No. 15　D_{4h}　$4/mmm$　[tetragonal] (polar)

表 1　rank 0

No.	irrep.	(tag)	mul.	comp.	harmonics	(tag)	definition
1	A_{1g}	A1g	–	–	$\mathbb{Q}_0^{(h,A_{1g})}$	Qh(0, A1g, ,)	C_0

表 2　rank 1

No.	irrep.	(tag)	mul.	comp.	harmonics	(tag)	definition
2	A_{2u}	A2u	–	–	$\mathbb{Q}_1^{(h,A_{2u})}$	Qh(1, A2u, ,)	C_0
3	E_u	Eu	–	0	$\mathbb{Q}_{1,0}^{(h,E_u)}$	Qh(1, Eu, , 0)	C_1
4	E_u	Eu	–	1	$\mathbb{Q}_{1,1}^{(h,E_u)}$	Qh(1, Eu, , 1)	S_1

表 3　rank 2

No.	irrep.	(tag)	mul.	comp.	harmonics	(tag)	definition
5	A_{1g}	A1g	–	–	$\mathbb{Q}_2^{(h,A_{1g})}$	Qh(2, A1g, ,)	C_0
6	B_{1g}	B1g	–	–	$\mathbb{Q}_2^{(h,B_{1g})}$	Qh(2, B1g, ,)	C_2
7	B_{2g}	B2g	–	–	$\mathbb{Q}_2^{(h,B_{2g})}$	Qh(2, B2g, ,)	S_2
8	E_g	Eg	–	0	$\mathbb{Q}_{2,0}^{(h,E_g)}$	Qh(2, Eg, , 0)	S_1
9	E_g	Eg	–	1	$\mathbb{Q}_{2,1}^{(h,E_g)}$	Qh(2, Eg, , 1)	C_1

表 4　rank 3

No.	irrep.	(tag)	mul.	comp.	harmonics	(tag)	definition
10	A_{2u}	A2u	–	–	$\mathbb{Q}_3^{(h,A_{2u})}$	Qh(3, A2u, ,)	C_0
11	B_{1u}	B1u	–	–	$\mathbb{Q}_3^{(h,B_{1u})}$	Qh(3, B1u, ,)	S_2
12	B_{2u}	B2u	–	–	$\mathbb{Q}_3^{(h,B_{2u})}$	Qh(3, B2u, ,)	C_2
13	E_u	Eu	1	0	$\mathbb{Q}_{3,0}^{(h,E_u,1)}$	Qh(3, Eu, 1, 0)	$-\frac{\sqrt{6}C_1}{4}+\frac{\sqrt{10}C_3}{4}$
14	E_u	Eu	1	1	$\mathbb{Q}_{3,1}^{(h,E_u,1)}$	Qh(3, Eu, 1, 1)	$-\frac{\sqrt{6}S_1}{4}-\frac{\sqrt{10}S_3}{4}$
15	E_u	Eu	2	0	$\mathbb{Q}_{3,0}^{(h,E_u,2)}$	Qh(3, Eu, 2, 0)	$-\frac{\sqrt{10}C_1}{4}-\frac{\sqrt{6}C_3}{4}$
16	E_u	Eu	2	1	$\mathbb{Q}_{3,1}^{(h,E_u,2)}$	Qh(3, Eu, 2, 1)	$-\frac{\sqrt{10}S_1}{4}+\frac{\sqrt{6}S_3}{4}$

表 5　rank 4

No.	irrep.	(tag)	mul.	comp.	harmonics	(tag)	definition
17	A_{1g}	A1g	1	–	$\mathbb{Q}_4^{(h,A_{1g},1)}$	Qh(4, A1g, 1,)	$\frac{\sqrt{21}C_0}{6}+\frac{\sqrt{15}C_4}{6}$
18	A_{1g}	A1g	2	–	$\mathbb{Q}_4^{(h,A_{1g},2)}$	Qh(4, A1g, 2,)	$\frac{\sqrt{15}C_0}{6}-\frac{\sqrt{21}C_4}{6}$
19	A_{2g}	A2g	–	–	$\mathbb{Q}_4^{(h,A_{2g})}$	Qh(4, A2g, ,)	S_4
20	B_{1g}	B1g	–	–	$\mathbb{Q}_4^{(h,B_{1g})}$	Qh(4, B1g, ,)	$-C_2$
21	B_{2g}	B2g	–	–	$\mathbb{Q}_4^{(h,B_{2g})}$	Qh(4, B2g, ,)	S_2
22	E_g	Eg	1	0	$\mathbb{Q}_{4,0}^{(h,E_g,1)}$	Qh(4, Eg, 1, 0)	$-\frac{\sqrt{14}S_1}{4}-\frac{\sqrt{2}S_3}{4}$
23	E_g	Eg	1	1	$\mathbb{Q}_{4,1}^{(h,E_g,1)}$	Qh(4, Eg, 1, 1)	$-\frac{\sqrt{14}C_1}{4}+\frac{\sqrt{2}C_3}{4}$
24	E_g	Eg	2	0	$\mathbb{Q}_{4,0}^{(h,E_g,2)}$	Qh(4, Eg, 2, 0)	$-\frac{\sqrt{2}S_1}{4}+\frac{\sqrt{14}S_3}{4}$
25	E_g	Eg	2	1	$\mathbb{Q}_{4,1}^{(h,E_g,2)}$	Qh(4, Eg, 2, 1)	$-\frac{\sqrt{2}C_1}{4}-\frac{\sqrt{14}C_3}{4}$

表 6　rank 5

No.	irrep.	(tag)	mul.	comp.	harmonics	(tag)	definition
26	A_{1u}	A1u	–	–	$\mathbb{Q}_5^{(h,A_{1u})}$	Qh(5, A1u, ,)	S_4
27	A_{2u}	A2u	1	–	$\mathbb{Q}_5^{(h,A_{2u},1)}$	Qh(5, A2u, 1,)	C_0
28	A_{2u}	A2u	2	–	$\mathbb{Q}_5^{(h,A_{2u},2)}$	Qh(5, A2u, 2,)	C_4
29	B_{1u}	B1u	–	–	$\mathbb{Q}_5^{(h,B_{1u})}$	Qh(5, B1u, ,)	$-S_2$
30	B_{2u}	B2u	–	–	$\mathbb{Q}_5^{(h,B_{2u})}$	Qh(5, B2u, ,)	C_2
31	E_u	Eu	1	0	$\mathbb{Q}_{5,0}^{(h,E_u,1)}$	Qh(5, Eu, 1, 0)	$\frac{\sqrt{15}C_1}{8} - \frac{\sqrt{70}C_3}{16} + \frac{3\sqrt{14}C_5}{16}$
32	E_u	Eu	1	1	$\mathbb{Q}_{5,1}^{(h,E_u,1)}$	Qh(5, Eu, 1, 1)	$\frac{\sqrt{15}S_1}{8} + \frac{\sqrt{70}S_3}{16} + \frac{3\sqrt{14}S_5}{16}$
33	E_u	Eu	2	0	$\mathbb{Q}_{5,0}^{(h,E_u,2)}$	Qh(5, Eu, 2, 0)	$\frac{\sqrt{21}C_1}{8} + \frac{9\sqrt{2}C_3}{16} + \frac{\sqrt{10}C_5}{16}$
34	E_u	Eu	2	1	$\mathbb{Q}_{5,1}^{(h,E_u,2)}$	Qh(5, Eu, 2, 1)	$\frac{\sqrt{21}S_1}{8} - \frac{9\sqrt{2}S_3}{16} + \frac{\sqrt{10}S_5}{16}$
35	E_u	Eu	3	0	$\mathbb{Q}_{5,0}^{(h,E_u,3)}$	Qh(5, Eu, 3, 0)	$\frac{\sqrt{7}C_1}{4} - \frac{\sqrt{6}C_3}{8} - \frac{\sqrt{30}C_5}{8}$
36	E_u	Eu	3	1	$\mathbb{Q}_{5,1}^{(h,E_u,3)}$	Qh(5, Eu, 3, 1)	$\frac{\sqrt{7}S_1}{4} + \frac{\sqrt{6}S_3}{8} - \frac{\sqrt{30}S_5}{8}$

表 7　rank 6

No.	irrep.	(tag)	mul.	comp.	harmonics	(tag)	definition
37	A_{1g}	A1g	1	–	$\mathbb{Q}_6^{(h,A_{1g},1)}$	Qh(6, A1g, 1,)	$\frac{\sqrt{2}C_0}{4} - \frac{\sqrt{14}C_4}{4}$
38	A_{1g}	A1g	2	–	$\mathbb{Q}_6^{(h,A_{1g},2)}$	Qh(6, A1g, 2,)	$\frac{\sqrt{14}C_0}{4} + \frac{\sqrt{2}C_4}{4}$
39	A_{2g}	A2g	–	–	$\mathbb{Q}_6^{(h,A_{2g})}$	Qh(6, A2g, ,)	S_4
40	B_{1g}	B1g	1	–	$\mathbb{Q}_6^{(h,B_{1g},1)}$	Qh(6, B1g, 1,)	$\frac{\sqrt{11}C_2}{4} - \frac{\sqrt{5}C_6}{4}$
41	B_{1g}	B1g	2	–	$\mathbb{Q}_6^{(h,B_{1g},2)}$	Qh(6, B1g, 2,)	$\frac{\sqrt{5}C_2}{4} + \frac{\sqrt{11}C_6}{4}$
42	B_{2g}	B2g	1	–	$\mathbb{Q}_6^{(h,B_{2g},1)}$	Qh(6, B2g, 1,)	S_6
43	B_{2g}	B2g	2	–	$\mathbb{Q}_6^{(h,B_{2g},2)}$	Qh(6, B2g, 2,)	S_2
44	E_g	Eg	1	0	$\mathbb{Q}_{6,0}^{(h,E_g,1)}$	Qh(6, Eg, 1, 0)	$\frac{\sqrt{3}S_1}{4} - \frac{\sqrt{30}S_3}{8} - \frac{\sqrt{22}S_5}{8}$
45	E_g	Eg	1	1	$\mathbb{Q}_{6,1}^{(h,E_g,1)}$	Qh(6, Eg, 1, 1)	$\frac{\sqrt{3}C_1}{4} + \frac{\sqrt{30}C_3}{8} - \frac{\sqrt{22}C_5}{8}$
46	E_g	Eg	2	0	$\mathbb{Q}_{6,0}^{(h,E_g,2)}$	Qh(6, Eg, 2, 0)	$\frac{3\sqrt{22}S_1}{16} + \frac{\sqrt{55}S_3}{16} + \frac{\sqrt{3}S_5}{16}$
47	E_g	Eg	2	1	$\mathbb{Q}_{6,1}^{(h,E_g,2)}$	Qh(6, Eg, 2, 1)	$\frac{3\sqrt{22}C_1}{16} - \frac{\sqrt{55}C_3}{16} + \frac{\sqrt{3}C_5}{16}$
48	E_g	Eg	3	0	$\mathbb{Q}_{6,0}^{(h,E_g,3)}$	Qh(6, Eg, 3, 0)	$\frac{\sqrt{10}S_1}{16} - \frac{9S_3}{16} + \frac{\sqrt{165}S_5}{16}$
49	E_g	Eg	3	1	$\mathbb{Q}_{6,1}^{(h,E_g,3)}$	Qh(6, Eg, 3, 1)	$\frac{\sqrt{10}C_1}{16} + \frac{9C_3}{16} + \frac{\sqrt{165}C_5}{16}$

表 8　rank 7

No.	irrep.	(tag)	mul.	comp.	harmonics	(tag)	definition
50	A_{1u}	A1u	–	–	$\mathbb{Q}_7^{(h,A_{1u})}$	Qh(7, A1u, ,)	S_4
51	A_{2u}	A2u	1	–	$\mathbb{Q}_7^{(h,A_{2u},1)}$	Qh(7, A2u, 1,)	C_0
52	A_{2u}	A2u	2	–	$\mathbb{Q}_7^{(h,A_{2u},2)}$	Qh(7, A2u, 2,)	C_4
53	B_{1u}	B1u	1	–	$\mathbb{Q}_7^{(h,B_{1u},1)}$	Qh(7, B1u, 1,)	$\frac{\sqrt{78}S_2}{12} + \frac{\sqrt{66}S_6}{12}$
54	B_{1u}	B1u	2	–	$\mathbb{Q}_7^{(h,B_{1u},2)}$	Qh(7, B1u, 2,)	$\frac{\sqrt{66}S_2}{12} - \frac{\sqrt{78}S_6}{12}$
55	B_{2u}	B2u	1	–	$\mathbb{Q}_7^{(h,B_{2u},1)}$	Qh(7, B2u, 1,)	C_6
56	B_{2u}	B2u	2	–	$\mathbb{Q}_7^{(h,B_{2u},2)}$	Qh(7, B2u, 2,)	C_2
57	E_u	Eu	1	0	$\mathbb{Q}_{7,0}^{(h,E_u,1)}$	Qh(7, Eu, 1, 0)	$-\frac{5\sqrt{7}C_1}{32} + \frac{3\sqrt{21}C_3}{32} - \frac{\sqrt{231}C_5}{32} + \frac{\sqrt{429}C_7}{32}$
58	E_u	Eu	1	1	$\mathbb{Q}_{7,1}^{(h,E_u,1)}$	Qh(7, Eu, 1, 1)	$-\frac{5\sqrt{7}S_1}{32} - \frac{3\sqrt{21}S_3}{32} - \frac{\sqrt{231}S_5}{32} - \frac{\sqrt{429}S_7}{32}$
59	E_u	Eu	2	0	$\mathbb{Q}_{7,0}^{(h,E_u,2)}$	Qh(7, Eu, 2, 0)	$-\frac{3\sqrt{33}C_1}{32} - \frac{\sqrt{11}C_3}{32} + \frac{25C_5}{32} + \frac{\sqrt{91}C_7}{32}$
60	E_u	Eu	2	1	$\mathbb{Q}_{7,1}^{(h,E_u,2)}$	Qh(7, Eu, 2, 1)	$-\frac{3\sqrt{33}S_1}{32} + \frac{\sqrt{11}S_3}{32} + \frac{25S_5}{32} - \frac{\sqrt{91}S_7}{32}$
61	E_u	Eu	3	0	$\mathbb{Q}_{7,0}^{(h,E_u,3)}$	Qh(7, Eu, 3, 0)	$-\frac{\sqrt{858}C_1}{64} - \frac{3\sqrt{286}C_3}{64} - \frac{5\sqrt{26}C_5}{64} - \frac{\sqrt{14}C_7}{64}$
62	E_u	Eu	3	1	$\mathbb{Q}_{7,1}^{(h,E_u,3)}$	Qh(7, Eu, 3, 1)	$-\frac{\sqrt{858}S_1}{64} + \frac{3\sqrt{286}S_3}{64} - \frac{5\sqrt{26}S_5}{64} + \frac{\sqrt{14}S_7}{64}$
63	E_u	Eu	4	0	$\mathbb{Q}_{7,0}^{(h,E_u,4)}$	Qh(7, Eu, 4, 0)	$-\frac{15\sqrt{6}C_1}{64} + \frac{19\sqrt{2}C_3}{64} - \frac{\sqrt{22}C_5}{64} - \frac{\sqrt{2002}C_7}{64}$
64	E_u	Eu	4	1	$\mathbb{Q}_{7,1}^{(h,E_u,4)}$	Qh(7, Eu, 4, 1)	$-\frac{15\sqrt{6}S_1}{64} - \frac{19\sqrt{2}S_3}{64} - \frac{\sqrt{22}S_5}{64} + \frac{\sqrt{2002}S_7}{64}$

表 9　rank 8

No.	irrep.	(tag)	mul.	comp.	harmonics	(tag)	definition
65	A_{1g}	A1g	1	–	$\mathbb{Q}_8^{(h,A_{1g},1)}$	Qh(8, A1g, 1,)	$\frac{\sqrt{33}C_0}{8} + \frac{\sqrt{21}C_4}{12} + \frac{\sqrt{195}C_8}{24}$
66	A_{1g}	A1g	2	–	$\mathbb{Q}_8^{(h,A_{1g},2)}$	Qh(8, A1g, 2,)	$-\frac{\sqrt{286}C_0}{32} + \frac{\sqrt{182}C_4}{16} + \frac{\sqrt{10}C_8}{32}$
67	A_{1g}	A1g	3	–	$\mathbb{Q}_8^{(h,A_{1g},3)}$	Qh(8, A1g, 3,)	$-\frac{\sqrt{210}C_0}{32} - \frac{\sqrt{330}C_4}{48} + \frac{\sqrt{6006}C_8}{96}$
68	A_{2g}	A2g	1	–	$\mathbb{Q}_8^{(h,A_{2g},1)}$	Qh(8, A2g, 1,)	S_8
69	A_{2g}	A2g	2	–	$\mathbb{Q}_8^{(h,A_{2g},2)}$	Qh(8, A2g, 2,)	S_4
70	B_{1g}	B1g	1	–	$\mathbb{Q}_8^{(h,B_{1g},1)}$	Qh(8, B1g, 1,)	C_6
71	B_{1g}	B1g	2	–	$\mathbb{Q}_8^{(h,B_{1g},2)}$	Qh(8, B1g, 2,)	C_2
72	B_{2g}	B2g	1	–	$\mathbb{Q}_8^{(h,B_{2g},1)}$	Qh(8, B2g, 1,)	S_6
73	B_{2g}	B2g	2	–	$\mathbb{Q}_8^{(h,B_{2g},2)}$	Qh(8, B2g, 2,)	S_2
74	E_g	Eg	1	0	$\mathbb{Q}_{8,0}^{(h,E_g,1)}$	Qh(8, Eg, 1, 0)	$-\frac{\sqrt{715}S_1}{32} - \frac{\sqrt{273}S_3}{32} - \frac{\sqrt{35}S_5}{32} - \frac{S_7}{32}$
75	E_g	Eg	1	1	$\mathbb{Q}_{8,1}^{(h,E_g,1)}$	Qh(8, Eg, 1, 1)	$-\frac{\sqrt{715}C_1}{32} + \frac{\sqrt{273}C_3}{32} - \frac{\sqrt{35}C_5}{32} + \frac{C_7}{32}$
76	E_g	Eg	2	0	$\mathbb{Q}_{8,0}^{(h,E_g,2)}$	Qh(8, Eg, 2, 0)	$-\frac{\sqrt{77}S_1}{32} + \frac{5\sqrt{15}S_3}{32} - \frac{3\sqrt{13}S_5}{32} - \frac{\sqrt{455}S_7}{32}$
77	E_g	Eg	2	1	$\mathbb{Q}_{8,1}^{(h,E_g,2)}$	Qh(8, Eg, 2, 1)	$-\frac{\sqrt{77}C_1}{32} - \frac{5\sqrt{15}C_3}{32} - \frac{3\sqrt{13}C_5}{32} + \frac{\sqrt{455}C_7}{32}$
78	E_g	Eg	3	0	$\mathbb{Q}_{8,0}^{(h,E_g,3)}$	Qh(8, Eg, 3, 0)	$-\frac{\sqrt{858}S_1}{64} + \frac{\sqrt{910}S_3}{64} + \frac{7\sqrt{42}S_5}{64} + \frac{3\sqrt{30}S_7}{64}$
79	E_g	Eg	3	1	$\mathbb{Q}_{8,1}^{(h,E_g,3)}$	Qh(8, Eg, 3, 1)	$-\frac{\sqrt{858}C_1}{64} - \frac{\sqrt{910}C_3}{64} + \frac{7\sqrt{42}C_5}{64} - \frac{3\sqrt{30}C_7}{64}$
80	E_g	Eg	4	0	$\mathbb{Q}_{8,0}^{(h,E_g,4)}$	Qh(8, Eg, 4, 0)	$-\frac{\sqrt{70}S_1}{64} + \frac{3\sqrt{66}S_3}{64} - \frac{\sqrt{1430}S_5}{64} + \frac{\sqrt{2002}S_7}{64}$
81	E_g	Eg	4	1	$\mathbb{Q}_{8,1}^{(h,E_g,4)}$	Qh(8, Eg, 4, 1)	$-\frac{\sqrt{70}C_1}{64} - \frac{3\sqrt{66}C_3}{64} - \frac{\sqrt{1430}C_5}{64} - \frac{\sqrt{2002}C_7}{64}$

表 10　rank 9

No.	irrep.	(tag)	mul.	comp.	harmonics	(tag)	definition
82	A_{1u}	A1u	1	–	$\mathbb{Q}_9^{(h,A_{1u},1)}$	Qh(9, A1u, 1,)	$\frac{\sqrt{102}S_4}{12} - \frac{\sqrt{42}S_8}{12}$
83	A_{1u}	A1u	2	–	$\mathbb{Q}_9^{(h,A_{1u},2)}$	Qh(9, A1u, 2,)	$\frac{\sqrt{42}S_4}{12} + \frac{\sqrt{102}S_8}{12}$
84	A_{2u}	A2u	1	–	$\mathbb{Q}_9^{(h,A_{2u},1)}$	Qh(9, A2u, 1,)	C_0
85	A_{2u}	A2u	2	–	$\mathbb{Q}_9^{(h,A_{2u},2)}$	Qh(9, A2u, 2,)	C_8
86	A_{2u}	A2u	3	–	$\mathbb{Q}_9^{(h,A_{2u},3)}$	Qh(9, A2u, 3,)	C_4
87	B_{1u}	B1u	1	–	$\mathbb{Q}_9^{(h,B_{1u},1)}$	Qh(9, B1u, 1,)	$\frac{\sqrt{3}S_2}{4} - \frac{\sqrt{13}S_6}{4}$
88	B_{1u}	B1u	2	–	$\mathbb{Q}_9^{(h,B_{1u},2)}$	Qh(9, B1u, 2,)	$-\frac{\sqrt{13}S_2}{4} - \frac{\sqrt{3}S_6}{4}$
89	B_{2u}	B2u	1	–	$\mathbb{Q}_9^{(h,B_{2u},1)}$	Qh(9, B2u, 1,)	C_6
90	B_{2u}	B2u	2	–	$\mathbb{Q}_9^{(h,B_{2u},2)}$	Qh(9, B2u, 2,)	C_2
91	E_u	Eu	1	0	$\mathbb{Q}_{9,0}^{(h,E_u,1)}$	Qh(9, Eu, 1, 0)	$\frac{21\sqrt{5}C_1}{128} - \frac{\sqrt{2310}C_3}{128} + \frac{3\sqrt{286}C_5}{128} - \frac{3\sqrt{1430}C_7}{256} + \frac{\sqrt{24310}C_9}{256}$
92	E_u	Eu	1	1	$\mathbb{Q}_{9,1}^{(h,E_u,1)}$	Qh(9, Eu, 1, 1)	$\frac{21\sqrt{5}S_1}{128} + \frac{\sqrt{2310}S_3}{128} + \frac{3\sqrt{286}S_5}{128} + \frac{3\sqrt{1430}S_7}{256} + \frac{\sqrt{24310}S_9}{256}$
93	E_u	Eu	2	0	$\mathbb{Q}_{9,0}^{(h,E_u,2)}$	Qh(9, Eu, 2, 0)	$\frac{\sqrt{2431}C_1}{128} + \frac{\sqrt{9282}C_3}{128} + \frac{5\sqrt{170}C_5}{128} + \frac{7\sqrt{34}C_7}{256} + \frac{3\sqrt{2}C_9}{256}$
94	E_u	Eu	2	1	$\mathbb{Q}_{9,1}^{(h,E_u,2)}$	Qh(9, Eu, 2, 1)	$\frac{\sqrt{2431}S_1}{128} - \frac{\sqrt{9282}S_3}{128} + \frac{5\sqrt{170}S_5}{128} - \frac{7\sqrt{34}S_7}{256} + \frac{3\sqrt{2}S_9}{256}$
95	E_u	Eu	3	0	$\mathbb{Q}_{9,0}^{(h,E_u,3)}$	Qh(9, Eu, 3, 0)	$\frac{\sqrt{1001}C_1}{64} - \frac{\sqrt{78}C_3}{64} - \frac{3\sqrt{70}C_5}{64} + \frac{23\sqrt{14}C_7}{128} + \frac{3\sqrt{238}C_9}{128}$
96	E_u	Eu	3	1	$\mathbb{Q}_{9,1}^{(h,E_u,3)}$	Qh(9, Eu, 3, 1)	$\frac{\sqrt{1001}S_1}{64} + \frac{\sqrt{78}S_3}{64} - \frac{3\sqrt{70}S_5}{64} - \frac{23\sqrt{14}S_7}{128} + \frac{3\sqrt{238}S_9}{128}$
97	E_u	Eu	4	0	$\mathbb{Q}_{9,0}^{(h,E_u,4)}$	Qh(9, Eu, 4, 0)	$\frac{\sqrt{858}C_1}{64} + \frac{\sqrt{91}C_3}{32} - \frac{5\sqrt{15}C_5}{32} - \frac{21\sqrt{3}C_7}{64} - \frac{\sqrt{51}C_9}{64}$
98	E_u	Eu	4	1	$\mathbb{Q}_{9,1}^{(h,E_u,4)}$	Qh(9, Eu, 4, 1)	$\frac{\sqrt{858}S_1}{64} - \frac{\sqrt{91}S_3}{32} - \frac{5\sqrt{15}S_5}{32} + \frac{21\sqrt{3}S_7}{64} - \frac{\sqrt{51}S_9}{64}$
99	E_u	Eu	5	0	$\mathbb{Q}_{9,0}^{(h,E_u,5)}$	Qh(9, Eu, 5, 0)	$\frac{7\sqrt{22}C_1}{64} - \frac{3\sqrt{21}C_3}{32} + \frac{\sqrt{65}C_5}{32} + \frac{\sqrt{13}C_7}{64} - \frac{3\sqrt{221}C_9}{64}$
100	E_u	Eu	5	1	$\mathbb{Q}_{9,1}^{(h,E_u,5)}$	Qh(9, Eu, 5, 1)	$\frac{7\sqrt{22}S_1}{64} + \frac{3\sqrt{21}S_3}{32} + \frac{\sqrt{65}S_5}{32} - \frac{\sqrt{13}S_7}{64} - \frac{3\sqrt{221}S_9}{64}$

表 11　rank 10

No.	irrep.	(tag)	mul.	comp.	harmonics	(tag)	definition
101	A_{1g}	A1g	1	–	$\mathbb{Q}_{10}^{(h,A_{1g},1)}$	Qh(10, A1g, 1,)	$\frac{\sqrt{390}C_0}{48} - \frac{\sqrt{22}C_4}{8} - \frac{\sqrt{1122}C_8}{48}$
102	A_{1g}	A1g	2	–	$\mathbb{Q}_{10}^{(h,A_{1g},2)}$	Qh(10, A1g, 2,)	$\frac{11\sqrt{420189}C_0}{8988} + \frac{\sqrt{827645}C_4}{1498} - \frac{\sqrt{146055}C_8}{8988}$
103	A_{1g}	A1g	3	–	$\mathbb{Q}_{10}^{(h,A_{1g},3)}$	Qh(10, A1g, 3,)	$\frac{3\sqrt{3213210}C_0}{11984} - \frac{83\sqrt{1498}C_4}{5992} + \frac{31\sqrt{76398}C_8}{11984}$
104	A_{2g}	A2g	1	–	$\mathbb{Q}_{10}^{(h,A_{2g},1)}$	Qh(10, A2g, 1,)	S_8
105	A_{2g}	A2g	2	–	$\mathbb{Q}_{10}^{(h,A_{2g},2)}$	Qh(10, A2g, 2,)	S_4
106	B_{1g}	B1g	1	–	$\mathbb{Q}_{10}^{(h,B_{1g},1)}$	Qh(10, B1g, 1,)	$-\frac{\sqrt{85}C_{10}}{16} + \frac{\sqrt{1482}C_2}{48} + \frac{\sqrt{57}C_6}{48}$
107	B_{1g}	B1g	2	–	$\mathbb{Q}_{10}^{(h,B_{1g},2)}$	Qh(10, B1g, 2,)	$\frac{\sqrt{370006}C_{10}}{749} + \frac{\sqrt{190995}C_2}{749}$
108	B_{1g}	B1g	3	–	$\mathbb{Q}_{10}^{(h,B_{1g},3)}$	Qh(10, B1g, 3,)	$\frac{\sqrt{1209635}C_{10}}{11984} - \frac{19\sqrt{58422}C_2}{35952} + \frac{\sqrt{2247}C_6}{48}$
109	B_{2g}	B2g	1	–	$\mathbb{Q}_{10}^{(h,B_{2g},1)}$	Qh(10, B2g, 1,)	S_{10}
110	B_{2g}	B2g	2	–	$\mathbb{Q}_{10}^{(h,B_{2g},2)}$	Qh(10, B2g, 2,)	S_6
111	B_{2g}	B2g	3	–	$\mathbb{Q}_{10}^{(h,B_{2g},3)}$	Qh(10, B2g, 3,)	S_2
112	E_g	Eg	1	0	$\mathbb{Q}_{10,0}^{(h,E_g,1)}$	Qh(10, Eg, 1, 0)	$\frac{\sqrt{221}S_1}{32} - \frac{\sqrt{102}S_3}{32} - \frac{\sqrt{510}S_5}{32} - \frac{11\sqrt{6}S_7}{64} - \frac{\sqrt{38}S_9}{64}$
113	E_g	Eg	1	1	$\mathbb{Q}_{10,1}^{(h,E_g,1)}$	Qh(10, Eg, 1, 1)	$\frac{\sqrt{221}C_1}{32} + \frac{\sqrt{102}C_3}{32} - \frac{\sqrt{510}C_5}{32} + \frac{11\sqrt{6}C_7}{64} - \frac{\sqrt{38}C_9}{64}$
114	E_g	Eg	2	0	$\mathbb{Q}_{10,0}^{(h,E_g,2)}$	Qh(10, Eg, 2, 0)	$\frac{\sqrt{39}S_1}{32} - \frac{11\sqrt{2}S_3}{32} + \frac{5\sqrt{10}S_5}{32} - \frac{\sqrt{34}S_7}{64} - \frac{\sqrt{1938}S_9}{64}$
115	E_g	Eg	2	1	$\mathbb{Q}_{10,1}^{(h,E_g,2)}$	Qh(10, Eg, 2, 1)	$\frac{\sqrt{39}C_1}{32} + \frac{11\sqrt{2}C_3}{32} + \frac{5\sqrt{10}C_5}{32} + \frac{\sqrt{34}C_7}{64} - \frac{\sqrt{1938}C_9}{64}$
116	E_g	Eg	3	0	$\mathbb{Q}_{10,0}^{(h,E_g,3)}$	Qh(10, Eg, 3, 0)	$\frac{\sqrt{41990}S_1}{256} + \frac{\sqrt{4845}S_3}{128} + \frac{\sqrt{969}S_5}{128} + \frac{\sqrt{285}S_7}{256} + \frac{\sqrt{5}S_9}{256}$
117	E_g	Eg	3	1	$\mathbb{Q}_{10,1}^{(h,E_g,3)}$	Qh(10, Eg, 3, 1)	$\frac{\sqrt{41990}C_1}{256} - \frac{\sqrt{4845}C_3}{128} + \frac{\sqrt{969}C_5}{128} - \frac{\sqrt{285}C_7}{256} + \frac{\sqrt{5}C_9}{256}$
118	E_g	Eg	4	0	$\mathbb{Q}_{10,0}^{(h,E_g,4)}$	Qh(10, Eg, 4, 0)	$\frac{9\sqrt{78}S_1}{256} - \frac{69S_3}{128} - \frac{\sqrt{5}S_5}{128} + \frac{43\sqrt{17}S_7}{256} + \frac{3\sqrt{969}S_9}{256}$
119	E_g	Eg	4	1	$\mathbb{Q}_{10,1}^{(h,E_g,4)}$	Qh(10, Eg, 4, 1)	$\frac{9\sqrt{78}C_1}{256} + \frac{69C_3}{128} - \frac{\sqrt{5}C_5}{128} - \frac{43\sqrt{17}C_7}{256} + \frac{3\sqrt{969}C_9}{256}$
120	E_g	Eg	5	0	$\mathbb{Q}_{10,0}^{(h,E_g,5)}$	Qh(10, Eg, 5, 0)	$\frac{7\sqrt{3}S_1}{128} - \frac{7\sqrt{26}S_3}{128} + \frac{5\sqrt{130}S_5}{128} - \frac{7\sqrt{442}S_7}{256} + \frac{\sqrt{25194}S_9}{256}$
121	E_g	Eg	5	1	$\mathbb{Q}_{10,1}^{(h,E_g,5)}$	Qh(10, Eg, 5, 1)	$\frac{7\sqrt{3}C_1}{128} + \frac{7\sqrt{26}C_3}{128} + \frac{5\sqrt{130}C_5}{128} + \frac{7\sqrt{442}C_7}{256} + \frac{\sqrt{25194}C_9}{256}$

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No.	irrep.	(tag)	mul.	comp.	harmonics	(tag)	definition
122	A_{1u}	A1u	1	–	$\mathbb{Q}_{11}^{(h,A_{1u},1)}$	Qh(11, A1u, 1,)	S_8
123	A_{1u}	A1u	2	–	$\mathbb{Q}_{11}^{(h,A_{1u},2)}$	Qh(11, A1u, 2,)	S_4
124	A_{2u}	A2u	1	–	$\mathbb{Q}_{11}^{(h,A_{2u},1)}$	Qh(11, A2u, 1,)	C_0
125	A_{2u}	A2u	2	–	$\mathbb{Q}_{11}^{(h,A_{2u},2)}$	Qh(11, A2u, 2,)	C_8
126	A_{2u}	A2u	3	–	$\mathbb{Q}_{11}^{(h,A_{2u},3)}$	Qh(11, A2u, 3,)	C_4
127	B_{1u}	B1u	1	–	$\mathbb{Q}_{11}^{(h,B_{1u},1)}$	Qh(11, B1u, 1,)	$\frac{\sqrt{798}S_{10}}{48} + \frac{\sqrt{255}S_2}{24} + \frac{3\sqrt{6}S_6}{16}$
128	B_{1u}	B1u	2	–	$\mathbb{Q}_{11}^{(h,B_{1u},2)}$	Qh(11, B1u, 2,)	$-\frac{\sqrt{210}S_{10}}{96} + \frac{\sqrt{969}S_2}{48} - \frac{\sqrt{570}S_6}{32}$
129	B_{1u}	B1u	3	–	$\mathbb{Q}_{11}^{(h,B_{1u},3)}$	Qh(11, B1u, 3,)	$-\frac{\sqrt{646}S_{10}}{32} + \frac{\sqrt{35}S_2}{16} + \frac{\sqrt{238}S_6}{32}$
130	B_{2u}	B2u	1	–	$\mathbb{Q}_{11}^{(h,B_{2u},1)}$	Qh(11, B2u, 1,)	C_{10}
131	B_{2u}	B2u	2	–	$\mathbb{Q}_{11}^{(h,B_{2u},2)}$	Qh(11, B2u, 2,)	C_6
132	B_{2u}	B2u	3	–	$\mathbb{Q}_{11}^{(h,B_{2u},3)}$	Qh(11, B2u, 3,)	C_2
133	E_u	Eu	1	0	$\mathbb{Q}_{11,0}^{(h,E_u,1)}$	Qh(11, Eu, 1, 0)	$-\frac{21\sqrt{66}C_1}{512} + \frac{\sqrt{88179}C_{11}}{512} + \frac{\sqrt{30030}C_3}{512} - \frac{15\sqrt{143}C_5}{512} + \frac{\sqrt{36465}C_7}{512} - \frac{\sqrt{46189}C_9}{512}$
134	E_u	Eu	1	1	$\mathbb{Q}_{11,1}^{(h,E_u,1)}$	Qh(11, Eu, 1, 1)	$-\frac{21\sqrt{66}S_1}{512} - \frac{\sqrt{88179}S_{11}}{512} - \frac{\sqrt{30030}S_3}{512} - \frac{15\sqrt{143}S_5}{512} - \frac{\sqrt{36465}S_7}{512} - \frac{\sqrt{46189}S_9}{512}$
135	E_u	Eu	2	0	$\mathbb{Q}_{11,0}^{(h,E_u,2)}$	Qh(11, Eu, 2, 0)	$-\frac{\sqrt{41990}C_1}{512} + \frac{\sqrt{385}C_{11}}{512} - \frac{3\sqrt{4522}C_3}{512} + \frac{3\sqrt{4845}C_5}{512} + \frac{77\sqrt{19}C_7}{512} + \frac{39\sqrt{15}C_9}{512}$
136	E_u	Eu	2	1	$\mathbb{Q}_{11,1}^{(h,E_u,2)}$	Qh(11, Eu, 2, 1)	$-\frac{\sqrt{41990}S_1}{512} - \frac{\sqrt{385}S_{11}}{512} + \frac{3\sqrt{4522}S_3}{512} + \frac{3\sqrt{4845}S_5}{512} - \frac{77\sqrt{19}S_7}{512} + \frac{39\sqrt{15}S_9}{512}$
137	E_u	Eu	3	0	$\mathbb{Q}_{11,0}^{(h,E_u,3)}$	Qh(11, Eu, 3, 0)	$-\frac{5\sqrt{546}C_1}{256} + \frac{\sqrt{10659}C_{11}}{256} + \frac{11\sqrt{30}C_3}{256} + \frac{13\sqrt{7}C_5}{256} - \frac{3\sqrt{1785}C_7}{256} + \frac{3\sqrt{2261}C_9}{256}$
138	E_u	Eu	3	1	$\mathbb{Q}_{11,1}^{(h,E_u,3)}$	Qh(11, Eu, 3, 1)	$-\frac{5\sqrt{546}S_1}{256} - \frac{\sqrt{10659}S_{11}}{256} - \frac{11\sqrt{30}S_3}{256} + \frac{13\sqrt{7}S_5}{256} + \frac{3\sqrt{1785}S_7}{256} + \frac{3\sqrt{2261}S_9}{256}$
139	E_u	Eu	4	0	$\mathbb{Q}_{11,0}^{(h,E_u,4)}$	Qh(11, Eu, 4, 0)	$-\frac{\sqrt{29393}C_1}{512} - \frac{\sqrt{22}C_{11}}{1024} - \frac{9\sqrt{1615}C_3}{512} - \frac{5\sqrt{13566}C_5}{1024} - \frac{7\sqrt{1330}C_7}{1024} - \frac{9\sqrt{42}C_9}{1024}$
140	E_u	Eu	4	1	$\mathbb{Q}_{11,1}^{(h,E_u,4)}$	Qh(11, Eu, 4, 1)	$-\frac{\sqrt{29393}S_1}{512} + \frac{\sqrt{22}S_{11}}{1024} + \frac{9\sqrt{1615}S_3}{512} - \frac{5\sqrt{13566}S_5}{1024} + \frac{7\sqrt{1330}S_7}{1024} - \frac{9\sqrt{42}S_9}{1024}$
141	E_u	Eu	5	0	$\mathbb{Q}_{11,0}^{(h,E_u,5)}$	Qh(11, Eu, 5, 0)	$-\frac{15\sqrt{221}C_1}{512} - \frac{3\sqrt{2926}C_{11}}{1024} - \frac{\sqrt{595}C_3}{512} + \frac{53\sqrt{102}C_5}{1024} - \frac{105\sqrt{10}C_7}{1024} - \frac{61\sqrt{114}C_9}{1024}$
142	E_u	Eu	5	1	$\mathbb{Q}_{11,1}^{(h,E_u,5)}$	Qh(11, Eu, 5, 1)	$-\frac{15\sqrt{221}S_1}{512} + \frac{3\sqrt{2926}S_{11}}{1024} + \frac{\sqrt{595}S_3}{512} + \frac{53\sqrt{102}S_5}{1024} + \frac{105\sqrt{10}S_7}{1024} - \frac{61\sqrt{114}S_9}{1024}$
143	E_u	Eu	6	0	$\mathbb{Q}_{11,0}^{(h,E_u,6)}$	Qh(11, Eu, 6, 0)	$-\frac{21\sqrt{130}C_1}{512} - \frac{\sqrt{124355}C_{11}}{512} + \frac{57\sqrt{14}C_3}{512} - \frac{41\sqrt{15}C_5}{512} + \frac{17\sqrt{17}C_7}{512} + \frac{\sqrt{4845}C_9}{512}$
144	E_u	Eu	6	1	$\mathbb{Q}_{11,1}^{(h,E_u,6)}$	Qh(11, Eu, 6, 1)	$-\frac{21\sqrt{130}S_1}{512} + \frac{\sqrt{124355}S_{11}}{512} - \frac{57\sqrt{14}S_3}{512} - \frac{41\sqrt{15}S_5}{512} - \frac{17\sqrt{17}S_7}{512} + \frac{\sqrt{4845}S_9}{512}$