

Model for “D3”

Generated on 2026-01-26 01:19:41 by MultiPie 2.0.6

General Condition

- Basis type: **lgs**
- SAMB selection:
 - Type: [Q, G]
 - Rank: [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11]
 - Irrep.: [A_1 , A_2 , E]
 - Spin (s): [0, 1]
- Atomic selection:
 - Type: [Q, G, M, T]
 - Rank: [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11]
 - Irrep.: [A_1 , A_2 , E]
 - Spin (s): [0, 1]
- Site-cluster selection:
 - Rank: [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11]
 - Irrep.: [A_1 , A_2 , E]
- Bond-cluster selection:
 - Type: [Q, G, M, T]
 - Rank: [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11]
 - Irrep.: [A_1 , A_2 , E]
- Max. neighbor: 10
- Search cell range: (-2, 3), (-2, 3), (-2, 3)
- Toroidal priority: **false**

Group and Unit Cell

- Group: PG No. 18 D_3 32 (321 setting) [trigonal]
- Unit cell:
 - $a = 1.00000$, $b = 1.00000$, $c = 1.00000$, $\alpha = 90.0$, $\beta = 90.0$, $\gamma = 120.0$
- Lattice vectors (conventional cell):
 - $\mathbf{a}_1 = [1.00000, 0.00000, 0.00000]$
 - $\mathbf{a}_2 = [-0.50000, 0.86603, 0.00000]$
 - $\mathbf{a}_3 = [0.00000, 0.00000, 1.00000]$

Symmetry Operation

Table 1: Symmetry operation

#	SO	#	SO	#	SO	#	SO	#	SO
1	1	2	3_{001}^+	3	3_{001}^-	4	2_{110}	5	2_{100}
6	2_{010}								

Harmonics

Table 2: Harmonics

#	symbol	irrep.	rank	X	multiplicity	component	symmetry
1	$\mathbb{G}_0(A_1)$	A_1	0	G, M	-	-	1
2	$\mathbb{Q}_0(A_1)$	A_1	0	Q, T	-	-	1
3	$\mathbb{G}_2(A_1)$	A_1	2	G, M	-	-	$-\frac{x^2}{2} - \frac{y^2}{2} + z^2$
4	$\mathbb{Q}_2(A_1)$	A_1	2	Q, T	-	-	$-\frac{x^2}{2} - \frac{y^2}{2} + z^2$
5	$\mathbb{G}_3(A_1)$	A_1	3	G, M	-	-	$\frac{\sqrt{10}x(x^2-3y^2)}{4}$
6	$\mathbb{Q}_3(A_1)$	A_1	3	Q, T	-	-	$\frac{\sqrt{10}x(x^2-3y^2)}{4}$
7	$\mathbb{G}_4(A_1, 1)$	A_1	4	G, M	1	-	$\frac{3x^4}{8} + \frac{3x^2y^2}{4} - 3x^2z^2 + \frac{3y^4}{8} - 3y^2z^2 + z^4$
8	$\mathbb{G}_4(A_1, 2)$	A_1	4	G, M	2	-	$\frac{\sqrt{70}yz(3x^2-y^2)}{4}$

continued ...

Table 2

#	symbol	irrep.	rank	X	multiplicity	component	symmetry
9	$\mathbb{Q}_4(A_1, 2)$	A_1	4	Q, T	2	-	$\frac{\sqrt{70}yz(3x^2-y^2)}{4}$
10	$\mathbb{G}_1(A_2)$	A_2	1	G, M	-	-	z
11	$\mathbb{Q}_1(A_2)$	A_2	1	Q, T	-	-	z
12	$\mathbb{G}_3(A_2, 1)$	A_2	3	G, M	1	-	$-\frac{z(3x^2+3y^2-2z^2)}{2}$
13	$\mathbb{G}_3(A_2, 2)$	A_2	3	G, M	2	-	$\frac{\sqrt{10}y(3x^2-y^2)}{4}$
14	$\mathbb{Q}_3(A_2, 1)$	A_2	3	Q, T	1	-	$-\frac{z(3x^2+3y^2-2z^2)}{2}$
15	$\mathbb{Q}_3(A_2, 2)$	A_2	3	Q, T	2	-	$\frac{\sqrt{10}y(3x^2-y^2)}{4}$
16	$\mathbb{G}_4(A_2)$	A_2	4	G, M	-	-	$\frac{\sqrt{70}xz(x^2-3y^2)}{4}$
17	$\mathbb{Q}_4(A_2)$	A_2	4	Q, T	-	-	$\frac{\sqrt{70}xz(x^2-3y^2)}{4}$
18	$\mathbb{G}_{1,1}(E)$	E	1	G, M	-	1	x
19	$\mathbb{G}_{1,2}(E)$					2	y
20	$\mathbb{Q}_{1,1}(E)$	E	1	Q, T	-	1	x
21	$\mathbb{Q}_{1,2}(E)$					2	y
22	$\mathbb{G}_{2,1}(E, 1)$	E	2	G, M	1	1	$\sqrt{3}yz$
23	$\mathbb{G}_{2,2}(E, 1)$					2	$-\sqrt{3}xz$
24	$\mathbb{G}_{2,1}(E, 2)$	E	2	G, M	2	1	$\frac{\sqrt{3}(x-y)(x+y)}{2}$
25	$\mathbb{G}_{2,2}(E, 2)$					2	$-\sqrt{3}xy$
26	$\mathbb{Q}_{2,1}(E, 1)$	E	2	Q, T	1	1	$\sqrt{3}yz$
27	$\mathbb{Q}_{2,2}(E, 1)$					2	$-\sqrt{3}xz$
28	$\mathbb{Q}_{2,1}(E, 2)$	E	2	Q, T	2	1	$\frac{\sqrt{3}(x-y)(x+y)}{2}$
29	$\mathbb{Q}_{2,2}(E, 2)$					2	$-\sqrt{3}xy$

continued ...

Table 2

#	symbol	irrep.	rank	X	multiplicity	component	symmetry
30	$\mathbb{G}_{3,1}(E, 1)$	E	3	G, M	1	1	$-\frac{\sqrt{6}x(x^2+y^2-4z^2)}{4}$
31	$\mathbb{G}_{3,2}(E, 1)$					2	$-\frac{\sqrt{6}y(x^2+y^2-4z^2)}{4}$
32	$\mathbb{G}_{3,1}(E, 2)$	E	3	G, M	2	1	$\sqrt{15}xyz$
33	$\mathbb{G}_{3,2}(E, 2)$					2	$\frac{\sqrt{15}z(x-y)(x+y)}{2}$
34	$\mathbb{Q}_{3,1}(E, 1)$	E	3	Q, T	1	1	$-\frac{\sqrt{6}x(x^2+y^2-4z^2)}{4}$
35	$\mathbb{Q}_{3,2}(E, 1)$					2	$-\frac{\sqrt{6}y(x^2+y^2-4z^2)}{4}$
36	$\mathbb{Q}_{3,1}(E, 2)$	E	3	Q, T	2	1	$\sqrt{15}xyz$
37	$\mathbb{Q}_{3,2}(E, 2)$					2	$\frac{\sqrt{15}z(x-y)(x+y)}{2}$
38	$\mathbb{G}_{4,1}(E, 1)$	E	4	G, M	1	1	$-\frac{\sqrt{10}yz(3x^2+3y^2-4z^2)}{4}$
39	$\mathbb{G}_{4,2}(E, 1)$					2	$\frac{\sqrt{10}xz(3x^2+3y^2-4z^2)}{4}$
40	$\mathbb{G}_{4,1}(E, 2)$	E	4	G, M	2	1	$\frac{\sqrt{35}(x^2-2xy-y^2)(x^2+2xy-y^2)}{8}$
41	$\mathbb{G}_{4,2}(E, 2)$					2	$\frac{\sqrt{35}xy(x-y)(x+y)}{2}$
42	$\mathbb{G}_{4,1}(E, 3)$	E	4	G, M	3	1	$-\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$
43	$\mathbb{G}_{4,2}(E, 3)$					2	$\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$
44	$\mathbb{Q}_{4,1}(E, 1)$	E	4	Q, T	1	1	$-\frac{\sqrt{10}yz(3x^2+3y^2-4z^2)}{4}$
45	$\mathbb{Q}_{4,2}(E, 1)$					2	$\frac{\sqrt{10}xz(3x^2+3y^2-4z^2)}{4}$
46	$\mathbb{Q}_{4,1}(E, 2)$	E	4	Q, T	2	1	$\frac{\sqrt{35}(x^2-2xy-y^2)(x^2+2xy-y^2)}{8}$
47	$\mathbb{Q}_{4,2}(E, 2)$					2	$\frac{\sqrt{35}xy(x-y)(x+y)}{2}$
48	$\mathbb{Q}_{4,1}(E, 3)$	E	4	Q, T	3	1	$-\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$
49	$\mathbb{Q}_{4,2}(E, 3)$					2	$\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$

Table 3: dimension = 48

#	orbital@atom(SL)	#	orbital@atom(SL)	#	orbital@atom(SL)	#	orbital@atom(SL)	#	orbital@atom(SL)
0	$ s, \uparrow\rangle @A(1)$	1	$ s, \downarrow\rangle @A(1)$	2	$ p_x, \uparrow\rangle @A(1)$	3	$ p_x, \downarrow\rangle @A(1)$	4	$ p_y, \uparrow\rangle @A(1)$
5	$ p_y, \downarrow\rangle @A(1)$	6	$ p_z, \uparrow\rangle @A(1)$	7	$ p_z, \downarrow\rangle @A(1)$	8	$ s, \uparrow\rangle @A(2)$	9	$ s, \downarrow\rangle @A(2)$
10	$ p_x, \uparrow\rangle @A(2)$	11	$ p_x, \downarrow\rangle @A(2)$	12	$ p_y, \uparrow\rangle @A(2)$	13	$ p_y, \downarrow\rangle @A(2)$	14	$ p_z, \uparrow\rangle @A(2)$
15	$ p_z, \downarrow\rangle @A(2)$	16	$ s, \uparrow\rangle @A(3)$	17	$ s, \downarrow\rangle @A(3)$	18	$ p_x, \uparrow\rangle @A(3)$	19	$ p_x, \downarrow\rangle @A(3)$
20	$ p_y, \uparrow\rangle @A(3)$	21	$ p_y, \downarrow\rangle @A(3)$	22	$ p_z, \uparrow\rangle @A(3)$	23	$ p_z, \downarrow\rangle @A(3)$	24	$ s, \uparrow\rangle @A(4)$
25	$ s, \downarrow\rangle @A(4)$	26	$ p_x, \uparrow\rangle @A(4)$	27	$ p_x, \downarrow\rangle @A(4)$	28	$ p_y, \uparrow\rangle @A(4)$	29	$ p_y, \downarrow\rangle @A(4)$
30	$ p_z, \uparrow\rangle @A(4)$	31	$ p_z, \downarrow\rangle @A(4)$	32	$ s, \uparrow\rangle @A(5)$	33	$ s, \downarrow\rangle @A(5)$	34	$ p_x, \uparrow\rangle @A(5)$
35	$ p_x, \downarrow\rangle @A(5)$	36	$ p_y, \uparrow\rangle @A(5)$	37	$ p_y, \downarrow\rangle @A(5)$	38	$ p_z, \uparrow\rangle @A(5)$	39	$ p_z, \downarrow\rangle @A(5)$
40	$ s, \uparrow\rangle @A(6)$	41	$ s, \downarrow\rangle @A(6)$	42	$ p_x, \uparrow\rangle @A(6)$	43	$ p_x, \downarrow\rangle @A(6)$	44	$ p_y, \uparrow\rangle @A(6)$
45	$ p_y, \downarrow\rangle @A(6)$	46	$ p_z, \uparrow\rangle @A(6)$	47	$ p_z, \downarrow\rangle @A(6)$				

Table 4: Atomic basis (orbital part only)

orbital	definition
$ s\rangle$	1
$ p_x\rangle$	x
$ p_y\rangle$	y
$ p_z\rangle$	z

SAMB

744 (all 744) SAMBs

- 'A' site-cluster : A
 - * bra: $\langle s, \uparrow |, \langle s, \downarrow |$
 - * ket: $|s, \uparrow\rangle, |s, \downarrow\rangle$
 - * wyckoff: **6c**

$$\boxed{\text{z1}} \quad \mathbb{Q}_0^{(c)}(A_1) = \mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z129}} \quad \mathbb{Q}_1^{(c)}(A_2) = \mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_1^{(s)}(A_2)$$

$$\boxed{\text{z249}} \quad \mathbb{Q}_{1,1}^{(c)}(E) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z250}} \quad \mathbb{Q}_{1,2}^{(c)}(E) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z251}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 1) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z252}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 1) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2}$$

- 'A' site-cluster : A

* bra: $\langle s, \uparrow |, \langle s, \downarrow |$

* ket: $|p_x, \uparrow\rangle, |p_x, \downarrow\rangle, |p_y, \uparrow\rangle, |p_y, \downarrow\rangle, |p_z, \uparrow\rangle, |p_z, \downarrow\rangle$

* wyckoff: 6c

$$\boxed{\text{z2}} \quad \mathbb{Q}_0^{(c)}(A_1) = \frac{\sqrt{3}\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{1,1}^{(s)}(E)}{3} + \frac{\sqrt{3}\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{1,2}^{(s)}(E)}{3} + \frac{\sqrt{3}\mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_1^{(s)}(A_2)}{3}$$

$$\boxed{\text{z3}} \quad \mathbb{Q}_2^{(c)}(A_1) = -\frac{\sqrt{6}\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{1,1}^{(s)}(E)}{6} - \frac{\sqrt{6}\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{1,2}^{(s)}(E)}{6} + \frac{\sqrt{6}\mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_1^{(s)}(A_2)}{3}$$

$$\boxed{\text{z4}} \quad \mathbb{Q}_2^{(1,-1;c)}(A_1) = -\frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E,1)\mathbb{Q}_{1,1}^{(s)}(E)}{2} - \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E,1)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z5}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_1) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E,2)\mathbb{Q}_{2,1}^{(s)}(E,1)}{2} + \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E,2)\mathbb{Q}_{2,2}^{(s)}(E,1)}{2}$$

$$\boxed{\text{z6}} \quad \mathbb{Q}_0^{(1,0;c)}(A_1) = \frac{\sqrt{3}\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(s)}(E)}{3} + \frac{\sqrt{3}\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(s)}(E)}{3} + \frac{\sqrt{3}\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_1^{(s)}(A_2)}{3}$$

$$\boxed{\text{z7}} \quad \mathbb{Q}_2^{(1,0;c)}(A_1) = -\frac{\sqrt{6}\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(s)}(E)}{6} - \frac{\sqrt{6}\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(s)}(E)}{6} + \frac{\sqrt{6}\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_1^{(s)}(A_2)}{3}$$

$$\boxed{\text{z8}} \quad \mathbb{G}_2^{(c)}(A_1) = \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{2,1}^{(s)}(E,1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{2,2}^{(s)}(E,1)}{2}$$

$$\boxed{\text{z9}} \quad \mathbb{G}_0^{(1,-1;c)}(A_1) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E,1)\mathbb{Q}_{2,1}^{(s)}(E,1)}{2} + \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E,1)\mathbb{Q}_{2,2}^{(s)}(E,1)}{2}$$

$$\boxed{\text{z10}} \quad \mathbb{G}_2^{(1,-1;c)}(A_1) = \mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z11}} \quad \mathbb{G}_3^{(1,-1;c)}(A_1) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E,2)\mathbb{Q}_{1,1}^{(s)}(E)}{2} + \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E,2)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z12}} \quad \mathbb{G}_2^{(1,0;c)}(A_1) = \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{2,1}^{(s)}(E,1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{2,2}^{(s)}(E,1)}{2}$$

$$\boxed{\text{z13}} \quad \mathbb{G}_0^{(1,1;c)}(A_1) = \mathbb{G}_0^{(1,1;a)}(A_1)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z130}} \quad \mathbb{Q}_1^{(c)}(A_2, a) = \mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z131}} \quad \mathbb{Q}_1^{(c)}(A_2, b) = -\frac{\sqrt{2}\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z132}} \quad \mathbb{Q}_1^{(1,-1;c)}(A_2) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2} - \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z133}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_2, 2) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2} - \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z134}} \quad \mathbb{Q}_1^{(1,0;c)}(A_2, a) = \mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z135}} \quad \mathbb{Q}_1^{(1,0;c)}(A_2, b) = -\frac{\sqrt{2}\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z136}} \quad \mathbb{G}_1^{(c)}(A_2) = \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{1,2}^{(s)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z137}} \quad \mathbb{G}_1^{(1,-1;c)}(A_2) = \frac{\sqrt{30}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(s)}(E)}{10} - \frac{\sqrt{30}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(s)}(E)}{10} + \frac{\sqrt{10}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_1^{(s)}(A_2)}{5}$$

$$\boxed{\text{z138}} \quad \mathbb{G}_3^{(1,-1;c)}(A_2, 1) = -\frac{\sqrt{5}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(s)}(E)}{5} + \frac{\sqrt{5}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(s)}(E)}{5} + \frac{\sqrt{15}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_1^{(s)}(A_2)}{5}$$

$$\boxed{\text{z139}} \quad \mathbb{G}_3^{(1,-1;c)}(A_2, 2) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(s)}(E)}{2} - \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z140}} \quad \mathbb{G}_1^{(1,0;c)}(A_2) = \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(s)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z141}} \quad \mathbb{G}_1^{(1,1;c)}(A_2) = \mathbb{G}_0^{(1,1;a)}(A_1)\mathbb{Q}_1^{(s)}(A_2)$$

$$\boxed{\text{z253}} \quad \mathbb{Q}_{1,1}^{(c)}(E, a) = \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_0^{(s)}(A_1)}{2}$$

$$\boxed{\text{z254}} \quad \mathbb{Q}_{1,2}^{(c)}(E, a) = \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_0^{(s)}(A_1)}{2}$$

$$\boxed{\text{z255}} \quad \mathbb{Q}_{1,1}^{(c)}(E, b) = -\frac{\sqrt{2}\mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z256}} \quad \mathbb{Q}_{1,2}^{(c)}(E, b) = \frac{\sqrt{2}\mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z257}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 1) = \frac{\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_1^{(s)}(A_2)}{2} + \frac{\mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z258}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 1) = -\frac{\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_1^{(s)}(A_2)}{2} - \frac{\mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z259}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 2) = \frac{\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{1,1}^{(s)}(E)}{2} - \frac{\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z260}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 2) = -\frac{\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{1,2}^{(s)}(E)}{2} - \frac{\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z261}} \quad \mathbb{Q}_{3,1}^{(c)}(E, 2) = \frac{\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2} - \frac{\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z262}} \quad \mathbb{Q}_{3,2}^{(c)}(E, 2) = -\frac{\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2} - \frac{\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z263}} \quad \mathbb{Q}_{1,1}^{(1,-1;c)}(E) = -\frac{\sqrt{10}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{10} + \frac{\sqrt{10}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{10} - \frac{\sqrt{30}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{10}$$

$$\boxed{\text{z264}} \quad \mathbb{Q}_{1,2}^{(1,-1;c)}(E) = \frac{\sqrt{10}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{10} + \frac{\sqrt{10}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{10} - \frac{\sqrt{30}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{10}$$

$$\boxed{\text{z265}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 1) = \frac{\sqrt{3}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(s)}(E)}{6} + \frac{\sqrt{3}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(s)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(s)}(E)}{6} + \frac{\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z266}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 1) = -\frac{\sqrt{3}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(s)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(s)}(E)}{6} - \frac{\sqrt{3}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(s)}(E)}{6} + \frac{\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z267}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 2) = -\frac{\sqrt{3}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(s)}(E)}{6} + \frac{\sqrt{3}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(s)}(E)}{6} - \frac{\sqrt{3}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_1^{(s)}(A_2)}{3}$$

$$\boxed{\text{z268}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 2) = \frac{\sqrt{3}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(s)}(E)}{6} + \frac{\sqrt{3}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_1^{(s)}(A_2)}{3} + \frac{\sqrt{3}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(s)}(E)}{6}$$

$$\boxed{\text{z269}} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(E, 1) = \frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{10} - \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{5}$$

$$\begin{aligned}
\text{z270} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(E,1) &= -\frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E,2)\mathbb{Q}_{2,2}^{(s)}(E,1)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E,2)\mathbb{Q}_{2,1}^{(s)}(E,1)}{10} - \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{2,2}^{(s)}(E,1)}{5} \\
\text{z271} \quad \mathbb{Q}_{1,1}^{(1,0;c)}(E,a) &= \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_0^{(s)}(A_1)}{2} \\
\text{z272} \quad \mathbb{Q}_{1,2}^{(1,0;c)}(E,a) &= \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_0^{(s)}(A_1)}{2} \\
\text{z273} \quad \mathbb{Q}_{1,1}^{(1,0;c)}(E,b) &= -\frac{\sqrt{2}\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_{2,2}^{(s)}(E,1)}{2} \\
\text{z274} \quad \mathbb{Q}_{1,2}^{(1,0;c)}(E,b) &= \frac{\sqrt{2}\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_{2,1}^{(s)}(E,1)}{2} \\
\text{z275} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E,1) &= \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_1^{(s)}(A_2)}{2} + \frac{\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,2}^{(s)}(E)}{2} \\
\text{z276} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E,1) &= -\frac{\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_1^{(s)}(A_2)}{2} - \frac{\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,1}^{(s)}(E)}{2} \\
\text{z277} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E,2) &= \frac{\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(s)}(E)}{2} - \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(s)}(E)}{2} \\
\text{z278} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E,2) &= -\frac{\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(s)}(E)}{2} - \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(s)}(E)}{2} \\
\text{z279} \quad \mathbb{Q}_{3,1}^{(1,0;c)}(E,2) &= \frac{\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{2,1}^{(s)}(E,1)}{2} - \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{2,2}^{(s)}(E,1)}{2} \\
\text{z280} \quad \mathbb{Q}_{3,2}^{(1,0;c)}(E,2) &= -\frac{\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{2,2}^{(s)}(E,1)}{2} - \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{2,1}^{(s)}(E,1)}{2} \\
\text{z281} \quad \mathbb{G}_{1,1}^{(c)}(E) &= \frac{\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_1^{(s)}(A_2)}{2} - \frac{\mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_{1,2}^{(s)}(E)}{2} \\
\text{z282} \quad \mathbb{G}_{1,2}^{(c)}(E) &= -\frac{\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_1^{(s)}(A_2)}{2} + \frac{\mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_{1,1}^{(s)}(E)}{2} \\
\text{z283} \quad \mathbb{G}_{1,1}^{(1,-1;c)}(E) &= \frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E,2)\mathbb{Q}_{1,1}^{(s)}(E)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E,1)\mathbb{Q}_1^{(s)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E,2)\mathbb{Q}_{1,2}^{(s)}(E)}{10} - \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,1}^{(s)}(E)}{10}
\end{aligned}$$

$$\begin{aligned}
\boxed{\text{z284}} \quad \mathbb{G}_{1,2}^{(1,-1;c)}(E) &= \frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E,1)\mathbb{Q}_1^{(s)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E,2)\mathbb{Q}_{1,2}^{(s)}(E)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E,2)\mathbb{Q}_{1,1}^{(s)}(E)}{10} - \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,2}^{(s)}(E)}{10} \\
\boxed{\text{z285}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E,1) &= \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E,1)\mathbb{Q}_0^{(s)}(A_1)}{2} \\
\boxed{\text{z286}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E,1) &= \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E,1)\mathbb{Q}_0^{(s)}(A_1)}{2} \\
\boxed{\text{z287}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E,2a) &= \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E,2)\mathbb{Q}_0^{(s)}(A_1)}{2} \\
\boxed{\text{z288}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E,2a) &= \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E,2)\mathbb{Q}_0^{(s)}(A_1)}{2} \\
\boxed{\text{z289}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E,2b) &= -\frac{\mathbb{G}_{2,1}^{(1,-1;a)}(E,1)\mathbb{Q}_{2,1}^{(s)}(E,1)}{2} + \frac{\mathbb{G}_{2,2}^{(1,-1;a)}(E,1)\mathbb{Q}_{2,2}^{(s)}(E,1)}{2} \\
\boxed{\text{z290}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E,2b) &= \frac{\mathbb{G}_{2,1}^{(1,-1;a)}(E,1)\mathbb{Q}_{2,2}^{(s)}(E,1)}{2} + \frac{\mathbb{G}_{2,2}^{(1,-1;a)}(E,1)\mathbb{Q}_{2,1}^{(s)}(E,1)}{2} \\
\boxed{\text{z291}} \quad \mathbb{G}_{3,1}^{(1,-1;c)}(E,1) &= -\frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E,2)\mathbb{Q}_{1,1}^{(s)}(E)}{30} - \frac{2\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E,1)\mathbb{Q}_1^{(s)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E,2)\mathbb{Q}_{1,2}^{(s)}(E)}{30} + \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,1}^{(s)}(E)}{5} \\
\boxed{\text{z292}} \quad \mathbb{G}_{3,2}^{(1,-1;c)}(E,1) &= \frac{2\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E,1)\mathbb{Q}_1^{(s)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E,2)\mathbb{Q}_{1,2}^{(s)}(E)}{30} + \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E,2)\mathbb{Q}_{1,1}^{(s)}(E)}{30} + \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,2}^{(s)}(E)}{5} \\
\boxed{\text{z293}} \quad \mathbb{G}_{3,1}^{(1,-1;c)}(E,2) &= \frac{\sqrt{6}\mathbb{G}_{2,1}^{(1,-1;a)}(E,1)\mathbb{Q}_{1,1}^{(s)}(E)}{6} - \frac{\sqrt{6}\mathbb{G}_{2,2}^{(1,-1;a)}(E,1)\mathbb{Q}_{1,2}^{(s)}(E)}{6} - \frac{\sqrt{6}\mathbb{G}_{2,2}^{(1,-1;a)}(E,2)\mathbb{Q}_1^{(s)}(A_2)}{6} \\
\boxed{\text{z294}} \quad \mathbb{G}_{3,2}^{(1,-1;c)}(E,2) &= -\frac{\sqrt{6}\mathbb{G}_{2,1}^{(1,-1;a)}(E,1)\mathbb{Q}_{1,2}^{(s)}(E)}{6} + \frac{\sqrt{6}\mathbb{G}_{2,1}^{(1,-1;a)}(E,2)\mathbb{Q}_1^{(s)}(A_2)}{6} - \frac{\sqrt{6}\mathbb{G}_{2,2}^{(1,-1;a)}(E,1)\mathbb{Q}_{1,1}^{(s)}(E)}{6} \\
\boxed{\text{z295}} \quad \mathbb{G}_{1,1}^{(1,0;c)}(E) &= \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_1^{(s)}(A_2)}{2} - \frac{\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,2}^{(s)}(E)}{2} \\
\boxed{\text{z296}} \quad \mathbb{G}_{1,2}^{(1,0;c)}(E) &= -\frac{\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_1^{(s)}(A_2)}{2} + \frac{\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,1}^{(s)}(E)}{2} \\
\boxed{\text{z297}} \quad \mathbb{G}_{1,1}^{(1,1;c)}(E) &= \frac{\sqrt{2}\mathbb{G}_0^{(1,1;a)}(A_1)\mathbb{Q}_{1,1}^{(s)}(E)}{2}
\end{aligned}$$

$$\boxed{\text{z298}} \quad \mathbb{G}_{1,2}^{(1,1;c)}(E) = \frac{\sqrt{2}\mathbb{G}_0^{(1,1;a)}(A_1)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z299}} \quad \mathbb{G}_{2,1}^{(1,1;c)}(E, 1) = \frac{\sqrt{2}\mathbb{G}_0^{(1,1;a)}(A_1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z300}} \quad \mathbb{G}_{2,2}^{(1,1;c)}(E, 1) = \frac{\sqrt{2}\mathbb{G}_0^{(1,1;a)}(A_1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2}$$

• 'A' site-cluster : **A**

* bra: $\langle p_x, \uparrow |, \langle p_x, \downarrow |, \langle p_y, \uparrow |, \langle p_y, \downarrow |, \langle p_z, \uparrow |, \langle p_z, \downarrow |$

* ket: $|p_x, \uparrow \rangle, |p_x, \downarrow \rangle, |p_y, \uparrow \rangle, |p_y, \downarrow \rangle, |p_z, \uparrow \rangle, |p_z, \downarrow \rangle$

* wyckoff: **6c**

$$\boxed{\text{z14}} \quad \mathbb{Q}_0^{(c)}(A_1, a) = \mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z15}} \quad \mathbb{Q}_0^{(c)}(A_1, b) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z16}} \quad \mathbb{Q}_2^{(c)}(A_1) = \mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z17}} \quad \mathbb{Q}_3^{(c)}(A_1) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(s)}(E)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z18}} \quad \mathbb{Q}_4^{(c)}(A_1, 2) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z19}} \quad \mathbb{Q}_0^{(1,-1;c)}(A_1) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z20}} \quad \mathbb{Q}_2^{(1,-1;c)}(A_1) = \mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z21}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_1) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(s)}(E)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z22}} \quad \mathbb{Q}_4^{(1,-1;c)}(A_1, 2) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z23}} \quad \mathbb{Q}_2^{(1,0;c)}(A_1) = \frac{\sqrt{2}\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z24}} \quad \mathbb{Q}_0^{(1,1;c)}(A_1) = \mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z25}} \quad \mathbb{G}_2^{(c)}(A_1) = -\frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E,1)\mathbb{Q}_{1,1}^{(s)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E,1)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z26}} \quad \mathbb{G}_2^{(1,-1;c)}(A_1) = -\frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E,1)\mathbb{Q}_{1,1}^{(s)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E,1)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z27}} \quad \mathbb{G}_0^{(1,0;c)}(A_1) = \frac{\sqrt{3}\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(s)}(E)}{3} + \frac{\sqrt{3}\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(s)}(E)}{3} + \frac{\sqrt{3}\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_1^{(s)}(A_2)}{3}$$

$$\boxed{\text{z28}} \quad \mathbb{G}_2^{(1,0;c)}(A_1) = -\frac{\sqrt{6}\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(s)}(E)}{6} - \frac{\sqrt{6}\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(s)}(E)}{6} + \frac{\sqrt{6}\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_1^{(s)}(A_2)}{3}$$

$$\boxed{\text{z142}} \quad \mathbb{Q}_1^{(c)}(A_2, a) = \mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_1^{(s)}(A_2)$$

$$\boxed{\text{z143}} \quad \mathbb{Q}_1^{(c)}(A_2, b) = \frac{\sqrt{30}\mathbb{Q}_{2,1}^{(a)}(E,1)\mathbb{Q}_{1,2}^{(s)}(E)}{10} - \frac{\sqrt{30}\mathbb{Q}_{2,2}^{(a)}(E,1)\mathbb{Q}_{1,1}^{(s)}(E)}{10} + \frac{\sqrt{10}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_1^{(s)}(A_2)}{5}$$

$$\boxed{\text{z144}} \quad \mathbb{Q}_3^{(c)}(A_2, 1) = -\frac{\sqrt{5}\mathbb{Q}_{2,1}^{(a)}(E,1)\mathbb{Q}_{1,2}^{(s)}(E)}{5} + \frac{\sqrt{5}\mathbb{Q}_{2,2}^{(a)}(E,1)\mathbb{Q}_{1,1}^{(s)}(E)}{5} + \frac{\sqrt{15}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_1^{(s)}(A_2)}{5}$$

$$\boxed{\text{z145}} \quad \mathbb{Q}_3^{(c)}(A_2, 2) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E,2)\mathbb{Q}_{1,2}^{(s)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E,2)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z146}} \quad \mathbb{Q}_4^{(c)}(A_2) = -\frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E,2)\mathbb{Q}_{2,2}^{(s)}(E,1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E,2)\mathbb{Q}_{2,1}^{(s)}(E,1)}{2}$$

$$\boxed{\text{z147}} \quad \mathbb{Q}_1^{(1,-1;c)}(A_2) = \frac{\sqrt{30}\mathbb{Q}_{2,1}^{(1,-1;a)}(E,1)\mathbb{Q}_{1,2}^{(s)}(E)}{10} - \frac{\sqrt{30}\mathbb{Q}_{2,2}^{(1,-1;a)}(E,1)\mathbb{Q}_{1,1}^{(s)}(E)}{10} + \frac{\sqrt{10}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_1^{(s)}(A_2)}{5}$$

$$\boxed{\text{z148}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_2, 1) = -\frac{\sqrt{5}\mathbb{Q}_{2,1}^{(1,-1;a)}(E,1)\mathbb{Q}_{1,2}^{(s)}(E)}{5} + \frac{\sqrt{5}\mathbb{Q}_{2,2}^{(1,-1;a)}(E,1)\mathbb{Q}_{1,1}^{(s)}(E)}{5} + \frac{\sqrt{15}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_1^{(s)}(A_2)}{5}$$

$$\boxed{\text{z149}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_2, 2) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E,2)\mathbb{Q}_{1,2}^{(s)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E,2)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z150}} \quad \mathbb{Q}_4^{(1,-1;c)}(A_2) = -\frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E,2)\mathbb{Q}_{2,2}^{(s)}(E,1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E,2)\mathbb{Q}_{2,1}^{(s)}(E,1)}{2}$$

$$\boxed{\text{z151}} \quad \mathbb{Q}_1^{(1,0;c)}(A_2) = \frac{\sqrt{2}\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(s)}(E)}{2} - \frac{\sqrt{2}\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z152}} \quad \mathbb{Q}_1^{(1,1;c)}(A_2) = \mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_1^{(s)}(A_2)$$

$$\boxed{\text{z153}} \quad \mathbb{G}_1^{(c)}(A_2) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E,1)\mathbb{Q}_{2,2}^{(s)}(E,1)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E,1)\mathbb{Q}_{2,1}^{(s)}(E,1)}{2}$$

$$\boxed{\text{z154}} \quad \mathbb{G}_1^{(1,-1;c)}(A_2) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E,1)\mathbb{Q}_{2,2}^{(s)}(E,1)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E,1)\mathbb{Q}_{2,1}^{(s)}(E,1)}{2}$$

$$\boxed{\text{z155}} \quad \mathbb{G}_1^{(1,0;c)}(A_2, a) = \mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z156}} \quad \mathbb{G}_1^{(1,0;c)}(A_2, b) = -\frac{\sqrt{2}\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{2,2}^{(s)}(E,1)}{2} + \frac{\sqrt{2}\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{2,1}^{(s)}(E,1)}{2}$$

$$\boxed{\text{z301}} \quad \mathbb{Q}_{1,1}^{(c)}(E, a) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z302}} \quad \mathbb{Q}_{1,2}^{(c)}(E, a) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z303}} \quad \mathbb{Q}_{1,1}^{(c)}(E, b) = \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(a)}(E,2)\mathbb{Q}_{1,1}^{(s)}(E)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(a)}(E,1)\mathbb{Q}_1^{(s)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(a)}(E,2)\mathbb{Q}_{1,2}^{(s)}(E)}{10} - \frac{\sqrt{5}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{1,1}^{(s)}(E)}{10}$$

$$\boxed{\text{z304}} \quad \mathbb{Q}_{1,2}^{(c)}(E, b) = \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(a)}(E,1)\mathbb{Q}_1^{(s)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(a)}(E,2)\mathbb{Q}_{1,2}^{(s)}(E)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(a)}(E,2)\mathbb{Q}_{1,1}^{(s)}(E)}{10} - \frac{\sqrt{5}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{1,2}^{(s)}(E)}{10}$$

$$\boxed{\text{z305}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 1a) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z306}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 1a) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z307}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 1b) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_0^{(s)}(A_1)}{2}$$

$$\boxed{\text{z308}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 1b) = \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_0^{(s)}(A_1)}{2}$$

$$\begin{aligned}
\text{z309} \quad \mathbb{Q}_{2,1}^{(c)}(E, 1c) &= -\frac{\sqrt{42}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{14} + \frac{\sqrt{42}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{14} + \frac{\sqrt{14}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{14} \\
\text{z310} \quad \mathbb{Q}_{2,2}^{(c)}(E, 1c) &= \frac{\sqrt{42}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{14} + \frac{\sqrt{42}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{14} + \frac{\sqrt{14}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{14} \\
\text{z311} \quad \mathbb{Q}_{2,1}^{(c)}(E, 2a) &= \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_0^{(s)}(A_1)}{2} \\
\text{z312} \quad \mathbb{Q}_{2,2}^{(c)}(E, 2a) &= \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_0^{(s)}(A_1)}{2} \\
\text{z313} \quad \mathbb{Q}_{2,1}^{(c)}(E, 2b) &= -\frac{\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2} + \frac{\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2} \\
\text{z314} \quad \mathbb{Q}_{2,2}^{(c)}(E, 2b) &= \frac{\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2} + \frac{\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2} \\
\text{z315} \quad \mathbb{Q}_{3,1}^{(c)}(E, 1) &= -\frac{\sqrt{15}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(s)}(E)}{30} - \frac{2\sqrt{15}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_1^{(s)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(s)}(E)}{30} + \frac{\sqrt{5}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{1,1}^{(s)}(E)}{5} \\
\text{z316} \quad \mathbb{Q}_{3,2}^{(c)}(E, 1) &= \frac{2\sqrt{15}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_1^{(s)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(s)}(E)}{30} + \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(s)}(E)}{30} + \frac{\sqrt{5}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{1,2}^{(s)}(E)}{5} \\
\text{z317} \quad \mathbb{Q}_{3,1}^{(c)}(E, 2) &= \frac{\sqrt{6}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{1,1}^{(s)}(E)}{6} - \frac{\sqrt{6}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{1,2}^{(s)}(E)}{6} - \frac{\sqrt{6}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_1^{(s)}(A_2)}{6} \\
\text{z318} \quad \mathbb{Q}_{3,2}^{(c)}(E, 2) &= -\frac{\sqrt{6}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{1,2}^{(s)}(E)}{6} + \frac{\sqrt{6}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_1^{(s)}(A_2)}{6} - \frac{\sqrt{6}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{1,1}^{(s)}(E)}{6} \\
\text{z319} \quad \mathbb{Q}_{4,1}^{(c)}(E, 1) &= \frac{\sqrt{7}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{14} - \frac{\sqrt{7}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{14} + \frac{\sqrt{21}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{7} \\
\text{z320} \quad \mathbb{Q}_{4,2}^{(c)}(E, 1) &= -\frac{\sqrt{7}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{14} - \frac{\sqrt{7}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{14} + \frac{\sqrt{21}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{7} \\
\text{z321} \quad \mathbb{Q}_{1,1}^{(1,-1;c)}(E) &= \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(s)}(E)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(s)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(s)}(E)}{10} - \frac{\sqrt{5}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,1}^{(s)}(E)}{10} \\
\text{z322} \quad \mathbb{Q}_{1,2}^{(1,-1;c)}(E) &= \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(s)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(s)}(E)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(s)}(E)}{10} - \frac{\sqrt{5}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,2}^{(s)}(E)}{10}
\end{aligned}$$

$$\begin{aligned}
\boxed{\text{z323}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 1a) &= \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_0^{(s)}(A_1)}{2} \\
\boxed{\text{z324}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 1a) &= \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_0^{(s)}(A_1)}{2} \\
\boxed{\text{z325}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 1b) &= -\frac{\sqrt{42}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{14} + \frac{\sqrt{42}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{14} + \frac{\sqrt{14}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{14} \\
\boxed{\text{z326}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 1b) &= \frac{\sqrt{42}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{14} + \frac{\sqrt{42}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{14} + \frac{\sqrt{14}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{14} \\
\boxed{\text{z327}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 2a) &= \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_0^{(s)}(A_1)}{2} \\
\boxed{\text{z328}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 2a) &= \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_0^{(s)}(A_1)}{2} \\
\boxed{\text{z329}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 2b) &= -\frac{\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2} + \frac{\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2} \\
\boxed{\text{z330}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 2b) &= \frac{\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2} + \frac{\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2} \\
\boxed{\text{z331}} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(E, 1) &= -\frac{\sqrt{15}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(s)}(E)}{30} - \frac{2\sqrt{15}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(s)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(s)}(E)}{30} + \frac{\sqrt{5}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,1}^{(s)}(E)}{5} \\
\boxed{\text{z332}} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(E, 1) &= \frac{2\sqrt{15}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(s)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(s)}(E)}{30} + \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(s)}(E)}{30} + \frac{\sqrt{5}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,2}^{(s)}(E)}{5} \\
\boxed{\text{z333}} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(E, 2) &= \frac{\sqrt{6}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(s)}(E)}{6} - \frac{\sqrt{6}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(s)}(E)}{6} - \frac{\sqrt{6}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_1^{(s)}(A_2)}{6} \\
\boxed{\text{z334}} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(E, 2) &= -\frac{\sqrt{6}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(s)}(E)}{6} + \frac{\sqrt{6}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_1^{(s)}(A_2)}{6} - \frac{\sqrt{6}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(s)}(E)}{6} \\
\boxed{\text{z335}} \quad \mathbb{Q}_{4,1}^{(1,-1;c)}(E, 1) &= \frac{\sqrt{7}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{14} - \frac{\sqrt{7}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{14} + \frac{\sqrt{21}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{7} \\
\boxed{\text{z336}} \quad \mathbb{Q}_{4,2}^{(1,-1;c)}(E, 1) &= -\frac{\sqrt{7}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{14} - \frac{\sqrt{7}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{14} + \frac{\sqrt{21}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{7}
\end{aligned}$$

$$\boxed{\text{z337}} \quad \mathbb{Q}_{1,1}^{(1,0;c)}(E) = \frac{\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_1^{(s)}(A_2)}{2} - \frac{\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z338}} \quad \mathbb{Q}_{1,2}^{(1,0;c)}(E) = -\frac{\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_1^{(s)}(A_2)}{2} + \frac{\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z339}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E, 1) = -\frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z340}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E, 1) = \frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z341}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E, 2) = \frac{\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2} - \frac{\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z342}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E, 2) = -\frac{\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2} - \frac{\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z343}} \quad \mathbb{Q}_{1,1}^{(1,1;c)}(E) = \frac{\sqrt{2}\mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z344}} \quad \mathbb{Q}_{1,2}^{(1,1;c)}(E) = \frac{\sqrt{2}\mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z345}} \quad \mathbb{Q}_{2,1}^{(1,1;c)}(E, 1) = \frac{\sqrt{2}\mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z346}} \quad \mathbb{Q}_{2,2}^{(1,1;c)}(E, 1) = \frac{\sqrt{2}\mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z347}} \quad \mathbb{G}_{2,1}^{(c)}(E, 1) = \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(s)}(E)}{6} + \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_1^{(s)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(s)}(E)}{6} + \frac{\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z348}} \quad \mathbb{G}_{2,2}^{(c)}(E, 1) = -\frac{\sqrt{3}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_1^{(s)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(s)}(E)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(s)}(E)}{6} + \frac{\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z349}} \quad \mathbb{G}_{2,1}^{(c)}(E, 2) = -\frac{\sqrt{3}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{1,1}^{(s)}(E)}{6} + \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{1,2}^{(s)}(E)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_1^{(s)}(A_2)}{3}$$

$$\boxed{\text{z350}} \quad \mathbb{G}_{2,2}^{(c)}(E, 2) = \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{1,2}^{(s)}(E)}{6} + \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_1^{(s)}(A_2)}{3} + \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{1,1}^{(s)}(E)}{6}$$

$$\boxed{\text{z351}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E,1) = \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(1,-1;a)}(E,2)\mathbb{Q}_{1,1}^{(s)}(E)}{6} + \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(1,-1;a)}(E,1)\mathbb{Q}_1^{(s)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(1,-1;a)}(E,2)\mathbb{Q}_{1,2}^{(s)}(E)}{6} + \frac{\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z352}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E,1) = -\frac{\sqrt{3}\mathbb{Q}_{2,1}^{(1,-1;a)}(E,1)\mathbb{Q}_1^{(s)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(1,-1;a)}(E,2)\mathbb{Q}_{1,2}^{(s)}(E)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(1,-1;a)}(E,2)\mathbb{Q}_{1,1}^{(s)}(E)}{6} + \frac{\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z353}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E,2) = -\frac{\sqrt{3}\mathbb{Q}_{2,1}^{(1,-1;a)}(E,1)\mathbb{Q}_{1,1}^{(s)}(E)}{6} + \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(1,-1;a)}(E,1)\mathbb{Q}_{1,2}^{(s)}(E)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(1,-1;a)}(E,2)\mathbb{Q}_1^{(s)}(A_2)}{3}$$

$$\boxed{\text{z354}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E,2) = \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(1,-1;a)}(E,1)\mathbb{Q}_{1,2}^{(s)}(E)}{6} + \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(1,-1;a)}(E,2)\mathbb{Q}_1^{(s)}(A_2)}{3} + \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(1,-1;a)}(E,1)\mathbb{Q}_{1,1}^{(s)}(E)}{6}$$

$$\boxed{\text{z355}} \quad \mathbb{G}_{1,1}^{(1,0;c)}(E) = \frac{\sqrt{2}\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_0^{(s)}(A_1)}{2}$$

$$\boxed{\text{z356}} \quad \mathbb{G}_{1,2}^{(1,0;c)}(E) = \frac{\sqrt{2}\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_0^{(s)}(A_1)}{2}$$

$$\boxed{\text{z357}} \quad \mathbb{G}_{2,1}^{(1,0;c)}(E,1) = \frac{\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_1^{(s)}(A_2)}{2} + \frac{\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z358}} \quad \mathbb{G}_{2,2}^{(1,0;c)}(E,1) = -\frac{\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_1^{(s)}(A_2)}{2} - \frac{\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z359}} \quad \mathbb{G}_{2,1}^{(1,0;c)}(E,2) = \frac{\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(s)}(E)}{2} - \frac{\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z360}} \quad \mathbb{G}_{2,2}^{(1,0;c)}(E,2) = -\frac{\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(s)}(E)}{2} - \frac{\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

• 'A'-'A' bond-cluster : **A;A_001_1**

* bra: $\langle s, \uparrow |, \langle s, \downarrow |$

* ket: $|s, \uparrow \rangle, |s, \downarrow \rangle$

* wyckoff: **6a@6c**

$$\boxed{\text{z29}} \quad \mathbb{Q}_0^{(c)}(A_1) = \mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z30}} \quad \mathbb{Q}_0^{(1,-1;c)}(A_1) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z31}} \quad \mathbb{G}_0^{(1,-1;c)}(A_1) = \frac{\sqrt{3}\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z32}} \quad \mathbb{G}_2^{(1,-1;c)}(A_1) = -\frac{\sqrt{6}\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z157}} \quad \mathbb{Q}_1^{(c)}(A_2) = \mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_1^{(b)}(A_2)$$

$$\boxed{\text{z158}} \quad \mathbb{Q}_1^{(1,-1;c)}(A_2) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z159}} \quad \mathbb{G}_1^{(1,-1;c)}(A_2, a) = \mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z160}} \quad \mathbb{G}_1^{(1,-1;c)}(A_2, b) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z361}} \quad \mathbb{Q}_{1,1}^{(c)}(E) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z362}} \quad \mathbb{Q}_{1,2}^{(c)}(E) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z363}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 1) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z364}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 1) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z365}} \quad \mathbb{Q}_{1,1}^{(1,-1;c)}(E) = \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z366}} \quad \mathbb{Q}_{1,2}^{(1,-1;c)}(E) = -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z367}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 1) = \frac{\sqrt{2}\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z368}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 1) = -\frac{\sqrt{2}\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\text{z369} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 2) = \frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\text{z370} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 2) = -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\text{z371} \quad \mathbb{G}_{1,1}^{(1,-1;c)}(E) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\text{z372} \quad \mathbb{G}_{1,2}^{(1,-1;c)}(E) = \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\text{z373} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 1) = \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\text{z374} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 1) = -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\text{z375} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 2) = \frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\text{z376} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 2) = -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

• 'A'-'A' bond-cluster : **A;A_001_1**

* bra: $\langle s, \uparrow |, \langle s, \downarrow |$

* ket: $|p_x, \uparrow\rangle, |p_x, \downarrow\rangle, |p_y, \uparrow\rangle, |p_y, \downarrow\rangle, |p_z, \uparrow\rangle, |p_z, \downarrow\rangle$

* wyckoff: **6a06c**

$$\text{z33} \quad \mathbb{Q}_0^{(c)}(A_1, a) = \frac{\sqrt{3}\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_1^{(b)}(A_2)}{3}$$

$$\text{z34} \quad \mathbb{Q}_0^{(c)}(A_1, b) = \frac{\sqrt{3}\mathbb{T}_{1,1}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{T}_{1,2}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{T}_1^{(a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\text{z35} \quad \mathbb{Q}_2^{(c)}(A_1, a) = -\frac{\sqrt{6}\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_1^{(b)}(A_2)}{3}$$

$$\text{z36} \quad \mathbb{Q}_2^{(c)}(A_1, b) = -\frac{\sqrt{6}\mathbb{T}_{1,1}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{T}_{1,2}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{T}_1^{(a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z37}} \quad \mathbb{Q}_2^{(1,-1;c)}(A_1, a) = -\frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z38}} \quad \mathbb{Q}_2^{(1,-1;c)}(A_1, b) = -\frac{\sqrt{2}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z39}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_1, a) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z40}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_1, b) = \frac{\sqrt{2}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z41}} \quad \mathbb{Q}_0^{(1,0;c)}(A_1, a) = \frac{\sqrt{3}\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z42}} \quad \mathbb{Q}_0^{(1,0;c)}(A_1, b) = \frac{\sqrt{3}\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{T}_1^{(1,0;a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z43}} \quad \mathbb{Q}_2^{(1,0;c)}(A_1, a) = -\frac{\sqrt{6}\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z44}} \quad \mathbb{Q}_2^{(1,0;c)}(A_1, b) = -\frac{\sqrt{6}\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{T}_1^{(1,0;a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z45}} \quad \mathbb{G}_0^{(c)}(A_1) = \frac{\sqrt{2}\mathbb{T}_{1,1}^{(a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{T}_{1,2}^{(a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z46}} \quad \mathbb{G}_2^{(c)}(A_1) = \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z47}} \quad \mathbb{G}_0^{(1,-1;c)}(A_1) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z48}} \quad \mathbb{G}_2^{(1,-1;c)}(A_1, a) = \mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z49}} \quad \mathbb{G}_2^{(1,-1;c)}(A_1, b) = \mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z50}} \quad \mathbb{G}_2^{(1,-1;c)}(A_1, c) = -\frac{\sqrt{2}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{M}_{1,1}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\begin{aligned}
\boxed{\text{z51}} \quad \mathbb{G}_3^{(1,-1;c)}(A_1, a) &= \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{2} \\
\boxed{\text{z52}} \quad \mathbb{G}_3^{(1,-1;c)}(A_1, b) &= \frac{\sqrt{2}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{2} \\
\boxed{\text{z53}} \quad \mathbb{G}_0^{(1,0;c)}(A_1) &= \frac{\sqrt{2}\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2} \\
\boxed{\text{z54}} \quad \mathbb{G}_2^{(1,0;c)}(A_1) &= \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} \\
\boxed{\text{z55}} \quad \mathbb{G}_0^{(1,1;c)}(A_1, a) &= \mathbb{G}_0^{(1,1;a)}(A_1)\mathbb{Q}_0^{(b)}(A_1) \\
\boxed{\text{z56}} \quad \mathbb{G}_0^{(1,1;c)}(A_1, b) &= \mathbb{M}_0^{(1,1;a)}(A_1)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z161}} \quad \mathbb{Q}_1^{(c)}(A_2, a) &= \mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_0^{(b)}(A_1) \\
\boxed{\text{z162}} \quad \mathbb{Q}_1^{(c)}(A_2, b) &= -\frac{\sqrt{2}\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} \\
\boxed{\text{z163}} \quad \mathbb{Q}_1^{(c)}(A_2, c) &= \mathbb{T}_1^{(a)}(A_2)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z164}} \quad \mathbb{Q}_1^{(c)}(A_2, d) &= \frac{\sqrt{2}\mathbb{T}_{1,1}^{(a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{T}_{1,2}^{(a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2} \\
\boxed{\text{z165}} \quad \mathbb{Q}_1^{(1,-1;c)}(A_2, a) &= \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} - \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} \\
\boxed{\text{z166}} \quad \mathbb{Q}_1^{(1,-1;c)}(A_2, b) &= \frac{\sqrt{2}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{M}_{1,1}^{(b)}(E)}{2} \\
\boxed{\text{z167}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_2, 2a) &= \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} - \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} \\
\boxed{\text{z168}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_2, 2b) &= \frac{\sqrt{2}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,1}^{(b)}(E)}{2} \\
\boxed{\text{z169}} \quad \mathbb{Q}_1^{(1,0;c)}(A_2, a) &= \mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_0^{(b)}(A_1)
\end{aligned}$$

$$\boxed{\text{z170}} \quad \mathbb{Q}_1^{(1,0;c)}(A_2, b) = -\frac{\sqrt{2}\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z171}} \quad \mathbb{Q}_1^{(1,0;c)}(A_2, c) = \mathbb{T}_1^{(1,0;a)}(A_2)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z172}} \quad \mathbb{Q}_1^{(1,0;c)}(A_2, d) = \frac{\sqrt{2}\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z173}} \quad \mathbb{G}_1^{(c)}(A_2, a) = \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z174}} \quad \mathbb{G}_1^{(c)}(A_2, b) = \frac{\sqrt{2}\mathbb{T}_{1,1}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{T}_{1,2}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z175}} \quad \mathbb{G}_1^{(1,-1;c)}(A_2, a) = \frac{\sqrt{30}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{30}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{10} + \frac{\sqrt{10}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_1^{(b)}(A_2)}{5}$$

$$\boxed{\text{z176}} \quad \mathbb{G}_1^{(1,-1;c)}(A_2, b) = \frac{\sqrt{30}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{30}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{10} + \frac{\sqrt{10}\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{T}_1^{(b)}(A_2)}{5}$$

$$\boxed{\text{z177}} \quad \mathbb{G}_3^{(1,-1;c)}(A_2, 1a) = -\frac{\sqrt{5}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{5} + \frac{\sqrt{5}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{5} + \frac{\sqrt{15}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_1^{(b)}(A_2)}{5}$$

$$\boxed{\text{z178}} \quad \mathbb{G}_3^{(1,-1;c)}(A_2, 1b) = -\frac{\sqrt{5}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{5} + \frac{\sqrt{5}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{5} + \frac{\sqrt{15}\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{T}_1^{(b)}(A_2)}{5}$$

$$\boxed{\text{z179}} \quad \mathbb{G}_3^{(1,-1;c)}(A_2, 2a) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z180}} \quad \mathbb{G}_3^{(1,-1;c)}(A_2, 2b) = \frac{\sqrt{2}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z181}} \quad \mathbb{G}_1^{(1,0;c)}(A_2, a) = \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z182}} \quad \mathbb{G}_1^{(1,0;c)}(A_2, b) = \frac{\sqrt{2}\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z183}} \quad \mathbb{G}_1^{(1,1;c)}(A_2, a) = \mathbb{G}_0^{(1,1;a)}(A_1)\mathbb{Q}_1^{(b)}(A_2)$$

$$\boxed{\text{z184}} \quad \mathbb{G}_1^{(1,1;c)}(A_2, b) = \mathbb{M}_0^{(1,1;a)}(A_1) \mathbb{T}_1^{(b)}(A_2)$$

$$\boxed{\text{z377}} \quad \mathbb{Q}_{1,1}^{(c)}(E, a) = \frac{\sqrt{2} \mathbb{Q}_{1,1}^{(a)}(E) \mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z378}} \quad \mathbb{Q}_{1,2}^{(c)}(E, a) = \frac{\sqrt{2} \mathbb{Q}_{1,2}^{(a)}(E) \mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z379}} \quad \mathbb{Q}_{1,1}^{(c)}(E, b) = -\frac{\sqrt{2} \mathbb{Q}_1^{(a)}(A_2) \mathbb{Q}_{2,2}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z380}} \quad \mathbb{Q}_{1,2}^{(c)}(E, b) = \frac{\sqrt{2} \mathbb{Q}_1^{(a)}(A_2) \mathbb{Q}_{2,1}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z381}} \quad \mathbb{Q}_{1,1}^{(c)}(E, c) = \frac{\sqrt{2} \mathbb{T}_{1,1}^{(a)}(E) \mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z382}} \quad \mathbb{Q}_{1,2}^{(c)}(E, c) = \frac{\sqrt{2} \mathbb{T}_{1,2}^{(a)}(E) \mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z383}} \quad \mathbb{Q}_{1,1}^{(c)}(E, d) = -\frac{\sqrt{2} \mathbb{T}_1^{(a)}(A_2) \mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z384}} \quad \mathbb{Q}_{1,2}^{(c)}(E, d) = \frac{\sqrt{2} \mathbb{T}_1^{(a)}(A_2) \mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z385}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 1a) = \frac{\mathbb{Q}_{1,2}^{(a)}(E) \mathbb{Q}_1^{(b)}(A_2)}{2} + \frac{\mathbb{Q}_1^{(a)}(A_2) \mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z386}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 1a) = -\frac{\mathbb{Q}_{1,1}^{(a)}(E) \mathbb{Q}_1^{(b)}(A_2)}{2} - \frac{\mathbb{Q}_1^{(a)}(A_2) \mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z387}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 1b) = \frac{\mathbb{T}_{1,2}^{(a)}(E) \mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{T}_1^{(a)}(A_2) \mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z388}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 1b) = -\frac{\mathbb{T}_{1,1}^{(a)}(E) \mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{T}_1^{(a)}(A_2) \mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z389}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 2a) = \frac{\mathbb{Q}_{1,1}^{(a)}(E) \mathbb{Q}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{Q}_{1,2}^{(a)}(E) \mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\text{z390} \quad \mathbb{Q}_{2,2}^{(c)}(E, 2a) = -\frac{\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\text{z391} \quad \mathbb{Q}_{2,1}^{(c)}(E, 2b) = \frac{\mathbb{T}_{1,1}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{T}_{1,2}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\text{z392} \quad \mathbb{Q}_{2,2}^{(c)}(E, 2b) = -\frac{\mathbb{T}_{1,1}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{T}_{1,2}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\text{z393} \quad \mathbb{Q}_{3,1}^{(c)}(E, 2) = \frac{\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} - \frac{\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2}$$

$$\text{z394} \quad \mathbb{Q}_{3,2}^{(c)}(E, 2) = -\frac{\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} - \frac{\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2}$$

$$\text{z395} \quad \mathbb{Q}_{1,1}^{(1,-1;c)}(E, a) = -\frac{\sqrt{10}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{10} + \frac{\sqrt{10}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{10} - \frac{\sqrt{30}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{10}$$

$$\text{z396} \quad \mathbb{Q}_{1,2}^{(1,-1;c)}(E, a) = \frac{\sqrt{10}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{10} + \frac{\sqrt{10}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{10} - \frac{\sqrt{30}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{10}$$

$$\text{z397} \quad \mathbb{Q}_{1,1}^{(1,-1;c)}(E, b) = \frac{\sqrt{42}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,1}^{(b)}(E)}{14} - \frac{\sqrt{42}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,2}^{(b)}(E)}{14} - \frac{\sqrt{14}\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{M}_{1,1}^{(b)}(E)}{14}$$

$$\text{z398} \quad \mathbb{Q}_{1,2}^{(1,-1;c)}(E, b) = -\frac{\sqrt{42}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,2}^{(b)}(E)}{14} - \frac{\sqrt{42}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,1}^{(b)}(E)}{14} - \frac{\sqrt{14}\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{M}_{1,2}^{(b)}(E)}{14}$$

$$\text{z399} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 1a) = \frac{\sqrt{3}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(b)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{6} + \frac{\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\text{z400} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 1a) = -\frac{\sqrt{3}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(b)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{3}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{6} + \frac{\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\text{z401} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 1b) = \frac{\sqrt{3}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\text{z402} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 1b) = -\frac{\sqrt{3}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{3}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{6} + \frac{\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\text{z403} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 2a) = -\frac{\sqrt{3}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{3}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_1^{(b)}(A_2)}{3}$$

$$\begin{aligned}
\text{z404} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 2a) &= \frac{\sqrt{3}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_1^{(b)}(A_2)}{3} + \frac{\sqrt{3}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{6} \\
\text{z405} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 2b) &= -\frac{\sqrt{3}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{3}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{3} \\
\text{z406} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 2b) &= \frac{\sqrt{3}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{3} + \frac{\sqrt{3}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{6} \\
\text{z407} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(E, 1a) &= \frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{10} - \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{5} \\
\text{z408} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(E, 1a) &= -\frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{10} - \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{5} \\
\text{z409} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(E, 1b) &= \frac{\sqrt{7}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,1}^{(b)}(E)}{14} - \frac{\sqrt{7}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,2}^{(b)}(E)}{14} + \frac{\sqrt{21}\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{M}_{1,1}^{(b)}(E)}{7} \\
\text{z410} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(E, 1b) &= -\frac{\sqrt{7}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,2}^{(b)}(E)}{14} - \frac{\sqrt{7}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,1}^{(b)}(E)}{14} + \frac{\sqrt{21}\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{M}_{1,2}^{(b)}(E)}{7} \\
\text{z411} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(E, 2) &= \frac{\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{M}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{M}_{1,2}^{(b)}(E)}{2} \\
\text{z412} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(E, 2) &= -\frac{\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{M}_{1,1}^{(b)}(E)}{2} \\
\text{z413} \quad \mathbb{Q}_{1,1}^{(1,0;c)}(E, a) &= \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_0^{(b)}(A_1)}{2} \\
\text{z414} \quad \mathbb{Q}_{1,2}^{(1,0;c)}(E, a) &= \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_0^{(b)}(A_1)}{2} \\
\text{z415} \quad \mathbb{Q}_{1,1}^{(1,0;c)}(E, b) &= -\frac{\sqrt{2}\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} \\
\text{z416} \quad \mathbb{Q}_{1,2}^{(1,0;c)}(E, b) &= \frac{\sqrt{2}\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} \\
\text{z417} \quad \mathbb{Q}_{1,1}^{(1,0;c)}(E, c) &= \frac{\sqrt{2}\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{T}_0^{(b)}(A_1)}{2}
\end{aligned}$$

$$\begin{aligned}
\boxed{\text{z418}} \quad \mathbb{Q}_{1,2}^{(1,0;c)}(E, c) &= \frac{\sqrt{2}\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{T}_0^{(b)}(A_1)}{2} \\
\boxed{\text{z419}} \quad \mathbb{Q}_{1,1}^{(1,0;c)}(E, d) &= -\frac{\sqrt{2}\mathbb{T}_1^{(1,0;a)}(A_2)\mathbb{M}_{1,2}^{(b)}(E)}{2} \\
\boxed{\text{z420}} \quad \mathbb{Q}_{1,2}^{(1,0;c)}(E, d) &= \frac{\sqrt{2}\mathbb{T}_1^{(1,0;a)}(A_2)\mathbb{M}_{1,1}^{(b)}(E)}{2} \\
\boxed{\text{z421}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E, 1a) &= \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_1^{(b)}(A_2)}{2} + \frac{\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,2}^{(b)}(E)}{2} \\
\boxed{\text{z422}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E, 1a) &= -\frac{\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_1^{(b)}(A_2)}{2} - \frac{\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,1}^{(b)}(E)}{2} \\
\boxed{\text{z423}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E, 1b) &= \frac{\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{T}_1^{(1,0;a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2} \\
\boxed{\text{z424}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E, 1b) &= -\frac{\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{T}_1^{(1,0;a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2} \\
\boxed{\text{z425}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E, 2a) &= \frac{\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2} \\
\boxed{\text{z426}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E, 2a) &= -\frac{\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2} \\
\boxed{\text{z427}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E, 2b) &= \frac{\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} \\
\boxed{\text{z428}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E, 2b) &= -\frac{\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2} \\
\boxed{\text{z429}} \quad \mathbb{Q}_{3,1}^{(1,0;c)}(E, 2) &= \frac{\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} - \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} \\
\boxed{\text{z430}} \quad \mathbb{Q}_{3,2}^{(1,0;c)}(E, 2) &= -\frac{\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} - \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} \\
\boxed{\text{z431}} \quad \mathbb{Q}_{1,1}^{(1,1;c)}(E) &= \frac{\sqrt{2}\mathbb{M}_0^{(1,1;a)}(A_1)\mathbb{M}_{1,1}^{(b)}(E)}{2}
\end{aligned}$$

$$\begin{aligned}
\boxed{\text{z432}} \quad \mathbb{Q}_{1,2}^{(1,1;c)}(E) &= \frac{\sqrt{2}\mathbb{M}_0^{(1,1;a)}(A_1)\mathbb{M}_{1,2}^{(b)}(E)}{2} \\
\boxed{\text{z433}} \quad \mathbb{G}_{1,1}^{(c)}(E, a) &= \frac{\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_1^{(b)}(A_2)}{2} - \frac{\mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_{1,2}^{(b)}(E)}{2} \\
\boxed{\text{z434}} \quad \mathbb{G}_{1,2}^{(c)}(E, a) &= -\frac{\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_1^{(b)}(A_2)}{2} + \frac{\mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_{1,1}^{(b)}(E)}{2} \\
\boxed{\text{z435}} \quad \mathbb{G}_{1,1}^{(c)}(E, b) &= \frac{\mathbb{T}_{1,2}^{(a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{T}_1^{(a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2} \\
\boxed{\text{z436}} \quad \mathbb{G}_{1,2}^{(c)}(E, b) &= -\frac{\mathbb{T}_{1,1}^{(a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{T}_1^{(a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2} \\
\boxed{\text{z437}} \quad \mathbb{G}_{2,1}^{(c)}(E, 2) &= \frac{\mathbb{T}_{1,1}^{(a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{T}_{1,2}^{(a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2} \\
\boxed{\text{z438}} \quad \mathbb{G}_{2,2}^{(c)}(E, 2) &= -\frac{\mathbb{T}_{1,1}^{(a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{T}_{1,2}^{(a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2} \\
\boxed{\text{z439}} \quad \mathbb{G}_{1,1}^{(1,-1;c)}(E, a) &= \frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(b)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{10} \\
\boxed{\text{z440}} \quad \mathbb{G}_{1,2}^{(1,-1;c)}(E, a) &= \frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(b)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{10} \\
\boxed{\text{z441}} \quad \mathbb{G}_{1,1}^{(1,-1;c)}(E, b) &= \frac{\sqrt{15}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{15}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{5}\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{10} \\
\boxed{\text{z442}} \quad \mathbb{G}_{1,2}^{(1,-1;c)}(E, b) &= \frac{\sqrt{15}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{15}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{5}\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{10} \\
\boxed{\text{z443}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 1a) &= \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_0^{(b)}(A_1)}{2} \\
\boxed{\text{z444}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 1a) &= \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_0^{(b)}(A_1)}{2} \\
\boxed{\text{z445}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 1b) &= \frac{\sqrt{2}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_0^{(b)}(A_1)}{2}
\end{aligned}$$

$$\begin{aligned}
\boxed{\text{z446}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 1b) &= \frac{\sqrt{2}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_0^{(b)}(A_1)}{2} \\
\boxed{\text{z447}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 2a) &= \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_0^{(b)}(A_1)}{2} \\
\boxed{\text{z448}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 2a) &= \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_0^{(b)}(A_1)}{2} \\
\boxed{\text{z449}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 2b) &= -\frac{\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} + \frac{\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} \\
\boxed{\text{z450}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 2b) &= \frac{\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} + \frac{\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} \\
\boxed{\text{z451}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 2c) &= \frac{\sqrt{2}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_0^{(b)}(A_1)}{2} \\
\boxed{\text{z452}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 2c) &= \frac{\sqrt{2}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_0^{(b)}(A_1)}{2} \\
\boxed{\text{z453}} \quad \mathbb{G}_{3,1}^{(1,-1;c)}(E, 1a) &= -\frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{30} - \frac{2\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(b)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{30} + \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{5} \\
\boxed{\text{z454}} \quad \mathbb{G}_{3,2}^{(1,-1;c)}(E, 1a) &= \frac{2\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(b)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{30} + \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{30} + \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{5} \\
\boxed{\text{z455}} \quad \mathbb{G}_{3,1}^{(1,-1;c)}(E, 1b) &= -\frac{\sqrt{15}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{30} - \frac{2\sqrt{15}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{30} + \frac{\sqrt{5}\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{5} \\
\boxed{\text{z456}} \quad \mathbb{G}_{3,2}^{(1,-1;c)}(E, 1b) &= \frac{2\sqrt{15}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{30} + \frac{\sqrt{15}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{30} + \frac{\sqrt{5}\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{5} \\
\boxed{\text{z457}} \quad \mathbb{G}_{3,1}^{(1,-1;c)}(E, 2a) &= \frac{\sqrt{6}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_1^{(b)}(A_2)}{6} \\
\boxed{\text{z458}} \quad \mathbb{G}_{3,2}^{(1,-1;c)}(E, 2a) &= -\frac{\sqrt{6}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_1^{(b)}(A_2)}{6} - \frac{\sqrt{6}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{6} \\
\boxed{\text{z459}} \quad \mathbb{G}_{3,1}^{(1,-1;c)}(E, 2b) &= \frac{\sqrt{6}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{6}
\end{aligned}$$

$$\boxed{\text{z460}} \quad \mathbb{G}_{3,2}^{(1,-1;c)}(E, 2b) = -\frac{\sqrt{6}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{6} - \frac{\sqrt{6}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{6}$$

$$\boxed{\text{z461}} \quad \mathbb{G}_{1,1}^{(1,0;c)}(E, a) = \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_1^{(b)}(A_2)}{2} - \frac{\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z462}} \quad \mathbb{G}_{1,2}^{(1,0;c)}(E, a) = -\frac{\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_1^{(b)}(A_2)}{2} + \frac{\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z463}} \quad \mathbb{G}_{1,1}^{(1,0;c)}(E, b) = \frac{\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{T}_1^{(1,0;a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z464}} \quad \mathbb{G}_{1,2}^{(1,0;c)}(E, b) = -\frac{\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{T}_1^{(1,0;a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z465}} \quad \mathbb{G}_{2,1}^{(1,0;c)}(E, 2) = \frac{\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z466}} \quad \mathbb{G}_{2,2}^{(1,0;c)}(E, 2) = -\frac{\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z467}} \quad \mathbb{G}_{1,1}^{(1,1;c)}(E, a) = \frac{\sqrt{2}\mathbb{G}_0^{(1,1;a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z468}} \quad \mathbb{G}_{1,2}^{(1,1;c)}(E, a) = \frac{\sqrt{2}\mathbb{G}_0^{(1,1;a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z469}} \quad \mathbb{G}_{1,1}^{(1,1;c)}(E, b) = \frac{\sqrt{2}\mathbb{M}_0^{(1,1;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z470}} \quad \mathbb{G}_{1,2}^{(1,1;c)}(E, b) = \frac{\sqrt{2}\mathbb{M}_0^{(1,1;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z471}} \quad \mathbb{G}_{2,1}^{(1,1;c)}(E, 1) = \frac{\sqrt{2}\mathbb{G}_0^{(1,1;a)}(A_1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z472}} \quad \mathbb{G}_{2,2}^{(1,1;c)}(E, 1) = \frac{\sqrt{2}\mathbb{G}_0^{(1,1;a)}(A_1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2}$$

- 'A'-'A' bond-cluster : A;A_001_1

* bra: $\langle p_x, \uparrow |, \langle p_x, \downarrow |, \langle p_y, \uparrow |, \langle p_y, \downarrow |, \langle p_z, \uparrow |, \langle p_z, \downarrow |$
 * ket: $|p_x, \uparrow \rangle, |p_x, \downarrow \rangle, |p_y, \uparrow \rangle, |p_y, \downarrow \rangle, |p_z, \uparrow \rangle, |p_z, \downarrow \rangle$
 * wyckoff: 6a@6c

$$\boxed{\text{z57}} \quad \mathbb{Q}_0^{(c)}(A_1, a) = \mathbb{Q}_0^{(a)}(A_1) \mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z58}} \quad \mathbb{Q}_0^{(c)}(A_1, b) = \frac{\sqrt{2} \mathbb{Q}_{2,1}^{(a)}(E, 1) \mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} + \frac{\sqrt{2} \mathbb{Q}_{2,2}^{(a)}(E, 1) \mathbb{Q}_{2,2}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z59}} \quad \mathbb{Q}_0^{(c)}(A_1, c) = \frac{\sqrt{2} \mathbb{M}_{1,1}^{(a)}(E) \mathbb{M}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2} \mathbb{M}_{1,2}^{(a)}(E) \mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z60}} \quad \mathbb{Q}_2^{(c)}(A_1) = \mathbb{Q}_2^{(a)}(A_1) \mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z61}} \quad \mathbb{Q}_3^{(c)}(A_1) = \frac{\sqrt{2} \mathbb{Q}_{2,1}^{(a)}(E, 2) \mathbb{Q}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2} \mathbb{Q}_{2,2}^{(a)}(E, 2) \mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z62}} \quad \mathbb{Q}_4^{(c)}(A_1, 2) = \frac{\sqrt{2} \mathbb{Q}_{2,1}^{(a)}(E, 2) \mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} + \frac{\sqrt{2} \mathbb{Q}_{2,2}^{(a)}(E, 2) \mathbb{Q}_{2,2}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z63}} \quad \mathbb{Q}_0^{(1,-1;c)}(A_1, a) = \frac{\sqrt{2} \mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1) \mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} + \frac{\sqrt{2} \mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1) \mathbb{Q}_{2,2}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z64}} \quad \mathbb{Q}_0^{(1,-1;c)}(A_1, b) = \frac{\sqrt{2} \mathbb{M}_{1,1}^{(1,-1;a)}(E) \mathbb{M}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2} \mathbb{M}_{1,2}^{(1,-1;a)}(E) \mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z65}} \quad \mathbb{Q}_2^{(1,-1;c)}(A_1, a) = \mathbb{Q}_2^{(1,-1;a)}(A_1) \mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z66}} \quad \mathbb{Q}_2^{(1,-1;c)}(A_1, b) = \frac{\sqrt{2} \mathbb{M}_{3,1}^{(1,-1;a)}(E, 1) \mathbb{M}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2} \mathbb{M}_{3,2}^{(1,-1;a)}(E, 1) \mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z67}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_1, a) = \frac{\sqrt{2} \mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2) \mathbb{Q}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2} \mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2) \mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z68}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_1, b) = -\frac{\sqrt{2} \mathbb{M}_{3,1}^{(1,-1;a)}(E, 2) \mathbb{T}_{1,1}^{(b)}(E)}{4} - \frac{\sqrt{2} \mathbb{M}_{3,2}^{(1,-1;a)}(E, 2) \mathbb{T}_{1,2}^{(b)}(E)}{4} + \frac{\sqrt{3} \mathbb{M}_3^{(1,-1;a)}(A_2, 2) \mathbb{T}_1^{(b)}(A_2)}{2}$$

$$\boxed{\text{z69}} \quad \mathbb{Q}_4^{(1,-1;c)}(A_1, 2a) = \frac{\sqrt{2} \mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2) \mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} + \frac{\sqrt{2} \mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2) \mathbb{Q}_{2,2}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z70}} \quad \mathbb{Q}_4^{(1,-1;c)}(A_1, 2b) = \frac{\sqrt{2}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z71}} \quad \mathbb{Q}_2^{(1,0;c)}(A_1, a) = \frac{\sqrt{2}\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z72}} \quad \mathbb{Q}_2^{(1,0;c)}(A_1, b) = \mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z73}} \quad \mathbb{Q}_2^{(1,0;c)}(A_1, c) = -\frac{\sqrt{2}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{M}_{1,1}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z74}} \quad \mathbb{Q}_3^{(1,0;c)}(A_1) = \frac{\sqrt{2}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z75}} \quad \mathbb{Q}_0^{(1,1;c)}(A_1, a) = \mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z76}} \quad \mathbb{Q}_0^{(1,1;c)}(A_1, b) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z77}} \quad \mathbb{G}_0^{(c)}(A_1) = \frac{\sqrt{3}\mathbb{M}_{1,1}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{M}_{1,2}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{M}_1^{(a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z78}} \quad \mathbb{G}_2^{(c)}(A_1, a) = -\frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z79}} \quad \mathbb{G}_2^{(c)}(A_1, b) = -\frac{\sqrt{6}\mathbb{M}_{1,1}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{M}_{1,2}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{M}_1^{(a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z80}} \quad \mathbb{G}_0^{(1,-1;c)}(A_1) = \frac{\sqrt{3}\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z81}} \quad \mathbb{G}_2^{(1,-1;c)}(A_1, a) = -\frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z82}} \quad \mathbb{G}_2^{(1,-1;c)}(A_1, b) = \frac{\sqrt{14}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{7} + \frac{\sqrt{14}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{7} + \frac{\sqrt{21}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_1^{(b)}(A_2)}{7}$$

$$\boxed{\text{z83}} \quad \mathbb{G}_2^{(1,-1;c)}(A_1, c) = -\frac{\sqrt{6}\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\begin{aligned}
\boxed{\text{z84}} \quad \mathbb{G}_3^{(1,-1;c)}(A_1) &= \mathbb{M}_3^{(1,-1;a)}(A_1) \mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z85}} \quad \mathbb{G}_4^{(1,-1;c)}(A_1, 1) &= -\frac{\sqrt{42}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{14} - \frac{\sqrt{42}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{14} + \frac{2\sqrt{7}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_1^{(b)}(A_2)}{7} \\
\boxed{\text{z86}} \quad \mathbb{G}_4^{(1,-1;c)}(A_1, 2) &= \frac{\sqrt{6}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{4} + \frac{\sqrt{6}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{4} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_1^{(b)}(A_2)}{2} \\
\boxed{\text{z87}} \quad \mathbb{G}_0^{(1,0;c)}(A_1) &= \frac{\sqrt{3}\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_1^{(b)}(A_2)}{3} \\
\boxed{\text{z88}} \quad \mathbb{G}_2^{(1,0;c)}(A_1, a) &= -\frac{\sqrt{6}\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_1^{(b)}(A_2)}{3} \\
\boxed{\text{z89}} \quad \mathbb{G}_2^{(1,0;c)}(A_1, b) &= -\frac{\sqrt{2}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{2} \\
\boxed{\text{z90}} \quad \mathbb{G}_3^{(1,0;c)}(A_1) &= \frac{\sqrt{2}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{M}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{M}_{1,2}^{(b)}(E)}{2} \\
\boxed{\text{z91}} \quad \mathbb{G}_0^{(1,1;c)}(A_1) &= \frac{\sqrt{3}\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3} \\
\boxed{\text{z92}} \quad \mathbb{G}_2^{(1,1;c)}(A_1) &= -\frac{\sqrt{6}\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3} \\
\boxed{\text{z185}} \quad \mathbb{Q}_1^{(c)}(A_2, a) &= \mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_1^{(b)}(A_2) \\
\boxed{\text{z186}} \quad \mathbb{Q}_1^{(c)}(A_2, b) &= \frac{\sqrt{30}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{30}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{10} + \frac{\sqrt{10}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_1^{(b)}(A_2)}{5} \\
\boxed{\text{z187}} \quad \mathbb{Q}_1^{(c)}(A_2, c) &= \frac{\sqrt{2}\mathbb{M}_{1,1}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{1,2}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2} \\
\boxed{\text{z188}} \quad \mathbb{Q}_3^{(c)}(A_2, 1) &= -\frac{\sqrt{5}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{5} + \frac{\sqrt{5}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{5} + \frac{\sqrt{15}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_1^{(b)}(A_2)}{5} \\
\boxed{\text{z189}} \quad \mathbb{Q}_3^{(c)}(A_2, 2) &= \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{2}
\end{aligned}$$

$$\begin{aligned}
\text{z190} \quad \mathbb{Q}_4^{(c)}(A_2) &= -\frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} \\
\text{z191} \quad \mathbb{Q}_1^{(1,-1;c)}(A_2, a) &= \frac{\sqrt{30}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{30}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{10} + \frac{\sqrt{10}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_1^{(b)}(A_2)}{5} \\
\text{z192} \quad \mathbb{Q}_1^{(1,-1;c)}(A_2, b) &= \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2} \\
\text{z193} \quad \mathbb{Q}_3^{(1,-1;c)}(A_2, 1a) &= -\frac{\sqrt{5}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{5} + \frac{\sqrt{5}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{5} + \frac{\sqrt{15}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_1^{(b)}(A_2)}{5} \\
\text{z194} \quad \mathbb{Q}_3^{(1,-1;c)}(A_2, 1b) &= \frac{\sqrt{2}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{2} \\
\text{z195} \quad \mathbb{Q}_3^{(1,-1;c)}(A_2, 2a) &= \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{2} \\
\text{z196} \quad \mathbb{Q}_3^{(1,-1;c)}(A_2, 2b) &= -\frac{\sqrt{2}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{4} + \frac{\sqrt{2}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{4} - \frac{\sqrt{3}\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_1^{(b)}(A_2)}{2} \\
\text{z197} \quad \mathbb{Q}_4^{(1,-1;c)}(A_2, a) &= -\frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} \\
\text{z198} \quad \mathbb{Q}_4^{(1,-1;c)}(A_2, b) &= -\frac{\sqrt{2}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,2}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,1}^{(b)}(E)}{2} \\
\text{z199} \quad \mathbb{Q}_1^{(1,0;c)}(A_2, a) &= \frac{\sqrt{2}\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2} \\
\text{z200} \quad \mathbb{Q}_1^{(1,0;c)}(A_2, b) &= \frac{\sqrt{30}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{30}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{10} + \frac{\sqrt{10}\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{T}_1^{(b)}(A_2)}{5} \\
\text{z201} \quad \mathbb{Q}_3^{(1,0;c)}(A_2, 1) &= -\frac{\sqrt{5}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{5} + \frac{\sqrt{5}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{5} + \frac{\sqrt{15}\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{T}_1^{(b)}(A_2)}{5} \\
\text{z202} \quad \mathbb{Q}_3^{(1,0;c)}(A_2, 2) &= \frac{\sqrt{2}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{2} \\
\text{z203} \quad \mathbb{Q}_1^{(1,1;c)}(A_2, a) &= \mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_1^{(b)}(A_2)
\end{aligned}$$

$$\boxed{\text{z204}} \quad \mathbb{Q}_1^{(1,1;c)}(A_2, b) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z205}} \quad \mathbb{G}_1^{(c)}(A_2, a) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z206}} \quad \mathbb{G}_1^{(c)}(A_2, b) = \mathbb{M}_1^{(a)}(A_2)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z207}} \quad \mathbb{G}_1^{(c)}(A_2, c) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{1,2}^{(a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z208}} \quad \mathbb{G}_1^{(1,-1;c)}(A_2, a) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z209}} \quad \mathbb{G}_1^{(1,-1;c)}(A_2, b) = \mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z210}} \quad \mathbb{G}_1^{(1,-1;c)}(A_2, c) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z211}} \quad \mathbb{G}_3^{(1,-1;c)}(A_2, 1a) = \mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z212}} \quad \mathbb{G}_3^{(1,-1;c)}(A_2, 1b) = \frac{\sqrt{2}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z213}} \quad \mathbb{G}_3^{(1,-1;c)}(A_2, 2) = \mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z214}} \quad \mathbb{G}_4^{(1,-1;c)}(A_2) = -\frac{\sqrt{6}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{4} + \frac{\sqrt{6}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{4} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_1^{(b)}(A_2)}{2}$$

$$\boxed{\text{z215}} \quad \mathbb{G}_1^{(1,0;c)}(A_2, a) = \mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z216}} \quad \mathbb{G}_1^{(1,0;c)}(A_2, b) = -\frac{\sqrt{2}\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z217}} \quad \mathbb{G}_1^{(1,0;c)}(A_2, c) = \frac{\sqrt{2}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z218}} \quad \mathbb{G}_3^{(1,0;c)}(A_2, 2) = \frac{\sqrt{2}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\begin{aligned}
\boxed{\text{z219}} \quad \mathbb{G}_1^{(1,1;c)}(A_2, a) &= \mathbb{M}_1^{(1,1;a)}(A_2) \mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z220}} \quad \mathbb{G}_1^{(1,1;c)}(A_2, b) &= \frac{\sqrt{2} \mathbb{M}_{1,1}^{(1,1;a)}(E) \mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2} \mathbb{M}_{1,2}^{(1,1;a)}(E) \mathbb{M}_{1,1}^{(b)}(E)}{2} \\
\boxed{\text{z473}} \quad \mathbb{Q}_{1,1}^{(c)}(E, a) &= \frac{\sqrt{2} \mathbb{Q}_0^{(a)}(A_1) \mathbb{Q}_{1,1}^{(b)}(E)}{2} \\
\boxed{\text{z474}} \quad \mathbb{Q}_{1,2}^{(c)}(E, a) &= \frac{\sqrt{2} \mathbb{Q}_0^{(a)}(A_1) \mathbb{Q}_{1,2}^{(b)}(E)}{2} \\
\boxed{\text{z475}} \quad \mathbb{Q}_{1,1}^{(c)}(E, b) &= \frac{\sqrt{15} \mathbb{Q}_{2,1}^{(a)}(E, 2) \mathbb{Q}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{15} \mathbb{Q}_{2,2}^{(a)}(E, 1) \mathbb{Q}_1^{(b)}(A_2)}{10} - \frac{\sqrt{15} \mathbb{Q}_{2,2}^{(a)}(E, 2) \mathbb{Q}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{5} \mathbb{Q}_2^{(a)}(A_1) \mathbb{Q}_{1,1}^{(b)}(E)}{10} \\
\boxed{\text{z476}} \quad \mathbb{Q}_{1,2}^{(c)}(E, b) &= \frac{\sqrt{15} \mathbb{Q}_{2,1}^{(a)}(E, 1) \mathbb{Q}_1^{(b)}(A_2)}{10} - \frac{\sqrt{15} \mathbb{Q}_{2,1}^{(a)}(E, 2) \mathbb{Q}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{15} \mathbb{Q}_{2,2}^{(a)}(E, 2) \mathbb{Q}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{5} \mathbb{Q}_2^{(a)}(A_1) \mathbb{Q}_{1,2}^{(b)}(E)}{10} \\
\boxed{\text{z477}} \quad \mathbb{Q}_{1,1}^{(c)}(E, c) &= \frac{\mathbb{M}_{1,2}^{(a)}(E) \mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{M}_1^{(a)}(A_2) \mathbb{T}_{1,2}^{(b)}(E)}{2} \\
\boxed{\text{z478}} \quad \mathbb{Q}_{1,2}^{(c)}(E, c) &= -\frac{\mathbb{M}_{1,1}^{(a)}(E) \mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{M}_1^{(a)}(A_2) \mathbb{T}_{1,1}^{(b)}(E)}{2} \\
\boxed{\text{z479}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 1a) &= \frac{\sqrt{2} \mathbb{Q}_0^{(a)}(A_1) \mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} \\
\boxed{\text{z480}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 1a) &= \frac{\sqrt{2} \mathbb{Q}_0^{(a)}(A_1) \mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} \\
\boxed{\text{z481}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 1b) &= \frac{\sqrt{2} \mathbb{Q}_{2,1}^{(a)}(E, 1) \mathbb{Q}_0^{(b)}(A_1)}{2} \\
\boxed{\text{z482}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 1b) &= \frac{\sqrt{2} \mathbb{Q}_{2,2}^{(a)}(E, 1) \mathbb{Q}_0^{(b)}(A_1)}{2} \\
\boxed{\text{z483}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 1c) &= -\frac{\sqrt{42} \mathbb{Q}_{2,1}^{(a)}(E, 2) \mathbb{Q}_{2,1}^{(b)}(E, 1)}{14} + \frac{\sqrt{42} \mathbb{Q}_{2,2}^{(a)}(E, 2) \mathbb{Q}_{2,2}^{(b)}(E, 1)}{14} + \frac{\sqrt{14} \mathbb{Q}_2^{(a)}(A_1) \mathbb{Q}_{2,1}^{(b)}(E, 1)}{14} \\
\boxed{\text{z484}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 1c) &= \frac{\sqrt{42} \mathbb{Q}_{2,1}^{(a)}(E, 2) \mathbb{Q}_{2,2}^{(b)}(E, 1)}{14} + \frac{\sqrt{42} \mathbb{Q}_{2,2}^{(a)}(E, 2) \mathbb{Q}_{2,1}^{(b)}(E, 1)}{14} + \frac{\sqrt{14} \mathbb{Q}_2^{(a)}(A_1) \mathbb{Q}_{2,2}^{(b)}(E, 1)}{14}
\end{aligned}$$

$$\begin{aligned}
\boxed{\text{z485}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 1d) &= \frac{\sqrt{2}\mathbb{M}_1^{(a)}(A_2)\mathbb{M}_{1,2}^{(b)}(E)}{2} \\
\boxed{\text{z486}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 1d) &= -\frac{\sqrt{2}\mathbb{M}_1^{(a)}(A_2)\mathbb{M}_{1,1}^{(b)}(E)}{2} \\
\boxed{\text{z487}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 2a) &= \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_0^{(b)}(A_1)}{2} \\
\boxed{\text{z488}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 2a) &= \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_0^{(b)}(A_1)}{2} \\
\boxed{\text{z489}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 2b) &= -\frac{\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} + \frac{\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} \\
\boxed{\text{z490}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 2b) &= \frac{\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} + \frac{\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} \\
\boxed{\text{z491}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 2c) &= \frac{\mathbb{M}_{1,1}^{(a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2} \\
\boxed{\text{z492}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 2c) &= -\frac{\mathbb{M}_{1,1}^{(a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2} \\
\boxed{\text{z493}} \quad \mathbb{Q}_{3,1}^{(c)}(E, 1) &= -\frac{\sqrt{15}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{30} - \frac{2\sqrt{15}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_1^{(b)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{30} + \frac{\sqrt{5}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{5} \\
\boxed{\text{z494}} \quad \mathbb{Q}_{3,2}^{(c)}(E, 1) &= \frac{2\sqrt{15}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_1^{(b)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{30} + \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{30} + \frac{\sqrt{5}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{5} \\
\boxed{\text{z495}} \quad \mathbb{Q}_{3,1}^{(c)}(E, 2) &= \frac{\sqrt{6}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_1^{(b)}(A_2)}{6} \\
\boxed{\text{z496}} \quad \mathbb{Q}_{3,2}^{(c)}(E, 2) &= -\frac{\sqrt{6}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_1^{(b)}(A_2)}{6} - \frac{\sqrt{6}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{6} \\
\boxed{\text{z497}} \quad \mathbb{Q}_{4,1}^{(c)}(E, 1) &= \frac{\sqrt{7}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{14} - \frac{\sqrt{7}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{14} + \frac{\sqrt{21}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{7} \\
\boxed{\text{z498}} \quad \mathbb{Q}_{4,2}^{(c)}(E, 1) &= -\frac{\sqrt{7}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{14} - \frac{\sqrt{7}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{14} + \frac{\sqrt{21}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{7}
\end{aligned}$$

$$\begin{aligned}
\text{z499} \quad \mathbb{Q}_{1,1}^{(1,-1;c)}(E,a) &= \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(1,-1;a)}(E,2)\mathbb{Q}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(1,-1;a)}(E,1)\mathbb{Q}_1^{(b)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(1,-1;a)}(E,2)\mathbb{Q}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{5}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{10} \\
\text{z500} \quad \mathbb{Q}_{1,2}^{(1,-1;c)}(E,a) &= \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(1,-1;a)}(E,1)\mathbb{Q}_1^{(b)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(1,-1;a)}(E,2)\mathbb{Q}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(1,-1;a)}(E,2)\mathbb{Q}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{5}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{10} \\
\text{z501} \quad \mathbb{Q}_{1,1}^{(1,-1;c)}(E,b) &= \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2} \\
\text{z502} \quad \mathbb{Q}_{1,2}^{(1,-1;c)}(E,b) &= -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2} \\
\text{z503} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E,1a) &= \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E,1)\mathbb{Q}_0^{(b)}(A_1)}{2} \\
\text{z504} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E,1a) &= \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E,1)\mathbb{Q}_0^{(b)}(A_1)}{2} \\
\text{z505} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E,1b) &= -\frac{\sqrt{42}\mathbb{Q}_{2,1}^{(1,-1;a)}(E,2)\mathbb{Q}_{2,1}^{(b)}(E,1)}{14} + \frac{\sqrt{42}\mathbb{Q}_{2,2}^{(1,-1;a)}(E,2)\mathbb{Q}_{2,2}^{(b)}(E,1)}{14} + \frac{\sqrt{14}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{2,1}^{(b)}(E,1)}{14} \\
\text{z506} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E,1b) &= \frac{\sqrt{42}\mathbb{Q}_{2,1}^{(1,-1;a)}(E,2)\mathbb{Q}_{2,2}^{(b)}(E,1)}{14} + \frac{\sqrt{42}\mathbb{Q}_{2,2}^{(1,-1;a)}(E,2)\mathbb{Q}_{2,1}^{(b)}(E,1)}{14} + \frac{\sqrt{14}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{2,2}^{(b)}(E,1)}{14} \\
\text{z507} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E,1c) &= \frac{\sqrt{130}\mathbb{M}_{3,1}^{(1,-1;a)}(E,2)\mathbb{M}_{1,1}^{(b)}(E)}{26} - \frac{\sqrt{130}\mathbb{M}_{3,2}^{(1,-1;a)}(E,2)\mathbb{M}_{1,2}^{(b)}(E)}{26} - \frac{\sqrt{78}\mathbb{M}_3^{(1,-1;a)}(A_2,1)\mathbb{M}_{1,2}^{(b)}(E)}{26} \\
\text{z508} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E,1c) &= -\frac{\sqrt{130}\mathbb{M}_{3,1}^{(1,-1;a)}(E,2)\mathbb{M}_{1,2}^{(b)}(E)}{26} - \frac{\sqrt{130}\mathbb{M}_{3,2}^{(1,-1;a)}(E,2)\mathbb{M}_{1,1}^{(b)}(E)}{26} + \frac{\sqrt{78}\mathbb{M}_3^{(1,-1;a)}(A_2,1)\mathbb{M}_{1,1}^{(b)}(E)}{26} \\
\text{z509} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E,1d) &= \frac{\sqrt{2}\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{M}_{1,2}^{(b)}(E)}{2} \\
\text{z510} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E,1d) &= -\frac{\sqrt{2}\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{M}_{1,1}^{(b)}(E)}{2} \\
\text{z511} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E,2a) &= \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E,2)\mathbb{Q}_0^{(b)}(A_1)}{2} \\
\text{z512} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E,2a) &= \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E,2)\mathbb{Q}_0^{(b)}(A_1)}{2}
\end{aligned}$$

$$\begin{aligned}
\text{z513} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 2b) &= -\frac{\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} + \frac{\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} \\
\text{z514} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 2b) &= \frac{\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} + \frac{\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} \\
\text{z515} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 2c) &= -\frac{\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{M}_{1,1}^{(b)}(E)}{8} + \frac{\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{M}_{1,2}^{(b)}(E)}{8} + \frac{\sqrt{15}\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{M}_{1,1}^{(b)}(E)}{8} + \frac{\sqrt{15}\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{M}_{1,2}^{(b)}(E)}{8} \\
\text{z516} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 2c) &= \frac{\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{M}_{1,2}^{(b)}(E)}{8} + \frac{\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{M}_{1,1}^{(b)}(E)}{8} + \frac{\sqrt{15}\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{M}_{1,2}^{(b)}(E)}{8} - \frac{\sqrt{15}\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{M}_{1,1}^{(b)}(E)}{8} \\
\text{z517} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 2d) &= \frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2} \\
\text{z518} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 2d) &= -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2} \\
\text{z519} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(E, 1a) &= -\frac{\sqrt{15}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{30} - \frac{2\sqrt{15}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(b)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{30} + \frac{\sqrt{5}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{5} \\
\text{z520} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(E, 1a) &= \frac{2\sqrt{15}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(b)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{30} + \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{30} + \frac{\sqrt{5}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{5} \\
\text{z521} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(E, 1b) &= -\frac{\sqrt{15}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{12} + \frac{\sqrt{6}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{12} + \frac{\sqrt{15}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{12} - \frac{\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_{1,2}^{(b)}(E)}{2} \\
\text{z522} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(E, 1b) &= -\frac{\sqrt{6}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{12} + \frac{\sqrt{15}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{12} + \frac{\sqrt{15}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{12} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_{1,1}^{(b)}(E)}{2} \\
\text{z523} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(E, 2a) &= \frac{\sqrt{6}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_1^{(b)}(A_2)}{6} \\
\text{z524} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(E, 2a) &= -\frac{\sqrt{6}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_1^{(b)}(A_2)}{6} - \frac{\sqrt{6}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{6} \\
\text{z525} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(E, 2b) &= \frac{\sqrt{15}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{12} - \frac{\sqrt{15}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{12} - \frac{\sqrt{6}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{6} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{4} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_{1,2}^{(b)}(E)}{4} \\
\text{z526} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(E, 2b) &= -\frac{\sqrt{15}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{12} + \frac{\sqrt{6}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{6} - \frac{\sqrt{15}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{12} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{4} - \frac{\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_{1,1}^{(b)}(E)}{4}
\end{aligned}$$

$$\begin{aligned}
\text{z527} \quad \mathbb{Q}_{4,1}^{(1,-1;c)}(E, 1a) &= \frac{\sqrt{7}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{14} - \frac{\sqrt{7}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{14} + \frac{\sqrt{21}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{7} \\
\text{z528} \quad \mathbb{Q}_{4,2}^{(1,-1;c)}(E, 1a) &= -\frac{\sqrt{7}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{14} - \frac{\sqrt{7}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{14} + \frac{\sqrt{21}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{7} \\
\text{z529} \quad \mathbb{Q}_{4,1}^{(1,-1;c)}(E, 1b) &= \frac{\sqrt{39}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,1}^{(b)}(E)}{26} - \frac{\sqrt{39}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,2}^{(b)}(E)}{26} + \frac{\sqrt{65}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{M}_{1,2}^{(b)}(E)}{13} \\
\text{z530} \quad \mathbb{Q}_{4,2}^{(1,-1;c)}(E, 1b) &= -\frac{\sqrt{39}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,2}^{(b)}(E)}{26} - \frac{\sqrt{39}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,1}^{(b)}(E)}{26} - \frac{\sqrt{65}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{M}_{1,1}^{(b)}(E)}{13} \\
\text{z531} \quad \mathbb{Q}_{4,1}^{(1,-1;c)}(E, 2) &= \frac{\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{M}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{M}_{1,2}^{(b)}(E)}{2} \\
\text{z532} \quad \mathbb{Q}_{4,2}^{(1,-1;c)}(E, 2) &= \frac{\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{M}_{1,2}^{(b)}(E)}{2} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{M}_{1,1}^{(b)}(E)}{2} \\
\text{z533} \quad \mathbb{Q}_{4,1}^{(1,-1;c)}(E, 3) &= \frac{\sqrt{15}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{M}_{1,1}^{(b)}(E)}{8} - \frac{\sqrt{15}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{M}_{1,2}^{(b)}(E)}{8} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{M}_{1,1}^{(b)}(E)}{8} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{M}_{1,2}^{(b)}(E)}{8} \\
\text{z534} \quad \mathbb{Q}_{4,2}^{(1,-1;c)}(E, 3) &= -\frac{\sqrt{15}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{M}_{1,2}^{(b)}(E)}{8} - \frac{\sqrt{15}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{M}_{1,1}^{(b)}(E)}{8} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{M}_{1,2}^{(b)}(E)}{8} - \frac{\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{M}_{1,1}^{(b)}(E)}{8} \\
\text{z535} \quad \mathbb{Q}_{1,1}^{(1,0;c)}(E, a) &= \frac{\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_1^{(b)}(A_2)}{2} - \frac{\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,2}^{(b)}(E)}{2} \\
\text{z536} \quad \mathbb{Q}_{1,2}^{(1,0;c)}(E, a) &= -\frac{\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_1^{(b)}(A_2)}{2} + \frac{\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,1}^{(b)}(E)}{2} \\
\text{z537} \quad \mathbb{Q}_{1,1}^{(1,0;c)}(E, b) &= \frac{\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{5}\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{10} \\
\text{z538} \quad \mathbb{Q}_{1,2}^{(1,0;c)}(E, b) &= \frac{\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{5}\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{10} \\
\text{z539} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E, 1a) &= -\frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} \\
\text{z540} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E, 1a) &= \frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2}
\end{aligned}$$

$$\boxed{\text{z541}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E, 1b) = \frac{\sqrt{2}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z542}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E, 1b) = \frac{\sqrt{2}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z543}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E, 1c) = \frac{\sqrt{10}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{M}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{10}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{M}_{1,2}^{(b)}(E)}{10} + \frac{\sqrt{30}\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{M}_{1,1}^{(b)}(E)}{10}$$

$$\boxed{\text{z544}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E, 1c) = -\frac{\sqrt{10}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{M}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{10}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{M}_{1,1}^{(b)}(E)}{10} + \frac{\sqrt{30}\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{M}_{1,2}^{(b)}(E)}{10}$$

$$\boxed{\text{z545}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E, 2a) = \frac{\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} - \frac{\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z546}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E, 2a) = -\frac{\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} - \frac{\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z547}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E, 2b) = \frac{\sqrt{2}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z548}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E, 2b) = \frac{\sqrt{2}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z549}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E, 2c) = -\frac{\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{M}_{1,1}^{(b)}(E)}{2} + \frac{\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z550}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E, 2c) = \frac{\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{M}_{1,2}^{(b)}(E)}{2} + \frac{\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z551}} \quad \mathbb{Q}_{3,1}^{(1,0;c)}(E, 1) = -\frac{\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{30} - \frac{2\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{30} + \frac{\sqrt{5}\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{5}$$

$$\boxed{\text{z552}} \quad \mathbb{Q}_{3,2}^{(1,0;c)}(E, 1) = \frac{2\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{30} + \frac{\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{30} + \frac{\sqrt{5}\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{5}$$

$$\boxed{\text{z553}} \quad \mathbb{Q}_{3,1}^{(1,0;c)}(E, 2) = \frac{\sqrt{6}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{6}$$

$$\boxed{\text{z554}} \quad \mathbb{Q}_{3,2}^{(1,0;c)}(E, 2) = -\frac{\sqrt{6}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{6} - \frac{\sqrt{6}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{6}$$

$$\boxed{\text{z555}} \quad \mathbb{Q}_{1,1}^{(1,1;c)}(E, a) = \frac{\sqrt{2}\mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z556}} \quad \mathbb{Q}_{1,2}^{(1,1;c)}(E, a) = \frac{\sqrt{2}\mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z557}} \quad \mathbb{Q}_{1,1}^{(1,1;c)}(E, b) = \frac{\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z558}} \quad \mathbb{Q}_{1,2}^{(1,1;c)}(E, b) = -\frac{\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z559}} \quad \mathbb{Q}_{2,1}^{(1,1;c)}(E, 1a) = \frac{\sqrt{2}\mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z560}} \quad \mathbb{Q}_{2,2}^{(1,1;c)}(E, 1a) = \frac{\sqrt{2}\mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z561}} \quad \mathbb{Q}_{2,1}^{(1,1;c)}(E, 1b) = \frac{\sqrt{2}\mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z562}} \quad \mathbb{Q}_{2,2}^{(1,1;c)}(E, 1b) = -\frac{\sqrt{2}\mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z563}} \quad \mathbb{Q}_{2,1}^{(1,1;c)}(E, 2) = \frac{\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z564}} \quad \mathbb{Q}_{2,2}^{(1,1;c)}(E, 2) = -\frac{\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z565}} \quad \mathbb{G}_{1,1}^{(c)}(E) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(a)}(E)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z566}} \quad \mathbb{G}_{1,2}^{(c)}(E) = \frac{\sqrt{2}\mathbb{M}_{1,2}^{(a)}(E)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z567}} \quad \mathbb{G}_{2,1}^{(c)}(E, 1a) = \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_1^{(b)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{6} + \frac{\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z568}} \quad \mathbb{G}_{2,2}^{(c)}(E, 1a) = -\frac{\sqrt{3}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_1^{(b)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{6} + \frac{\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z569}} \quad \mathbb{G}_{2,1}^{(c)}(E, 1b) = \frac{\mathbb{M}_{1,2}^{(a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{M}_1^{(a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z570}} \quad \mathbb{G}_{2,2}^{(c)}(E, 1b) = -\frac{\mathbb{M}_{1,1}^{(a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{M}_1^{(a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z571}} \quad \mathbb{G}_{2,1}^{(c)}(E, 2a) = -\frac{\sqrt{3}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z572}} \quad \mathbb{G}_{2,2}^{(c)}(E, 2a) = \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_1^{(b)}(A_2)}{3} + \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{6}$$

$$\boxed{\text{z573}} \quad \mathbb{G}_{2,1}^{(c)}(E, 2b) = \frac{\mathbb{M}_{1,1}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z574}} \quad \mathbb{G}_{2,2}^{(c)}(E, 2b) = -\frac{\mathbb{M}_{1,1}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z575}} \quad \mathbb{G}_{1,1}^{(1,-1;c)}(E) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z576}} \quad \mathbb{G}_{1,2}^{(1,-1;c)}(E) = \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z577}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 1a) = \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(b)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{6} + \frac{\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z578}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 1a) = -\frac{\sqrt{3}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(b)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{6} + \frac{\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z579}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 1b) = \frac{\sqrt{210}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{42} + \frac{2\sqrt{21}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{21} - \frac{\sqrt{210}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{42} - \frac{\sqrt{14}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_{1,2}^{(b)}(E)}{14}$$

$$\boxed{\text{z580}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 1b) = -\frac{2\sqrt{21}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{21} - \frac{\sqrt{210}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{42} - \frac{\sqrt{210}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{42} + \frac{\sqrt{14}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_{1,1}^{(b)}(E)}{14}$$

$$\boxed{\text{z581}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 1c) = \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z582}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 1c) = -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\begin{aligned}
\text{z583} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 2a) &= -\frac{\sqrt{3}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_1^{(b)}(A_2)}{3} \\
\text{z584} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 2a) &= \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_1^{(b)}(A_2)}{3} + \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{6} \\
\text{z585} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 2b) &= -\frac{\sqrt{21}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{42} + \frac{\sqrt{21}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{42} + \frac{\sqrt{210}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{42} + \frac{\sqrt{35}\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{14} + \frac{\sqrt{35}\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_{1,2}^{(b)}(E)}{14} \\
\text{z586} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 2b) &= \frac{\sqrt{21}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{42} - \frac{\sqrt{210}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{42} + \frac{\sqrt{21}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{42} + \frac{\sqrt{35}\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{14} - \frac{\sqrt{35}\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_{1,1}^{(b)}(E)}{14} \\
\text{z587} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 2c) &= \frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} \\
\text{z588} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 2c) &= -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2} \\
\text{z589} \quad \mathbb{G}_{3,1}^{(1,-1;c)}(E, 1) &= \frac{\sqrt{2}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_0^{(b)}(A_1)}{2} \\
\text{z590} \quad \mathbb{G}_{3,2}^{(1,-1;c)}(E, 1) &= \frac{\sqrt{2}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_0^{(b)}(A_1)}{2} \\
\text{z591} \quad \mathbb{G}_{3,1}^{(1,-1;c)}(E, 2) &= \frac{\sqrt{2}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_0^{(b)}(A_1)}{2} \\
\text{z592} \quad \mathbb{G}_{3,2}^{(1,-1;c)}(E, 2) &= \frac{\sqrt{2}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_0^{(b)}(A_1)}{2} \\
\text{z593} \quad \mathbb{G}_{4,1}^{(1,-1;c)}(E, 1) &= -\frac{\sqrt{21}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{28} + \frac{\sqrt{210}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{28} + \frac{\sqrt{21}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{28} + \frac{\sqrt{35}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_{1,2}^{(b)}(E)}{14} \\
\text{z594} \quad \mathbb{G}_{4,2}^{(1,-1;c)}(E, 1) &= -\frac{\sqrt{210}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{28} + \frac{\sqrt{21}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{28} + \frac{\sqrt{21}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{28} - \frac{\sqrt{35}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_{1,1}^{(b)}(E)}{14} \\
\text{z595} \quad \mathbb{G}_{4,1}^{(1,-1;c)}(E, 2) &= \frac{\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_{1,2}^{(b)}(E)}{2} \\
\text{z596} \quad \mathbb{G}_{4,2}^{(1,-1;c)}(E, 2) &= \frac{\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{2} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_{1,1}^{(b)}(E)}{2}
\end{aligned}$$

$$\begin{aligned}
\boxed{\text{z597}} \quad \mathbb{G}_{4,1}^{(1,-1;c)}(E,3) &= \frac{\sqrt{105}\mathbb{M}_{3,1}^{(1,-1;a)}(E,1)\mathbb{T}_{1,1}^{(b)}(E)}{28} - \frac{\sqrt{105}\mathbb{M}_{3,2}^{(1,-1;a)}(E,1)\mathbb{T}_{1,2}^{(b)}(E)}{28} + \frac{\sqrt{42}\mathbb{M}_{3,2}^{(1,-1;a)}(E,2)\mathbb{T}_1^{(b)}(A_2)}{14} - \frac{\sqrt{7}\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{28} - \frac{\sqrt{7}\mathbb{M}_3^{(1,-1;a)}(A_2,2)\mathbb{T}_{1,2}^{(b)}(E)}{28} \\
\boxed{\text{z598}} \quad \mathbb{G}_{4,2}^{(1,-1;c)}(E,3) &= -\frac{\sqrt{105}\mathbb{M}_{3,1}^{(1,-1;a)}(E,1)\mathbb{T}_{1,2}^{(b)}(E)}{28} - \frac{\sqrt{42}\mathbb{M}_{3,1}^{(1,-1;a)}(E,2)\mathbb{T}_1^{(b)}(A_2)}{14} - \frac{\sqrt{105}\mathbb{M}_{3,2}^{(1,-1;a)}(E,1)\mathbb{T}_{1,1}^{(b)}(E)}{28} - \frac{\sqrt{7}\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{28} + \frac{\sqrt{7}\mathbb{M}_3^{(1,-1;a)}(A_2,2)\mathbb{T}_{1,1}^{(b)}(E)}{28} \\
\boxed{\text{z599}} \quad \mathbb{G}_{1,1}^{(1,0;c)}(E,a) &= \frac{\sqrt{2}\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_0^{(b)}(A_1)}{2} \\
\boxed{\text{z600}} \quad \mathbb{G}_{1,2}^{(1,0;c)}(E,a) &= \frac{\sqrt{2}\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_0^{(b)}(A_1)}{2} \\
\boxed{\text{z601}} \quad \mathbb{G}_{1,1}^{(1,0;c)}(E,b) &= \frac{\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(E,2)\mathbb{M}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(E,2)\mathbb{M}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{5}\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{M}_{1,1}^{(b)}(E)}{5} \\
\boxed{\text{z602}} \quad \mathbb{G}_{1,2}^{(1,0;c)}(E,b) &= -\frac{\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(E,2)\mathbb{M}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(E,2)\mathbb{M}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{5}\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{M}_{1,2}^{(b)}(E)}{5} \\
\boxed{\text{z603}} \quad \mathbb{G}_{2,1}^{(1,0;c)}(E,1a) &= \frac{\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_1^{(b)}(A_2)}{2} + \frac{\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,2}^{(b)}(E)}{2} \\
\boxed{\text{z604}} \quad \mathbb{G}_{2,2}^{(1,0;c)}(E,1a) &= -\frac{\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_1^{(b)}(A_2)}{2} - \frac{\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,1}^{(b)}(E)}{2} \\
\boxed{\text{z605}} \quad \mathbb{G}_{2,1}^{(1,0;c)}(E,1b) &= \frac{\sqrt{3}\mathbb{T}_{2,1}^{(1,0;a)}(E,2)\mathbb{T}_{1,1}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{T}_{2,2}^{(1,0;a)}(E,1)\mathbb{T}_1^{(b)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{T}_{2,2}^{(1,0;a)}(E,2)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{2} \\
\boxed{\text{z606}} \quad \mathbb{G}_{2,2}^{(1,0;c)}(E,1b) &= -\frac{\sqrt{3}\mathbb{T}_{2,1}^{(1,0;a)}(E,1)\mathbb{T}_1^{(b)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{T}_{2,1}^{(1,0;a)}(E,2)\mathbb{T}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{3}\mathbb{T}_{2,2}^{(1,0;a)}(E,2)\mathbb{T}_{1,1}^{(b)}(E)}{6} + \frac{\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{2} \\
\boxed{\text{z607}} \quad \mathbb{G}_{2,1}^{(1,0;c)}(E,2a) &= \frac{\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2} \\
\boxed{\text{z608}} \quad \mathbb{G}_{2,2}^{(1,0;c)}(E,2a) &= -\frac{\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2} \\
\boxed{\text{z609}} \quad \mathbb{G}_{2,1}^{(1,0;c)}(E,2b) &= -\frac{\sqrt{3}\mathbb{T}_{2,1}^{(1,0;a)}(E,1)\mathbb{T}_{1,1}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{T}_{2,2}^{(1,0;a)}(E,1)\mathbb{T}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{3}\mathbb{T}_{2,2}^{(1,0;a)}(E,2)\mathbb{T}_1^{(b)}(A_2)}{3} \\
\boxed{\text{z610}} \quad \mathbb{G}_{2,2}^{(1,0;c)}(E,2b) &= \frac{\sqrt{3}\mathbb{T}_{2,1}^{(1,0;a)}(E,1)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{T}_{2,1}^{(1,0;a)}(E,2)\mathbb{T}_1^{(b)}(A_2)}{3} + \frac{\sqrt{3}\mathbb{T}_{2,2}^{(1,0;a)}(E,1)\mathbb{T}_{1,1}^{(b)}(E)}{6}
\end{aligned}$$

$$\boxed{\text{z611}} \quad \mathbb{G}_{1,1}^{(1,1;c)}(E) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z612}} \quad \mathbb{G}_{1,2}^{(1,1;c)}(E) = \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z613}} \quad \mathbb{G}_{2,1}^{(1,1;c)}(E, 1) = \frac{\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z614}} \quad \mathbb{G}_{2,2}^{(1,1;c)}(E, 1) = -\frac{\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z615}} \quad \mathbb{G}_{2,1}^{(1,1;c)}(E, 2) = \frac{\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z616}} \quad \mathbb{G}_{2,2}^{(1,1;c)}(E, 2) = -\frac{\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

• 'A'-A' bond-cluster : A;A_002_1

* bra: $\langle s, \uparrow |, \langle s, \downarrow |$

* ket: $|s, \uparrow \rangle, |s, \downarrow \rangle$

* wyckoff: 3a03b

$$\boxed{\text{z93}} \quad \mathbb{Q}_0^{(c)}(A_1) = \mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z94}} \quad \mathbb{G}_0^{(1,-1;c)}(A_1) = \frac{\sqrt{3}\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z95}} \quad \mathbb{G}_2^{(1,-1;c)}(A_1) = -\frac{\sqrt{6}\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z221}} \quad \mathbb{Q}_1^{(1,-1;c)}(A_2) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z617}} \quad \mathbb{Q}_{1,1}^{(c)}(E) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z618}} \quad \mathbb{Q}_{1,2}^{(c)}(E) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z619}} \quad \mathbb{Q}_{1,1}^{(1,-1;c)}(E) = \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z620}} \quad \mathbb{Q}_{1,2}^{(1,-1;c)}(E) = -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z621}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 1) = \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z622}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 1) = -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z623}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 2) = \frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z624}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 2) = -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

• 'A'-'A' bond-cluster : **A;A_002_1**

* bra: $\langle s, \uparrow |, \langle s, \downarrow |$

* ket: $|p_x, \uparrow\rangle, |p_x, \downarrow\rangle, |p_y, \uparrow\rangle, |p_y, \downarrow\rangle, |p_z, \uparrow\rangle, |p_z, \downarrow\rangle$

* wyckoff: **3a03b**

$$\boxed{\text{z96}} \quad \mathbb{Q}_0^{(c)}(A_1, a) = \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z97}} \quad \mathbb{Q}_0^{(c)}(A_1, b) = \frac{\sqrt{3}\mathbb{T}_{1,1}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{T}_{1,2}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{T}_1^{(a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z98}} \quad \mathbb{Q}_2^{(c)}(A_1) = -\frac{\sqrt{6}\mathbb{T}_{1,1}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{T}_{1,2}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{T}_1^{(a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z99}} \quad \mathbb{Q}_2^{(1,-1;c)}(A_1, a) = -\frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z100}} \quad \mathbb{Q}_2^{(1,-1;c)}(A_1, b) = -\frac{\sqrt{2}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z101}} \quad \mathbb{Q}_0^{(1,0;c)}(A_1, a) = \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\begin{aligned}
\text{z102} \quad \mathbb{Q}_0^{(1,0;c)}(A_1, b) &= \frac{\sqrt{3}\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{T}_1^{(1,0;a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3} \\
\text{z103} \quad \mathbb{Q}_2^{(1,0;c)}(A_1) &= -\frac{\sqrt{6}\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{T}_1^{(1,0;a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3} \\
\text{z104} \quad \mathbb{G}_2^{(1,-1;c)}(A_1) &= \mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_0^{(b)}(A_1) \\
\text{z105} \quad \mathbb{G}_3^{(1,-1;c)}(A_1, a) &= \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{2} \\
\text{z106} \quad \mathbb{G}_3^{(1,-1;c)}(A_1, b) &= \frac{\sqrt{2}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{2} \\
\text{z107} \quad \mathbb{G}_0^{(1,1;c)}(A_1) &= \mathbb{G}_0^{(1,1;a)}(A_1)\mathbb{Q}_0^{(b)}(A_1) \\
\text{z222} \quad \mathbb{Q}_1^{(c)}(A_2) &= \mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_0^{(b)}(A_1) \\
\text{z223} \quad \mathbb{Q}_1^{(1,0;c)}(A_2) &= \mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_0^{(b)}(A_1) \\
\text{z224} \quad \mathbb{G}_1^{(c)}(A_2, a) &= \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2} \\
\text{z225} \quad \mathbb{G}_1^{(c)}(A_2, b) &= \frac{\sqrt{2}\mathbb{T}_{1,1}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{T}_{1,2}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2} \\
\text{z226} \quad \mathbb{G}_1^{(1,-1;c)}(A_2, a) &= \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{2} \\
\text{z227} \quad \mathbb{G}_1^{(1,-1;c)}(A_2, b) &= \frac{\sqrt{30}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{30}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{10} + \frac{\sqrt{10}\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{T}_1^{(b)}(A_2)}{5} \\
\text{z228} \quad \mathbb{G}_3^{(1,-1;c)}(A_2, 1) &= -\frac{\sqrt{5}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{5} + \frac{\sqrt{5}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{5} + \frac{\sqrt{15}\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{T}_1^{(b)}(A_2)}{5} \\
\text{z229} \quad \mathbb{G}_3^{(1,-1;c)}(A_2, 2a) &= \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{2} \\
\text{z230} \quad \mathbb{G}_3^{(1,-1;c)}(A_2, 2b) &= \frac{\sqrt{2}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{2}
\end{aligned}$$

$$\boxed{\text{z231}} \quad \mathbb{G}_1^{(1,0;c)}(A_2, a) = \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z232}} \quad \mathbb{G}_1^{(1,0;c)}(A_2, b) = \frac{\sqrt{2}\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z233}} \quad \mathbb{G}_1^{(1,1;c)}(A_2) = \mathbb{M}_0^{(1,1;a)}(A_1)\mathbb{T}_1^{(b)}(A_2)$$

$$\boxed{\text{z625}} \quad \mathbb{Q}_{1,1}^{(c)}(E) = \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z626}} \quad \mathbb{Q}_{1,2}^{(c)}(E) = \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z627}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 1a) = \frac{\sqrt{2}\mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z628}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 1a) = -\frac{\sqrt{2}\mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z629}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 1b) = \frac{\mathbb{T}_{1,2}^{(a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{T}_1^{(a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z630}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 1b) = -\frac{\mathbb{T}_{1,1}^{(a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{T}_1^{(a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z631}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 2a) = \frac{\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z632}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 2a) = -\frac{\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z633}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 2b) = \frac{\mathbb{T}_{1,1}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{T}_{1,2}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z634}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 2b) = -\frac{\mathbb{T}_{1,1}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{T}_{1,2}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z635}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 1a) = \frac{\sqrt{10}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{10}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{10} + \frac{\sqrt{30}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{10}$$

$$\begin{aligned}
\text{z636} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 1a) &= -\frac{\sqrt{10}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{10}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{10} + \frac{\sqrt{30}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{10} \\
\text{z637} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 1b) &= \frac{\sqrt{3}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{2} \\
\text{z638} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 1b) &= -\frac{\sqrt{3}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{3}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{6} + \frac{\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{2} \\
\text{z639} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 2a) &= -\frac{\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{2} + \frac{\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{2} \\
\text{z640} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 2a) &= \frac{\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{2} + \frac{\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{2} \\
\text{z641} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 2b) &= -\frac{\sqrt{3}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{3}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{3} \\
\text{z642} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 2b) &= \frac{\sqrt{3}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{3} + \frac{\sqrt{3}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{6} \\
\text{z643} \quad \mathbb{Q}_{1,1}^{(1,0;c)}(E) &= \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_0^{(b)}(A_1)}{2} \\
\text{z644} \quad \mathbb{Q}_{1,2}^{(1,0;c)}(E) &= \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_0^{(b)}(A_1)}{2} \\
\text{z645} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E, 1a) &= \frac{\sqrt{2}\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,2}^{(b)}(E)}{2} \\
\text{z646} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E, 1a) &= -\frac{\sqrt{2}\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,1}^{(b)}(E)}{2} \\
\text{z647} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E, 1b) &= \frac{\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{T}_1^{(1,0;a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2} \\
\text{z648} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E, 1b) &= -\frac{\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{T}_1^{(1,0;a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2} \\
\text{z649} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E, 2a) &= \frac{\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2}
\end{aligned}$$

$$\boxed{\text{z650}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E, 2a) = -\frac{\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z651}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E, 2b) = \frac{\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z652}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E, 2b) = -\frac{\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z653}} \quad \mathbb{G}_{1,1}^{(c)}(E) = \frac{\mathbb{T}_{1,2}^{(a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{T}_1^{(a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z654}} \quad \mathbb{G}_{1,2}^{(c)}(E) = -\frac{\mathbb{T}_{1,1}^{(a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{T}_1^{(a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z655}} \quad \mathbb{G}_{1,1}^{(1,-1;c)}(E, a) = \frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{5}$$

$$\boxed{\text{z656}} \quad \mathbb{G}_{1,2}^{(1,-1;c)}(E, a) = -\frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{5}$$

$$\boxed{\text{z657}} \quad \mathbb{G}_{1,1}^{(1,-1;c)}(E, b) = \frac{\sqrt{15}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{15}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{5}\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{10}$$

$$\boxed{\text{z658}} \quad \mathbb{G}_{1,2}^{(1,-1;c)}(E, b) = \frac{\sqrt{15}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{15}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{5}\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{10}$$

$$\boxed{\text{z659}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 1) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z660}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 1) = \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z661}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 2) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z662}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 2) = \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z663}} \quad \mathbb{G}_{3,1}^{(1,-1;c)}(E, 1) = -\frac{\sqrt{15}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{30} - \frac{2\sqrt{15}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{30} + \frac{\sqrt{5}\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{5}$$

$$\boxed{\text{z664}} \quad \mathbb{G}_{3,2}^{(1,-1;c)}(E,1) = \frac{2\sqrt{15}\mathbb{M}_{2,1}^{(1,-1;a)}(E,1)\mathbb{T}_1^{(b)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{M}_{2,1}^{(1,-1;a)}(E,2)\mathbb{T}_{1,2}^{(b)}(E)}{30} + \frac{\sqrt{15}\mathbb{M}_{2,2}^{(1,-1;a)}(E,2)\mathbb{T}_{1,1}^{(b)}(E)}{30} + \frac{\sqrt{5}\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{5}$$

$$\boxed{\text{z665}} \quad \mathbb{G}_{3,1}^{(1,-1;c)}(E,2) = \frac{\sqrt{6}\mathbb{M}_{2,1}^{(1,-1;a)}(E,1)\mathbb{T}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{M}_{2,2}^{(1,-1;a)}(E,1)\mathbb{T}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{M}_{2,2}^{(1,-1;a)}(E,2)\mathbb{T}_1^{(b)}(A_2)}{6}$$

$$\boxed{\text{z666}} \quad \mathbb{G}_{3,2}^{(1,-1;c)}(E,2) = -\frac{\sqrt{6}\mathbb{M}_{2,1}^{(1,-1;a)}(E,1)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{M}_{2,1}^{(1,-1;a)}(E,2)\mathbb{T}_1^{(b)}(A_2)}{6} - \frac{\sqrt{6}\mathbb{M}_{2,2}^{(1,-1;a)}(E,1)\mathbb{T}_{1,1}^{(b)}(E)}{6}$$

$$\boxed{\text{z667}} \quad \mathbb{G}_{1,1}^{(1,0;c)}(E) = \frac{\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{T}_1^{(1,0;a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z668}} \quad \mathbb{G}_{1,2}^{(1,0;c)}(E) = -\frac{\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{T}_1^{(1,0;a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z669}} \quad \mathbb{G}_{1,1}^{(1,1;c)}(E,a) = \frac{\sqrt{2}\mathbb{G}_0^{(1,1;a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z670}} \quad \mathbb{G}_{1,2}^{(1,1;c)}(E,a) = \frac{\sqrt{2}\mathbb{G}_0^{(1,1;a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z671}} \quad \mathbb{G}_{1,1}^{(1,1;c)}(E,b) = \frac{\sqrt{2}\mathbb{M}_0^{(1,1;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z672}} \quad \mathbb{G}_{1,2}^{(1,1;c)}(E,b) = \frac{\sqrt{2}\mathbb{M}_0^{(1,1;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

• 'A'-'A' bond-cluster : **A;A_002_1**

* bra: $\langle p_x, \uparrow |, \langle p_x, \downarrow |, \langle p_y, \uparrow |, \langle p_y, \downarrow |, \langle p_z, \uparrow |, \langle p_z, \downarrow |$

* ket: $|p_x, \uparrow \rangle, |p_x, \downarrow \rangle, |p_y, \uparrow \rangle, |p_y, \downarrow \rangle, |p_z, \uparrow \rangle, |p_z, \downarrow \rangle$

* wyckoff: **3aQ3b**

$$\boxed{\text{z108}} \quad \mathbb{Q}_0^{(c)}(A_1) = \mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z109}} \quad \mathbb{Q}_2^{(c)}(A_1) = \mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z110}} \quad \mathbb{Q}_3^{(c)}(A_1) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E,2)\mathbb{Q}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E,2)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z111}} \quad \mathbb{Q}_2^{(1,-1;c)}(A_1) = \mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_0^{(b)}(A_1)$$

$$\begin{aligned}
\text{z112} \quad \mathbb{Q}_3^{(1,-1;c)}(A_1, a) &= \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{2} \\
\text{z113} \quad \mathbb{Q}_3^{(1,-1;c)}(A_1, b) &= -\frac{\sqrt{2}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{4} - \frac{\sqrt{2}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{4} + \frac{\sqrt{3}\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_1^{(b)}(A_2)}{2} \\
\text{z114} \quad \mathbb{Q}_3^{(1,0;c)}(A_1) &= \frac{\sqrt{2}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{2} \\
\text{z115} \quad \mathbb{Q}_0^{(1,1;c)}(A_1) &= \mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_0^{(b)}(A_1) \\
\text{z116} \quad \mathbb{G}_0^{(c)}(A_1) &= \frac{\sqrt{3}\mathbb{M}_{1,1}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{M}_{1,2}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{M}_1^{(a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3} \\
\text{z117} \quad \mathbb{G}_2^{(c)}(A_1, a) &= -\frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{2} \\
\text{z118} \quad \mathbb{G}_2^{(c)}(A_1, b) &= -\frac{\sqrt{6}\mathbb{M}_{1,1}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{M}_{1,2}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{M}_1^{(a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3} \\
\text{z119} \quad \mathbb{G}_0^{(1,-1;c)}(A_1) &= \frac{\sqrt{3}\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3} \\
\text{z120} \quad \mathbb{G}_2^{(1,-1;c)}(A_1, a) &= -\frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{2} \\
\text{z121} \quad \mathbb{G}_2^{(1,-1;c)}(A_1, b) &= \frac{\sqrt{14}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{7} + \frac{\sqrt{14}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{7} + \frac{\sqrt{21}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_1^{(b)}(A_2)}{7} \\
\text{z122} \quad \mathbb{G}_2^{(1,-1;c)}(A_1, c) &= -\frac{\sqrt{6}\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3} \\
\text{z123} \quad \mathbb{G}_4^{(1,-1;c)}(A_1, 1) &= -\frac{\sqrt{42}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{14} - \frac{\sqrt{42}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{14} + \frac{2\sqrt{7}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_1^{(b)}(A_2)}{7} \\
\text{z124} \quad \mathbb{G}_4^{(1,-1;c)}(A_1, 2) &= \frac{\sqrt{6}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{4} + \frac{\sqrt{6}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{4} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_1^{(b)}(A_2)}{2} \\
\text{z125} \quad \mathbb{G}_0^{(1,0;c)}(A_1) &= \frac{\sqrt{2}\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2}
\end{aligned}$$

$$\begin{aligned}
\text{z126} \quad \mathbb{G}_2^{(1,0;c)}(A_1) &= -\frac{\sqrt{2}\mathbb{T}_{2,1}^{(1,0;a)}(E,1)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{T}_{2,2}^{(1,0;a)}(E,1)\mathbb{T}_{1,2}^{(b)}(E)}{2} \\
\text{z127} \quad \mathbb{G}_0^{(1,1;c)}(A_1) &= \frac{\sqrt{3}\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3} \\
\text{z128} \quad \mathbb{G}_2^{(1,1;c)}(A_1) &= -\frac{\sqrt{6}\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3} \\
\text{z234} \quad \mathbb{Q}_1^{(c)}(A_2, a) &= \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E,1)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E,1)\mathbb{Q}_{1,1}^{(b)}(E)}{2} \\
\text{z235} \quad \mathbb{Q}_1^{(c)}(A_2, b) &= \frac{\sqrt{2}\mathbb{M}_{1,1}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{1,2}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2} \\
\text{z236} \quad \mathbb{Q}_3^{(c)}(A_2, 2) &= \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E,2)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E,2)\mathbb{Q}_{1,1}^{(b)}(E)}{2} \\
\text{z237} \quad \mathbb{Q}_1^{(1,-1;c)}(A_2, a) &= \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E,1)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E,1)\mathbb{Q}_{1,1}^{(b)}(E)}{2} \\
\text{z238} \quad \mathbb{Q}_1^{(1,-1;c)}(A_2, b) &= \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2} \\
\text{z239} \quad \mathbb{Q}_3^{(1,-1;c)}(A_2, 1) &= \frac{\sqrt{2}\mathbb{M}_{3,1}^{(1,-1;a)}(E,1)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{3,2}^{(1,-1;a)}(E,1)\mathbb{T}_{1,1}^{(b)}(E)}{2} \\
\text{z240} \quad \mathbb{Q}_3^{(1,-1;c)}(A_2, 2a) &= \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E,2)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E,2)\mathbb{Q}_{1,1}^{(b)}(E)}{2} \\
\text{z241} \quad \mathbb{Q}_3^{(1,-1;c)}(A_2, 2b) &= -\frac{\sqrt{2}\mathbb{M}_{3,1}^{(1,-1;a)}(E,2)\mathbb{T}_{1,2}^{(b)}(E)}{4} + \frac{\sqrt{2}\mathbb{M}_{3,2}^{(1,-1;a)}(E,2)\mathbb{T}_{1,1}^{(b)}(E)}{4} - \frac{\sqrt{3}\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_1^{(b)}(A_2)}{2} \\
\text{z242} \quad \mathbb{Q}_1^{(1,0;c)}(A_2, a) &= \frac{\sqrt{2}\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2} \\
\text{z243} \quad \mathbb{Q}_1^{(1,0;c)}(A_2, b) &= \frac{\sqrt{30}\mathbb{T}_{2,1}^{(1,0;a)}(E,1)\mathbb{T}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{30}\mathbb{T}_{2,2}^{(1,0;a)}(E,1)\mathbb{T}_{1,1}^{(b)}(E)}{10} + \frac{\sqrt{10}\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{T}_1^{(b)}(A_2)}{5} \\
\text{z244} \quad \mathbb{Q}_3^{(1,0;c)}(A_2, 1) &= -\frac{\sqrt{5}\mathbb{T}_{2,1}^{(1,0;a)}(E,1)\mathbb{T}_{1,2}^{(b)}(E)}{5} + \frac{\sqrt{5}\mathbb{T}_{2,2}^{(1,0;a)}(E,1)\mathbb{T}_{1,1}^{(b)}(E)}{5} + \frac{\sqrt{15}\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{T}_1^{(b)}(A_2)}{5}
\end{aligned}$$

$$\begin{aligned}
\boxed{\text{z245}} \quad \mathbb{Q}_3^{(1,0;c)}(A_2, 2) &= \frac{\sqrt{2}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{2} \\
\boxed{\text{z246}} \quad \mathbb{Q}_1^{(1,1;c)}(A_2) &= \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2} \\
\boxed{\text{z247}} \quad \mathbb{G}_4^{(1,-1;c)}(A_2) &= -\frac{\sqrt{6}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{4} + \frac{\sqrt{6}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{4} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_1^{(b)}(A_2)}{2} \\
\boxed{\text{z248}} \quad \mathbb{G}_1^{(1,0;c)}(A_2) &= \mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_0^{(b)}(A_1) \\
\boxed{\text{z673}} \quad \mathbb{Q}_{1,1}^{(c)}(E, a) &= \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{2} \\
\boxed{\text{z674}} \quad \mathbb{Q}_{1,2}^{(c)}(E, a) &= \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{2} \\
\boxed{\text{z675}} \quad \mathbb{Q}_{1,1}^{(c)}(E, b) &= \frac{\sqrt{42}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{14} - \frac{\sqrt{42}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{14} - \frac{\sqrt{14}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{14} \\
\boxed{\text{z676}} \quad \mathbb{Q}_{1,2}^{(c)}(E, b) &= -\frac{\sqrt{42}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{14} - \frac{\sqrt{42}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{14} - \frac{\sqrt{14}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{14} \\
\boxed{\text{z677}} \quad \mathbb{Q}_{1,1}^{(c)}(E, c) &= \frac{\mathbb{M}_{1,2}^{(a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{M}_1^{(a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2} \\
\boxed{\text{z678}} \quad \mathbb{Q}_{1,2}^{(c)}(E, c) &= -\frac{\mathbb{M}_{1,1}^{(a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{M}_1^{(a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2} \\
\boxed{\text{z679}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 1) &= \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_0^{(b)}(A_1)}{2} \\
\boxed{\text{z680}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 1) &= \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_0^{(b)}(A_1)}{2} \\
\boxed{\text{z681}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 2) &= \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_0^{(b)}(A_1)}{2} \\
\boxed{\text{z682}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 2) &= \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_0^{(b)}(A_1)}{2}
\end{aligned}$$

$$\begin{aligned}
\text{z683} \quad \mathbb{Q}_{3,1}^{(c)}(E, 1) &= \frac{\sqrt{7}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{14} - \frac{\sqrt{7}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{14} + \frac{\sqrt{21}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{7} \\
\text{z684} \quad \mathbb{Q}_{3,2}^{(c)}(E, 1) &= -\frac{\sqrt{7}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{14} - \frac{\sqrt{7}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{14} + \frac{\sqrt{21}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{7} \\
\text{z685} \quad \mathbb{Q}_{3,1}^{(c)}(E, 2) &= \frac{\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{2} \\
\text{z686} \quad \mathbb{Q}_{3,2}^{(c)}(E, 2) &= -\frac{\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{2} \\
\text{z687} \quad \mathbb{Q}_{1,1}^{(1,-1;c)}(E, a) &= \frac{\sqrt{42}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{14} - \frac{\sqrt{42}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{14} - \frac{\sqrt{14}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{14} \\
\text{z688} \quad \mathbb{Q}_{1,2}^{(1,-1;c)}(E, a) &= -\frac{\sqrt{42}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{14} - \frac{\sqrt{42}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{14} - \frac{\sqrt{14}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{14} \\
\text{z689} \quad \mathbb{Q}_{1,1}^{(1,-1;c)}(E, b) &= \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2} \\
\text{z690} \quad \mathbb{Q}_{1,2}^{(1,-1;c)}(E, b) &= -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2} \\
\text{z691} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 1) &= \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_0^{(b)}(A_1)}{2} \\
\text{z692} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 1) &= \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_0^{(b)}(A_1)}{2} \\
\text{z693} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 2) &= \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_0^{(b)}(A_1)}{2} \\
\text{z694} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 2) &= \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_0^{(b)}(A_1)}{2} \\
\text{z695} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(E, 1a) &= \frac{\sqrt{7}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{14} - \frac{\sqrt{7}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{14} + \frac{\sqrt{21}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{7} \\
\text{z696} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(E, 1a) &= -\frac{\sqrt{7}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{14} - \frac{\sqrt{7}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{14} + \frac{\sqrt{21}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{7}
\end{aligned}$$

$$\begin{aligned}
\text{z697} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(E, 1b) &= -\frac{\sqrt{15}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{12} + \frac{\sqrt{6}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{12} + \frac{\sqrt{15}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{12} - \frac{\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_{1,2}^{(b)}(E)}{2} \\
\text{z698} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(E, 1b) &= -\frac{\sqrt{6}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{12} + \frac{\sqrt{15}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{12} + \frac{\sqrt{15}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{12} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_{1,1}^{(b)}(E)}{2} \\
\text{z699} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(E, 2a) &= \frac{\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{2} \\
\text{z700} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(E, 2a) &= -\frac{\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{2} \\
\text{z701} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(E, 2b) &= \frac{\sqrt{15}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{12} - \frac{\sqrt{15}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{12} - \frac{\sqrt{6}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{6} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{4} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_{1,2}^{(b)}(E)}{4} \\
\text{z702} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(E, 2b) &= -\frac{\sqrt{15}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{12} + \frac{\sqrt{6}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{6} - \frac{\sqrt{15}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{12} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{4} - \frac{\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_{1,1}^{(b)}(E)}{4} \\
\text{z703} \quad \mathbb{Q}_{1,1}^{(1,0;c)}(E, a) &= -\frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,2}^{(b)}(E)}{2} \\
\text{z704} \quad \mathbb{Q}_{1,2}^{(1,0;c)}(E, a) &= \frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,1}^{(b)}(E)}{2} \\
\text{z705} \quad \mathbb{Q}_{1,1}^{(1,0;c)}(E, b) &= \frac{\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{5}\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{10} \\
\text{z706} \quad \mathbb{Q}_{1,2}^{(1,0;c)}(E, b) &= \frac{\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{5}\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{10} \\
\text{z707} \quad \mathbb{Q}_{3,1}^{(1,0;c)}(E, 1) &= -\frac{\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{30} - \frac{2\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{30} + \frac{\sqrt{5}\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{5} \\
\text{z708} \quad \mathbb{Q}_{3,2}^{(1,0;c)}(E, 1) &= \frac{2\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{30} + \frac{\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{30} + \frac{\sqrt{5}\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{5} \\
\text{z709} \quad \mathbb{Q}_{3,1}^{(1,0;c)}(E, 2) &= \frac{\sqrt{6}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{6} \\
\text{z710} \quad \mathbb{Q}_{3,2}^{(1,0;c)}(E, 2) &= -\frac{\sqrt{6}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{6} - \frac{\sqrt{6}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{6}
\end{aligned}$$

$$\boxed{\text{z711}} \quad \mathbb{Q}_{1,1}^{(1,1;c)}(E, a) = \frac{\sqrt{2}\mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z712}} \quad \mathbb{Q}_{1,2}^{(1,1;c)}(E, a) = \frac{\sqrt{2}\mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z713}} \quad \mathbb{Q}_{1,1}^{(1,1;c)}(E, b) = \frac{\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z714}} \quad \mathbb{Q}_{1,2}^{(1,1;c)}(E, b) = -\frac{\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z715}} \quad \mathbb{G}_{2,1}^{(c)}(E, 1) = \frac{\mathbb{M}_{1,2}^{(a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{M}_1^{(a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z716}} \quad \mathbb{G}_{2,2}^{(c)}(E, 1) = -\frac{\mathbb{M}_{1,1}^{(a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{M}_1^{(a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z717}} \quad \mathbb{G}_{2,1}^{(c)}(E, 2) = \frac{\mathbb{M}_{1,1}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z718}} \quad \mathbb{G}_{2,2}^{(c)}(E, 2) = -\frac{\mathbb{M}_{1,1}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z719}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 1a) = \frac{\sqrt{210}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{42} + \frac{2\sqrt{21}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{21} - \frac{\sqrt{210}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{42} - \frac{\sqrt{14}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_{1,2}^{(b)}(E)}{14}$$

$$\boxed{\text{z720}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 1a) = -\frac{2\sqrt{21}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{21} - \frac{\sqrt{210}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{42} - \frac{\sqrt{210}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{42} + \frac{\sqrt{14}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_{1,1}^{(b)}(E)}{14}$$

$$\boxed{\text{z721}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 1b) = \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z722}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 1b) = -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z723}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 2a) = -\frac{\sqrt{21}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{42} + \frac{\sqrt{21}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{42} + \frac{\sqrt{210}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{42} + \frac{\sqrt{35}\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{14} + \frac{\sqrt{35}\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_{1,2}^{(b)}(E)}{14}$$

$$\boxed{\text{z724}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 2a) = \frac{\sqrt{21}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{42} - \frac{\sqrt{210}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{42} + \frac{\sqrt{21}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{42} + \frac{\sqrt{35}\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{14} - \frac{\sqrt{35}\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_{1,1}^{(b)}(E)}{14}$$

$$\boxed{\text{z725}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 2b) = \frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z726}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 2b) = -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z727}} \quad \mathbb{G}_{4,1}^{(1,-1;c)}(E, 1) = -\frac{\sqrt{21}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{28} + \frac{\sqrt{210}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{28} + \frac{\sqrt{21}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{28} + \frac{\sqrt{35}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_{1,2}^{(b)}(E)}{14}$$

$$\boxed{\text{z728}} \quad \mathbb{G}_{4,2}^{(1,-1;c)}(E, 1) = -\frac{\sqrt{210}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{28} + \frac{\sqrt{21}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{28} + \frac{\sqrt{21}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{28} - \frac{\sqrt{35}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_{1,1}^{(b)}(E)}{14}$$

$$\boxed{\text{z729}} \quad \mathbb{G}_{4,1}^{(1,-1;c)}(E, 2) = \frac{\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z730}} \quad \mathbb{G}_{4,2}^{(1,-1;c)}(E, 2) = \frac{\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{2} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z731}} \quad \mathbb{G}_{4,1}^{(1,-1;c)}(E, 3) = \frac{\sqrt{105}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{28} - \frac{\sqrt{105}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{28} + \frac{\sqrt{42}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{14} - \frac{\sqrt{7}\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{28} - \frac{\sqrt{7}\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_{1,2}^{(b)}(E)}{28}$$

$$\boxed{\text{z732}} \quad \mathbb{G}_{4,2}^{(1,-1;c)}(E, 3) = -\frac{\sqrt{105}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{28} - \frac{\sqrt{42}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{14} - \frac{\sqrt{105}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{28} - \frac{\sqrt{7}\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{28} + \frac{\sqrt{7}\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_{1,1}^{(b)}(E)}{28}$$

$$\boxed{\text{z733}} \quad \mathbb{G}_{1,1}^{(1,0;c)}(E) = \frac{\sqrt{2}\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z734}} \quad \mathbb{G}_{1,2}^{(1,0;c)}(E) = \frac{\sqrt{2}\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z735}} \quad \mathbb{G}_{2,1}^{(1,0;c)}(E, 1) = \frac{\sqrt{3}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z736}} \quad \mathbb{G}_{2,2}^{(1,0;c)}(E, 1) = -\frac{\sqrt{3}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{3}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{6} + \frac{\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z737}} \quad \mathbb{G}_{2,1}^{(1,0;c)}(E, 2a) = \frac{\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z738}} \quad \mathbb{G}_{2,2}^{(1,0;c)}(E, 2a) = -\frac{\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z739}} \quad \mathbb{G}_{2,1}^{(1,0;c)}(E, 2b) = -\frac{\sqrt{3}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{3}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z740}} \quad \mathbb{G}_{2,2}^{(1,0;c)}(E, 2b) = \frac{\sqrt{3}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{3} + \frac{\sqrt{3}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{6}$$

$$\boxed{\text{z741}} \quad \mathbb{G}_{2,1}^{(1,1;c)}(E, 1) = \frac{\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z742}} \quad \mathbb{G}_{2,2}^{(1,1;c)}(E, 1) = -\frac{\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z743}} \quad \mathbb{G}_{2,1}^{(1,1;c)}(E, 2) = \frac{\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z744}} \quad \mathbb{G}_{2,2}^{(1,1;c)}(E, 2) = -\frac{\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

Atomic SAMB

- bra: $\langle s, \uparrow |, \langle s, \downarrow |$
- ket: $|s, \uparrow\rangle, |s, \downarrow\rangle$

$$\boxed{\text{x1}} \quad \mathbb{Q}_0^{(a)}(A_1) = \begin{bmatrix} \frac{\sqrt{2}}{2} & 0 \\ 0 & \frac{\sqrt{2}}{2} \end{bmatrix}$$

$$\boxed{\text{x2}} \quad \mathbb{M}_1^{(1,-1;a)}(A_2) = \begin{bmatrix} \frac{\sqrt{2}}{2} & 0 \\ 0 & -\frac{\sqrt{2}}{2} \end{bmatrix}$$

$$\boxed{\text{x3}} \quad \mathbb{M}_{1,1}^{(1,-1;a)}(E) = \begin{bmatrix} 0 & \frac{\sqrt{2}}{2} \\ \frac{\sqrt{2}}{2} & 0 \end{bmatrix}$$

$$\boxed{\text{x4}} \quad \mathbb{M}_{1,2}^{(1,-1;a)}(E) = \begin{bmatrix} 0 & -\frac{\sqrt{2}i}{2} \\ \frac{\sqrt{2}i}{2} & 0 \end{bmatrix}$$

- bra: $\langle s, \uparrow |, \langle s, \downarrow |$

• ket: $|p_x, \uparrow\rangle, |p_x, \downarrow\rangle, |p_y, \uparrow\rangle, |p_y, \downarrow\rangle, |p_z, \uparrow\rangle, |p_z, \downarrow\rangle$

$$\boxed{\text{x5}} \quad \mathbb{Q}_1^{(a)}(A_2) = \begin{bmatrix} 0 & 0 & 0 & 0 & \frac{1}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{1}{2} \end{bmatrix}$$

$$\boxed{\text{x6}} \quad \mathbb{Q}_{1,1}^{(a)}(E) = \begin{bmatrix} \frac{1}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{2} & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x7}} \quad \mathbb{Q}_{1,2}^{(a)}(E) = \begin{bmatrix} 0 & 0 & \frac{1}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{1}{2} & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x8}} \quad \mathbb{Q}_1^{(1,0;a)}(A_2) = \begin{bmatrix} 0 & -\frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \\ \frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x9}} \quad \mathbb{Q}_{1,1}^{(1,0;a)}(E) = \begin{bmatrix} 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & \frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & -\frac{\sqrt{2}}{4} & 0 \end{bmatrix}$$

$$\boxed{\text{x10}} \quad \mathbb{Q}_{1,2}^{(1,0;a)}(E) = \begin{bmatrix} \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 \end{bmatrix}$$

$$\boxed{\text{x11}} \quad \mathbb{G}_2^{(1,-1;a)}(A_1) = \begin{bmatrix} 0 & -\frac{\sqrt{6}i}{12} & 0 & -\frac{\sqrt{6}}{12} & \frac{\sqrt{6}i}{6} & 0 \\ -\frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & -\frac{\sqrt{6}i}{6} \end{bmatrix}$$

$$\boxed{\text{x12}} \quad \mathbb{G}_{2,1}^{(1,-1;a)}(E, 1) = \begin{bmatrix} 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & \frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & -\frac{\sqrt{2}}{4} & 0 \end{bmatrix}$$

$$\boxed{\text{x13}} \quad \mathbb{G}_{2,2}^{(1,-1;a)}(E, 1) = \begin{bmatrix} -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 \end{bmatrix}$$

$$\boxed{\text{x14}} \quad \mathbb{G}_{2,1}^{(1,-1;a)}(E, 2) = \begin{bmatrix} 0 & \frac{\sqrt{2}i}{4} & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 \\ \frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x15}} \quad \mathbb{G}_{2,2}^{(1,-1;a)}(E, 2) = \begin{bmatrix} 0 & -\frac{\sqrt{2}}{4} & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 \\ \frac{\sqrt{2}}{4} & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x16}} \quad \mathbb{G}_0^{(1,1;a)}(A_1) = \begin{bmatrix} 0 & \frac{\sqrt{3}i}{6} & 0 & \frac{\sqrt{3}}{6} & \frac{\sqrt{3}i}{6} & 0 \\ \frac{\sqrt{3}i}{6} & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & -\frac{\sqrt{3}i}{6} \end{bmatrix}$$

$$\boxed{\text{x17}} \quad \mathbb{M}_2^{(1,-1;a)}(A_1) = \begin{bmatrix} 0 & -\frac{\sqrt{6}}{12} & 0 & \frac{\sqrt{6}i}{12} & \frac{\sqrt{6}}{6} & 0 \\ -\frac{\sqrt{6}}{12} & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & -\frac{\sqrt{6}}{6} \end{bmatrix}$$

$$\boxed{\text{x18}} \quad \mathbb{M}_{2,1}^{(1,-1;a)}(E, 1) = \begin{bmatrix} 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & \frac{\sqrt{2}i}{4} & 0 \end{bmatrix}$$

$$\boxed{\text{x19}} \quad \mathbb{M}_{2,2}^{(1,-1;a)}(E, 1) = \begin{bmatrix} -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} \\ 0 & \frac{\sqrt{2}}{4} & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 \end{bmatrix}$$

$$\boxed{\text{x20}} \quad \mathbb{M}_{2,1}^{(1,-1;a)}(E, 2) = \begin{bmatrix} 0 & \frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \\ \frac{\sqrt{2}}{4} & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x21}} \quad \mathbb{M}_{2,2}^{(1,-1;a)}(E, 2) = \begin{bmatrix} 0 & \frac{\sqrt{2}i}{4} & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x22}} \quad \mathbb{M}_0^{(1,1;a)}(A_1) = \begin{bmatrix} 0 & \frac{\sqrt{3}}{6} & 0 & -\frac{\sqrt{3}i}{6} & \frac{\sqrt{3}}{6} & 0 \\ \frac{\sqrt{3}}{6} & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & -\frac{\sqrt{3}}{6} \end{bmatrix}$$

$$\boxed{\text{x23}} \quad \mathbb{T}_1^{(a)}(A_2) = \begin{bmatrix} 0 & 0 & 0 & 0 & \frac{i}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{i}{2} \end{bmatrix}$$

$$\boxed{\text{x24}} \quad \mathbb{T}_{1,1}^{(a)}(E) = \begin{bmatrix} \frac{i}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{i}{2} & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x25}} \quad \mathbb{T}_{1,2}^{(a)}(E) = \begin{bmatrix} 0 & 0 & \frac{i}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{i}{2} & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x26}} \quad \mathbb{T}_1^{(1,0;a)}(A_2) = \begin{bmatrix} 0 & \frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x27}} \quad \mathbb{T}_{1,1}^{(1,0;a)}(E) = \begin{bmatrix} 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & \frac{\sqrt{2}}{4} & \frac{\sqrt{2}i}{4} & 0 \end{bmatrix}$$

$$\boxed{\text{x28}} \quad \mathbb{T}_{1,2}^{(1,0;a)}(E) = \begin{bmatrix} \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} \\ 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 \end{bmatrix}$$

• bra: $\langle p_x, \uparrow |, \langle p_x, \downarrow |, \langle p_y, \uparrow |, \langle p_y, \downarrow |, \langle p_z, \uparrow |, \langle p_z, \downarrow |$

- ket: $|p_x, \uparrow\rangle, |p_x, \downarrow\rangle, |p_y, \uparrow\rangle, |p_y, \downarrow\rangle, |p_z, \uparrow\rangle, |p_z, \downarrow\rangle$

$$\boxed{\text{x29}} \quad \mathbb{Q}_0^{(a)}(A_1) = \begin{bmatrix} \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} \end{bmatrix}$$

$$\boxed{\text{x30}} \quad \mathbb{Q}_2^{(a)}(A_1) = \begin{bmatrix} -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{3} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{3} \end{bmatrix}$$

$$\boxed{\text{x31}} \quad \mathbb{Q}_{2,1}^{(a)}(E, 1) = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{1}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & \frac{1}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{1}{2} & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x32}} \quad \mathbb{Q}_{2,2}^{(a)}(E, 1) = \begin{bmatrix} 0 & 0 & 0 & 0 & -\frac{1}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{1}{2} \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{1}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{1}{2} & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x33}} \quad \mathbb{Q}_{2,1}^{(a)}(E, 2) = \begin{bmatrix} \frac{1}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{2} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{1}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{1}{2} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x34}} \quad \mathbb{Q}_{2,2}^{(a)}(E, 2) = \begin{bmatrix} 0 & 0 & -\frac{1}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{1}{2} & 0 & 0 \\ -\frac{1}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{1}{2} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x35}} \quad \mathbb{Q}_2^{(1,-1;a)}(A_1) = \begin{bmatrix} 0 & 0 & -\frac{\sqrt{6}i}{6} & 0 & 0 & -\frac{\sqrt{6}}{12} \\ 0 & 0 & 0 & \frac{\sqrt{6}i}{6} & \frac{\sqrt{6}}{12} & 0 \\ \frac{\sqrt{6}i}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{12} \\ 0 & -\frac{\sqrt{6}}{6} & 0 & 0 & \frac{\sqrt{6}i}{12} & 0 \\ 0 & \frac{\sqrt{6}}{12} & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 \\ -\frac{\sqrt{6}}{12} & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x36}} \quad \mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1) = \begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & \frac{\sqrt{2}i}{4} & 0 \\ 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x37}} \quad \mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1) = \begin{bmatrix} 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \\ 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x38}} \quad \mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2) = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 \\ 0 & \frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \\ -\frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x39}} \quad \mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2) = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 \\ 0 & \frac{\sqrt{2}i}{4} & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 \\ \frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x40}} \quad \mathbb{Q}_0^{(1,1;a)}(A_1) = \begin{bmatrix} 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & \frac{\sqrt{3}}{6} \\ 0 & 0 & 0 & \frac{\sqrt{3}i}{6} & -\frac{\sqrt{3}}{6} & 0 \\ \frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} \\ 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 \\ 0 & -\frac{\sqrt{3}}{6} & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 \\ \frac{\sqrt{3}}{6} & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x41}} \quad \mathbb{G}_1^{(1,0;a)}(A_2) = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 \\ 0 & -\frac{\sqrt{2}i}{4} & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x42}} \quad \mathbb{G}_{1,1}^{(1,0;a)}(E) = \begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & -\frac{\sqrt{2}i}{4} & 0 \\ 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x43}} \quad \mathbb{G}_{1,2}^{(1,0;a)}(E) = \begin{bmatrix} 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \\ 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x44}} \quad \mathbb{M}_1^{(a)}(A_2) = \begin{bmatrix} 0 & 0 & -\frac{i}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{i}{2} & 0 & 0 \\ \frac{i}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{i}{2} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x45}} \quad \mathbb{M}_{1,1}^{(a)}(E) = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{i}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{i}{2} \\ 0 & 0 & \frac{i}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{i}{2} & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x46}} \quad \mathbb{M}_{1,2}^{(a)}(E) = \begin{bmatrix} 0 & 0 & 0 & 0 & \frac{i}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{i}{2} \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{i}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{i}{2} & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x47}} \quad \mathbb{M}_3^{(1,-1;a)}(A_1) = \begin{bmatrix} 0 & \frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \\ \frac{\sqrt{2}}{4} & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}i}{4} & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x48}} \quad \mathbb{M}_1^{(1,-1;a)}(A_2) = \begin{bmatrix} \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{6}}{6} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{6} \end{bmatrix}$$

$$\boxed{\text{x49}} \quad \mathbb{M}_3^{(1,-1;a)}(A_2, 1) = \begin{bmatrix} -\frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{10} \\ 0 & \frac{\sqrt{5}}{10} & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 \\ 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & \frac{\sqrt{5}i}{10} \\ 0 & 0 & 0 & \frac{\sqrt{5}}{10} & -\frac{\sqrt{5}i}{10} & 0 \\ 0 & -\frac{\sqrt{5}}{10} & 0 & \frac{\sqrt{5}i}{10} & \frac{\sqrt{5}}{5} & 0 \\ -\frac{\sqrt{5}}{10} & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & -\frac{\sqrt{5}}{5} \end{bmatrix}$$

$$\boxed{\text{x50}} \quad \mathbb{M}_3^{(1,-1;a)}(A_2, 2) = \begin{bmatrix} 0 & -\frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 \\ \frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \\ \frac{\sqrt{2}}{4} & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x51}} \quad \mathbb{M}_{1,1}^{(1,-1;a)}(E) = \begin{bmatrix} 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 \\ \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 \end{bmatrix}$$

$$\boxed{\text{x52}} \quad \mathbb{M}_{1,2}^{(1,-1;a)}(E) = \begin{bmatrix} 0 & -\frac{\sqrt{6}i}{6} & 0 & 0 & 0 & 0 \\ \frac{\sqrt{6}i}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{6}i}{6} & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}i}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{6} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{6} & 0 \end{bmatrix}$$

$$\boxed{\text{x53}} \quad \mathbb{M}_{3,1}^{(1,-1;a)}(E, 1) = \begin{bmatrix} 0 & -\frac{\sqrt{30}}{20} & 0 & \frac{\sqrt{30}i}{60} & \frac{\sqrt{30}}{15} & 0 \\ -\frac{\sqrt{30}}{20} & 0 & -\frac{\sqrt{30}i}{60} & 0 & 0 & -\frac{\sqrt{30}}{15} \\ 0 & \frac{\sqrt{30}i}{60} & 0 & -\frac{\sqrt{30}}{60} & 0 & 0 \\ -\frac{\sqrt{30}i}{60} & 0 & -\frac{\sqrt{30}}{60} & 0 & 0 & 0 \\ \frac{\sqrt{30}}{15} & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{15} \\ 0 & -\frac{\sqrt{30}}{15} & 0 & 0 & \frac{\sqrt{30}}{15} & 0 \end{bmatrix}$$

$$\boxed{\text{x54}} \quad \mathbb{M}_{3,2}^{(1,-1;a)}(E, 1) = \begin{bmatrix} 0 & \frac{\sqrt{30}i}{60} & 0 & -\frac{\sqrt{30}}{60} & 0 & 0 \\ -\frac{\sqrt{30}i}{60} & 0 & -\frac{\sqrt{30}}{60} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{30}}{60} & 0 & \frac{\sqrt{30}i}{20} & \frac{\sqrt{30}}{15} & 0 \\ -\frac{\sqrt{30}}{60} & 0 & -\frac{\sqrt{30}i}{20} & 0 & 0 & -\frac{\sqrt{30}}{15} \\ 0 & 0 & \frac{\sqrt{30}}{15} & 0 & 0 & -\frac{\sqrt{30}i}{15} \\ 0 & 0 & 0 & -\frac{\sqrt{30}}{15} & \frac{\sqrt{30}i}{15} & 0 \end{bmatrix}$$

$$\boxed{\text{x55}} \quad \mathbb{M}_{3,1}^{(1,-1;a)}(E, 2) = \begin{bmatrix} 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & -\frac{\sqrt{3}i}{6} \\ 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & \frac{\sqrt{3}i}{6} & 0 \\ \frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{6} \\ 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & \frac{\sqrt{3}}{6} & 0 \\ 0 & -\frac{\sqrt{3}i}{6} & 0 & \frac{\sqrt{3}}{6} & 0 & 0 \\ \frac{\sqrt{3}i}{6} & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x56}} \quad \mathbb{M}_{3,2}^{(1,-1;a)}(E, 2) = \begin{bmatrix} \frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{6} \\ 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & \frac{\sqrt{3}}{6} & 0 \\ 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & \frac{\sqrt{3}i}{6} \\ 0 & 0 & 0 & \frac{\sqrt{3}}{6} & -\frac{\sqrt{3}i}{6} & 0 \\ 0 & \frac{\sqrt{3}}{6} & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 \\ \frac{\sqrt{3}}{6} & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x57}} \quad \mathbb{M}_1^{(1,1;a)}(A_2) = \begin{bmatrix} -\frac{\sqrt{30}}{30} & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{20} \\ 0 & \frac{\sqrt{30}}{30} & 0 & 0 & \frac{\sqrt{30}}{20} & 0 \\ 0 & 0 & -\frac{\sqrt{30}}{30} & 0 & 0 & -\frac{\sqrt{30}i}{20} \\ 0 & 0 & 0 & \frac{\sqrt{30}}{30} & \frac{\sqrt{30}i}{20} & 0 \\ 0 & \frac{\sqrt{30}}{20} & 0 & -\frac{\sqrt{30}i}{20} & \frac{\sqrt{30}}{15} & 0 \\ \frac{\sqrt{30}}{20} & 0 & \frac{\sqrt{30}i}{20} & 0 & 0 & -\frac{\sqrt{30}}{15} \end{bmatrix}$$

$$\boxed{\text{x58}} \quad \mathbb{M}_{1,1}^{(1,1;a)}(E) = \begin{bmatrix} 0 & \frac{\sqrt{30}}{15} & 0 & -\frac{\sqrt{30}i}{20} & \frac{\sqrt{30}}{20} & 0 \\ \frac{\sqrt{30}}{15} & 0 & \frac{\sqrt{30}i}{20} & 0 & 0 & -\frac{\sqrt{30}}{20} \\ 0 & -\frac{\sqrt{30}i}{20} & 0 & -\frac{\sqrt{30}}{30} & 0 & 0 \\ \frac{\sqrt{30}i}{20} & 0 & -\frac{\sqrt{30}}{30} & 0 & 0 & 0 \\ \frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{30} \\ 0 & -\frac{\sqrt{30}}{20} & 0 & 0 & -\frac{\sqrt{30}}{30} & 0 \end{bmatrix}$$

$$\boxed{\text{x59}} \quad \mathbb{M}_{1,2}^{(1,1;a)}(E) = \begin{bmatrix} 0 & \frac{\sqrt{30}i}{30} & 0 & \frac{\sqrt{30}}{20} & 0 & 0 \\ -\frac{\sqrt{30}i}{30} & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{30}}{20} & 0 & -\frac{\sqrt{30}i}{15} & \frac{\sqrt{30}}{20} & 0 \\ \frac{\sqrt{30}}{20} & 0 & \frac{\sqrt{30}i}{15} & 0 & 0 & -\frac{\sqrt{30}}{20} \\ 0 & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & \frac{\sqrt{30}i}{30} \\ 0 & 0 & 0 & -\frac{\sqrt{30}}{20} & -\frac{\sqrt{30}i}{30} & 0 \end{bmatrix}$$

$$\boxed{\text{x60}} \quad \mathbb{T}_2^{(1,0;a)}(A_1) = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 \\ 0 & \frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x61}} \quad \mathbb{T}_{2,1}^{(1,0;a)}(E, 1) = \begin{bmatrix} 0 & 0 & 0 & \frac{\sqrt{6}i}{12} & \frac{\sqrt{6}}{12} & 0 \\ 0 & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & -\frac{\sqrt{6}}{12} \\ 0 & \frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{6} & 0 & 0 \\ -\frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 \\ \frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{6} \\ 0 & -\frac{\sqrt{6}}{12} & 0 & 0 & -\frac{\sqrt{6}}{6} & 0 \end{bmatrix}$$

$$\boxed{\text{x62}} \quad \mathbb{T}_{2,2}^{(1,0;a)}(E, 1) = \begin{bmatrix} 0 & -\frac{\sqrt{6}i}{6} & 0 & -\frac{\sqrt{6}}{12} & 0 & 0 \\ \frac{\sqrt{6}i}{6} & 0 & -\frac{\sqrt{6}}{12} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{6}}{12} & 0 & 0 & \frac{\sqrt{6}}{12} & 0 \\ -\frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{12} \\ 0 & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & \frac{\sqrt{6}i}{6} \\ 0 & 0 & 0 & -\frac{\sqrt{6}}{12} & -\frac{\sqrt{6}i}{6} & 0 \end{bmatrix}$$

$$\boxed{\text{x63}} \quad \mathbb{T}_{2,1}^{(1,0;a)}(E, 2) = \begin{bmatrix} 0 & 0 & -\frac{\sqrt{6}}{6} & 0 & 0 & -\frac{\sqrt{6}i}{12} \\ 0 & 0 & 0 & \frac{\sqrt{6}}{6} & \frac{\sqrt{6}i}{12} & 0 \\ -\frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{12} \\ 0 & \frac{\sqrt{6}}{6} & 0 & 0 & \frac{\sqrt{6}}{12} & 0 \\ 0 & -\frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{12} & 0 & 0 \\ \frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x64}} \quad \mathbb{T}_{2,2}^{(1,0;a)}(E, 2) = \begin{bmatrix} -\frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{12} \\ 0 & \frac{\sqrt{6}}{6} & 0 & 0 & \frac{\sqrt{6}}{12} & 0 \\ 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & \frac{\sqrt{6}i}{12} \\ 0 & 0 & 0 & -\frac{\sqrt{6}}{6} & -\frac{\sqrt{6}i}{12} & 0 \\ 0 & \frac{\sqrt{6}}{12} & 0 & \frac{\sqrt{6}i}{12} & 0 & 0 \\ \frac{\sqrt{6}}{12} & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & 0 \end{bmatrix}$$

Cluster SAMB

- Site cluster

** Wyckoff: 6c

$$\boxed{\text{y1}} \quad \mathbb{Q}_0^{(s)}(A_1) = \left[\frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6} \right]$$

$$\boxed{\text{y2}} \quad \mathbb{Q}_1^{(s)}(A_2) = \left[\frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6}, -\frac{\sqrt{6}}{6}, -\frac{\sqrt{6}}{6}, -\frac{\sqrt{6}}{6} \right]$$

$$\boxed{\text{y3}} \quad \mathbb{Q}_{1,1}^{(s)}(E) = \left[\frac{5\sqrt{21}}{42}, -\frac{2\sqrt{21}}{21}, -\frac{\sqrt{21}}{42}, -\frac{\sqrt{21}}{42}, \frac{5\sqrt{21}}{42}, -\frac{2\sqrt{21}}{21} \right]$$

$$\boxed{\text{y4}} \quad \mathbb{Q}_{1,2}^{(s)}(E) = \left[\frac{\sqrt{7}}{14}, \frac{\sqrt{7}}{7}, -\frac{3\sqrt{7}}{14}, \frac{3\sqrt{7}}{14}, -\frac{\sqrt{7}}{14}, -\frac{\sqrt{7}}{7} \right]$$

$$\boxed{\text{y5}} \quad \mathbb{Q}_{2,1}^{(s)}(E, 1) = \left[\frac{\sqrt{7}}{14}, \frac{\sqrt{7}}{7}, -\frac{3\sqrt{7}}{14}, -\frac{3\sqrt{7}}{14}, \frac{\sqrt{7}}{14}, \frac{\sqrt{7}}{7} \right]$$

$$\boxed{\text{y6}} \quad \mathbb{Q}_{2,2}^{(s)}(E, 1) = \left[-\frac{5\sqrt{21}}{42}, \frac{2\sqrt{21}}{21}, \frac{\sqrt{21}}{42}, -\frac{\sqrt{21}}{42}, \frac{5\sqrt{21}}{42}, -\frac{2\sqrt{21}}{21} \right]$$

• Bond cluster

** Wyckoff: **3a@3b**

$$\boxed{\text{y7}} \quad \mathbb{Q}_0^{(s)}(A_1) = \left[\frac{\sqrt{3}}{3}, \frac{\sqrt{3}}{3}, \frac{\sqrt{3}}{3} \right]$$

$$\boxed{\text{y8}} \quad \mathbb{T}_1^{(s)}(A_2) = \left[\frac{\sqrt{3}i}{3}, \frac{\sqrt{3}i}{3}, \frac{\sqrt{3}i}{3} \right]$$

$$\boxed{\text{y9}} \quad \mathbb{Q}_{1,1}^{(s)}(E) = \left[\frac{\sqrt{6}}{3}, -\frac{\sqrt{6}}{6}, -\frac{\sqrt{6}}{6} \right]$$

$$\boxed{\text{y10}} \quad \mathbb{Q}_{1,2}^{(s)}(E) = \left[0, \frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2} \right]$$

$$\boxed{\text{y11}} \quad \mathbb{T}_{1,1}^{(s)}(E) = \left[0, -\frac{\sqrt{2}i}{2}, \frac{\sqrt{2}i}{2} \right]$$

$$\boxed{\text{y12}} \quad \mathbb{T}_{1,2}^{(s)}(E) = \left[\frac{\sqrt{6}i}{3}, -\frac{\sqrt{6}i}{6}, -\frac{\sqrt{6}i}{6} \right]$$

** Wyckoff: **6a@6c**

$$\boxed{\text{y13}} \quad \mathbb{Q}_0^{(s)}(A_1) = \left[\frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6} \right]$$

$$\boxed{\text{y14}} \quad \mathbb{T}_0^{(s)}(A_1) = \left[\frac{\sqrt{6}i}{6}, \frac{\sqrt{6}i}{6}, \frac{\sqrt{6}i}{6}, \frac{\sqrt{6}i}{6}, \frac{\sqrt{6}i}{6}, \frac{\sqrt{6}i}{6} \right]$$

$$\boxed{\text{y15}} \quad \mathbb{Q}_1^{(s)}(A_2) = \left[\frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6}, -\frac{\sqrt{6}}{6}, -\frac{\sqrt{6}}{6}, -\frac{\sqrt{6}}{6} \right]$$

$$\boxed{\text{y16}} \quad \mathbb{T}_1^{(s)}(A_2) = \left[\frac{\sqrt{6}i}{6}, \frac{\sqrt{6}i}{6}, \frac{\sqrt{6}i}{6}, -\frac{\sqrt{6}i}{6}, -\frac{\sqrt{6}i}{6}, -\frac{\sqrt{6}i}{6} \right]$$

$$\boxed{\text{y17}} \quad \mathbb{Q}_{1,1}^{(s)}(E) = \left[\frac{5\sqrt{21}}{42}, -\frac{2\sqrt{21}}{21}, -\frac{\sqrt{21}}{42}, -\frac{\sqrt{21}}{42}, \frac{5\sqrt{21}}{42}, -\frac{2\sqrt{21}}{21} \right]$$

$$\boxed{\text{y18}} \quad \mathbb{Q}_{1,2}^{(s)}(E) = \left[\frac{\sqrt{7}}{14}, \frac{\sqrt{7}}{7}, -\frac{3\sqrt{7}}{14}, \frac{3\sqrt{7}}{14}, -\frac{\sqrt{7}}{14}, -\frac{\sqrt{7}}{7} \right]$$

$$\boxed{\text{y19}} \quad \mathbb{T}_{1,1}^{(s)}(E) = \left[\frac{5\sqrt{21}i}{42}, -\frac{2\sqrt{21}i}{21}, -\frac{\sqrt{21}i}{42}, -\frac{\sqrt{21}i}{42}, \frac{5\sqrt{21}i}{42}, -\frac{2\sqrt{21}i}{21} \right]$$

$$\boxed{\text{y20}} \quad \mathbb{T}_{1,2}^{(s)}(E) = \left[\frac{\sqrt{7}i}{14}, \frac{\sqrt{7}i}{7}, -\frac{3\sqrt{7}i}{14}, \frac{3\sqrt{7}i}{14}, -\frac{\sqrt{7}i}{14}, -\frac{\sqrt{7}i}{7} \right]$$

$$\boxed{\text{y21}} \quad \mathbb{M}_{1,1}^{(s)}(E) = \left[\frac{\sqrt{7}i}{14}, \frac{\sqrt{7}i}{7}, -\frac{3\sqrt{7}i}{14}, -\frac{3\sqrt{7}i}{14}, \frac{\sqrt{7}i}{14}, \frac{\sqrt{7}i}{7} \right]$$

$$\boxed{\text{y22}} \quad \mathbb{M}_{1,2}^{(s)}(E) = \left[-\frac{5\sqrt{21}i}{42}, \frac{2\sqrt{21}i}{21}, \frac{\sqrt{21}i}{42}, -\frac{\sqrt{21}i}{42}, \frac{5\sqrt{21}i}{42}, -\frac{2\sqrt{21}i}{21} \right]$$

$$\boxed{\text{y23}} \quad \mathbb{Q}_{2,1}^{(s)}(E, 1) = \left[\frac{\sqrt{7}}{14}, \frac{\sqrt{7}}{7}, -\frac{3\sqrt{7}}{14}, -\frac{3\sqrt{7}}{14}, \frac{\sqrt{7}}{14}, \frac{\sqrt{7}}{7} \right]$$

$$\boxed{\text{y24}} \quad \mathbb{Q}_{2,2}^{(s)}(E, 1) = \left[-\frac{5\sqrt{21}}{42}, \frac{2\sqrt{21}}{21}, \frac{\sqrt{21}}{42}, -\frac{\sqrt{21}}{42}, \frac{5\sqrt{21}}{42}, -\frac{2\sqrt{21}}{21} \right]$$

Table 5: Orbital of each site

#	site	orbital
1	A	$ s, \uparrow\rangle, s, \downarrow\rangle, p_x, \uparrow\rangle, p_x, \downarrow\rangle, p_y, \uparrow\rangle, p_y, \downarrow\rangle, p_z, \uparrow\rangle, p_z, \downarrow\rangle$

Table 6: Neighbor and bra-ket of each bond

#	head	tail	neighbor	head (bra)	tail (ket)
1	A	A	[1,2]	[s,p]	[s,p]

Site in Unit Cell

Sites in (conventional) cell (no plus set), SL = sublattice

Table 7: 'A' (#1) site cluster (6c), 1

SL	position (\mathbf{s})	mapping
1	[1.00000, 0.00000, 1.00000]	[1]
2	[0.00000, 1.00000, 1.00000]	[2]
3	[-1.00000, -1.00000, 1.00000]	[3]

continued ...

Table 7

SL	position (\mathbf{s})	mapping
4	[0.00000, 1.00000, -1.00000]	[4]
5	[1.00000, 0.00000, -1.00000]	[5]
6	[-1.00000, -1.00000, -1.00000]	[6]

Bond in Unit Cell

Bonds in (conventional) cell (no plus set): tail, head = (SL, plus set), (N)D = (non)directional (listed up to 5th neighbor at most)

Table 8: 1-th 'A'-'A' [1] (#1) bond cluster (6a06c), D, $|\mathbf{v}|=1.73205$ (cartesian)

SL	vector (\mathbf{v})	center (\mathbf{c})	mapping	head	tail	\mathbf{R} (primitive)
1	[-1.00000, 1.00000, 0.00000]	[0.50000, 0.50000, 1.00000]	[1]	(2,1)	(1,1)	[0,0,0]
2	[-1.00000, -2.00000, 0.00000]	[-0.50000, 0.00000, 1.00000]	[2]	(3,1)	(2,1)	[0,0,0]
3	[2.00000, 1.00000, 0.00000]	[0.00000, -0.50000, 1.00000]	[3]	(1,1)	(3,1)	[0,0,0]
4	[1.00000, -1.00000, 0.00000]	[0.50000, 0.50000, -1.00000]	[4]	(5,1)	(4,1)	[0,0,0]
5	[-2.00000, -1.00000, 0.00000]	[0.00000, -0.50000, -1.00000]	[5]	(6,1)	(5,1)	[0,0,0]
6	[1.00000, 2.00000, 0.00000]	[-0.50000, 0.00000, -1.00000]	[6]	(4,1)	(6,1)	[0,0,0]

Table 9: 2-th 'A'-'A' [1] (#2) bond cluster (3a03b), ND, $|\mathbf{v}|=2.0$ (cartesian)

SL	vector (\mathbf{v})	center (\mathbf{c})	mapping	head	tail	\mathbf{R} (primitive)
1	[0.00000, 0.00000, -2.00000]	[1.00000, 0.00000, 0.00000]	[1,-5]	(5,1)	(1,1)	[0,0,0]
2	[0.00000, 0.00000, -2.00000]	[0.00000, 1.00000, 0.00000]	[2,-4]	(4,1)	(2,1)	[0,0,0]
3	[0.00000, 0.00000, -2.00000]	[-1.00000, -1.00000, 0.00000]	[3,-6]	(6,1)	(3,1)	[0,0,0]