X^2Y^4-140X^2Y^2Z^2+168X^2Z^4+5Y^6-70Y^4Z^2+168Y^2Z^4-80Z^6)}}{32}$   |
| 126 | $-\frac{\sqrt{3003XYZ(5X^8-150X^6Y^2+90X^6Z^2+336X^4Y^4-70X^4Y^2Z^2-168X^4Z^4-150X^2Y^6-70X^2Y^4Z^2+140X^2Y^2Z^4+60X^2Z^6+5Y^8+90Y^6Z^2-168Y^4Z^4+60Y^2Z^6-10Z^8)}}{32}$  |
| 127 | $-\frac{Y(693X^{10}-11550X^8Y^2+3465X^8Z^2+36960X^6Y^4-46200X^6Y^2Z^2+6930X^6Z^4-31680X^4Y^6+110880X^4Y^4Z^2-69300X^4Y^2Z^4+6930X^4Z^6+7040X^2Y^8-63360X^2Y^6Z^2+110880X^2Y^4Z^4-46200X^2Y^2Z^6+3465X^2Z^8-256Y^{10}+7040Y^8Z^2-31680Y^6Z^4+36960Y^4Z^6-11550Y^2Z^8+693Z^{10})}{256}$ |
| 128 | $-\frac{\sqrt{692835Y(X^2-6Y^2+Z^2)(X^4-4X^3Z-6X^2Z^2+4XZ^3+Z^4)(X^4+4X^3Z-6X^2Z^2-4XZ^3+Z^4)}}{256}$   |
| 129 | $-\frac{3\sqrt{1001Y(X^2-2XZ-Z^2)(X^2+2XZ-Z^2)(5X^6-70X^4Y^2+15X^4Z^2+168X^2Y^4-140X^2Y^2Z^2+15X^2Z^4-80Y^6+168Y^4Z^2-70Y^2Z^4+5Z^6)}}{128}$  |
| 130 | $-\frac{\sqrt{1939938Y(X-Z)(X+Z)(X^4-4X^3Z-14X^2Z^2-4XZ^3+Z^4)(X^4+4X^3Z-14X^2Z^2+4XZ^3+Z^4)}}{512}$  |
| 131 | $-\frac{\sqrt{14586Y(X-Z)(X+Z)(X^2-4XZ+Z^2)(X^2+4XZ+Z^2)(15X^4-160X^2Y^2+30X^2Z^2+224Y^4-160Y^2Z^2+15Z^4)}}{512}$   |
| 132 | $-\frac{\sqrt{2145Y(X-Z)(X+Z)(21X^8-336X^6Y^2+84X^6Z^2+1008X^4Y^4-1008X^4Y^2Z^2+126X^4Z^4-768X^2Y^6+2016X^2Y^4Z^2-1008X^2Y^2Z^4+84X^2Z^6+128Y^8-768Y^6Z^2+1008Y^4Z^4-336Y^2Z^6+21Z^8)}}{256}$   |
| 133 | $-\frac{X(256X^{10}-7040X^8Y^2-7040X^8Z^2+31680X^6Y^4+63360X^6Y^2Z^2+31680X^6Z^4-36960X^4Y^6-110880X^4Y^4Z^2-110880X^4Y^2Z^4-36960X^4Z^6+11550X^2Y^8+46200X^2Y^6Z^2+69300X^2Y^4Z^4+46200X^2Y^2Z^6+11550X^2Z^8-693Y^{10}-3465Y^8Z^2-6930Y^6Z^4-6930Y^4Z^6-3465Y^2Z^8-693Z^{10})}{256}$ |
| 134 | $-\frac{Z(693X^{10}+3465X^8Y^2-11550X^8Z^2+6930X^6Y^4-46200X^6Y^2Z^2+36960X^6Z^4+6930X^4Y^6-69300X^4Y^4Z^2+110880X^4Y^2Z^4-31680X^4Z^6+3465X^2Y^8-46200X^2Y^6Z^2+110880X^2Y^4Z^4-63360X^2Y^2Z^6+7040X^2Z^8+693Y^{10}-11550Y^8Z^2+36960Y^6Z^4-31680Y^4Z^6+7040Y^2Z^8-256Z^{10})}{256}$ |
| 135 | $-\frac{\sqrt{692835X(6X^2-Y^2-Z^2)(Y^4-4Y^3Z-6Y^2Z^2+4YZ^3+Z^4)(Y^4+4Y^3Z-6Y^2Z^2-4YZ^3+Z^4)}}{256}$   |
| 136 | $-\frac{\sqrt{692835Z(X^2+Y^2-6Z^2)(X^4-4X^3Y-6X^2Y^2+4XY^3+Y^4)(X^4+4X^3Y-6X^2Y^2-4XY^3+Y^4)}}{256}$   |
| 137 | $-\frac{3\sqrt{1001X(Y^2-2YZ-Z^2)(Y^2+2YZ-Z^2)(80X^6-168X^4Y^2-168X^4Z^2+70X^2Y^4+140X^2Y^2Z^2+70X^2Z^4-5Y^6-15Y^4Z^2-15Y^2Z^4-5Z^6)}}{128}$  |
| 138 | $-\frac{3\sqrt{1001X(X^2-2XY-Y^2)(X^2+2XY-Y^2)(5X^6+15X^4Y^2-70X^4Z^2+15X^2Y^4-140X^2Y^2Z^2+168X^2Z^4+5Y^6-70Y^4Z^2+168Y^2Z^4-80Z^6)}}{128}$  |
| 139 | $-\frac{\sqrt{1939938X(Y-Z)(Y+Z)(Y^4-4Y^3Z-14Y^2Z^2-4YZ^3+Z^4)(Y^4+4Y^3Z-14Y^2Z^2+4YZ^3+Z^4)}}{512}$  |
| 140 | $-\frac{\sqrt{1939938Z(X-Y)(X+Y)(X^4-4X^3Y-14X^2Y^2-4XY^3+Y^4)(X^4+4X^3Y-14X^2Y^2+4XY^3+Y^4)}}{512}$  |
| 141 | $-\frac{\sqrt{14586X(Y-Z)(Y+Z)(Y^2-4YZ+Z^2)(Y^2+4YZ+Z^2)(224X^4-160X^2Y^2-160X^2Z^2+15Y^4+30Y^2Z^2+15Z^4)}}{512}$   |
| 142 | $-\frac{\sqrt{14586Z(X-Y)(X+Y)(X^2-4XY+Y^2)(X^2+4XY+Y^2)(15X^4+30X^2Y^2-160X^2Z^2+15Y^4-160Y^2Z^2+224Z^4)}}{512}$   |
| 143 | $-\frac{\sqrt{2145X(Y-Z)(Y+Z)(128X^8-768X^6Y^2-768X^6Z^2+1008X^4Y^4+2016X^4Y^2Z^2+1008X^4Z^4-336X^2Y^6-1008X^2Y^4Z^2-1008X^2Y^2Z^4-336X^2Z^6+21Y^8+84Y^6Z^2+126Y^4Z^4+84Y^2Z^6+21Z^8)}}{256}$   |
| 144 | $-\frac{\sqrt{2145Z(X-Y)(X+Y)(21X^8+84X^6Y^2-336X^6Z^2+126X^4Y^4-1008X^4Y^2Z^2+1008X^4Z^4+84X^2Y^6-1008X^2Y^4Z^2+2016X^2Y^2Z^4-768X^2Z^6+21Y^8-336Y^6Z^2+1008Y^4Z^4-768Y^2Z^6+128Z^8)}}{256}$   |