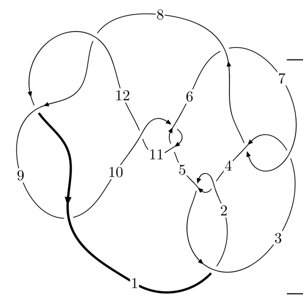
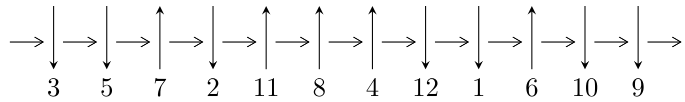
# $12a_{0061}$ $(K12a_{0061})$




A knot diagram[1]

**Linearized knot diagam**




**Solving Sequence**

$$8{,}12 \xrightarrow[c_8]{} 9 \xrightarrow[c_{12}]{} 1 \xrightarrow[c_9]{} 4{,}10 \xrightarrow[c_7]{} 7 \xrightarrow[c_3]{} 3 \xrightarrow[c_1]{} 2 \xrightarrow[c_6]{} 6 \xrightarrow[c_{11}]{} 11 \xrightarrow[c_5]{} 5 \twoheadrightarrow c_2, c_4, c_{10}$$

**Ideals for irreducible components[2] of $X_{\mathbf{par}}$**

$$\begin{aligned}
I_1^u &= \langle 9.78678\times10^{34}u^{99} + 6.59298\times10^{35}u^{98} + \cdots + 1.09528\times10^{33}b + 7.70863\times10^{34}, \\
&\quad 1.13394\times10^{35}u^{99} + 7.80081\times10^{35}u^{98} + \cdots + 5.47642\times10^{32}a + 9.43267\times10^{34},\ u^{100} + 8u^{99} + \cdots - 2u + 
\end{aligned}$$

$$I_2^u = \langle 2a^5 - 2a^4 + 7a^3 - 5a^2 + 3b + a - 4,\ a^6 + 4a^4 + a^3 + 4a^2 + 1,\ u - 1\rangle$$

$$I_3^u = \langle b,\ -u^2 + a - u + 1,\ u^5 + u^4 - 2u^3 - u^2 + u - 1\rangle$$

* 3 irreducible components of $\dim_{\mathbb{C}} = 0$, with total 111 representations.

[1]The image of knot diagram is generated by the software "**Draw programme**" developed by Andrew Bartholomew(`http://www.layer8.co.uk/maths/draw/index.htm#Running-draw`), where we modified some parts for our purpose(`https://github.com/CATsTAILs/LinksPainter`).

[2]All coefficients of polynomials are rational numbers. But the coefficients are sometimes approximated in decimal forms when there is not enough margin.

**I.**

$\boldsymbol{I_1^u = \langle 9.79\times10^{34}u^{99}+6.59\times10^{35}u^{98}+\cdots+1.10\times10^{33}b+7.71\times10^{34},\ 1.13\times10^{35}u^{99}+7.80\times10^{35}u^{98}+\cdots+5.48\times10^{32}a+9.43\times10^{34},\ u^{100}+8u^{99}+\cdots-2u+1\rangle}$

**(i) Arc colorings**

$$a_8 = \begin{pmatrix}1\\0\end{pmatrix}$$
$$a_{12} = \begin{pmatrix}0\\u\end{pmatrix}$$
$$a_9 = \begin{pmatrix}1\\u^2\end{pmatrix}$$
$$a_1 = \begin{pmatrix}-u\\-u^3+u\end{pmatrix}$$
$$a_4 = \begin{pmatrix}-207.058u^{99}-1424.44u^{98}+\cdots+486.994u-172.242\\-89.3539u^{99}-601.943u^{98}+\cdots+192.348u-70.3803\end{pmatrix}$$
$$a_{10} = \begin{pmatrix}-u^2+1\\-u^4+2u^2\end{pmatrix}$$
$$a_7 = \begin{pmatrix}70.5297u^{99}+463.919u^{98}+\cdots-137.456u+47.4816\\154.340u^{99}+987.870u^{98}+\cdots-227.661u+90.4459\end{pmatrix}$$
$$a_3 = \begin{pmatrix}-173.653u^{99}-1215.48u^{98}+\cdots+437.871u-154.696\\-46.3300u^{99}-355.564u^{98}+\cdots+185.885u-61.7454\end{pmatrix}$$
$$a_2 = \begin{pmatrix}194.960u^{99}+1330.52u^{98}+\cdots-438.893u+154.655\\135.876u^{99}+888.170u^{98}+\cdots-235.645u+90.8592\end{pmatrix}$$
$$a_6 = \begin{pmatrix}-83.8108u^{99}-523.951u^{98}+\cdots+90.2049u-42.9643\\154.340u^{99}+987.870u^{98}+\cdots-227.661u+90.4459\end{pmatrix}$$
$$a_{11} = \begin{pmatrix}u^5-2u^3+u\\u^7-3u^5+2u^3+u\end{pmatrix}$$
$$a_5 = \begin{pmatrix}-9.87259u^{99}-93.4878u^{98}+\cdots+64.7923u-23.7609\\155.602u^{99}+985.103u^{98}+\cdots-207.683u+85.0368\end{pmatrix}$$

**(ii) Obstruction class** $= -1$

**(iii) Cusp Shapes** $= -10.1896u^{99}-65.6881u^{98}+\cdots+19.6205u-12.0698$

**(iv) u-Polynomials at the component**

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $u^{100} + 53u^{99} + \cdots + 7u + 1$ |
| $c_2, c_4$ | $u^{100} - 7u^{99} + \cdots + 7u - 1$ |
| $c_3, c_7$ | $u^{100} - 2u^{99} + \cdots + 64u + 32$ |
| $c_5, c_{10}$ | $u^{100} - 2u^{99} + \cdots + 256u - 64$ |
| $c_6$ | $u^{100} - 36u^{99} + \cdots - 27136u + 1024$ |
| $c_8, c_9, c_{12}$ | $u^{100} - 8u^{99} + \cdots + 2u + 1$ |
| $c_{11}$ | $u^{100} + 42u^{99} + \cdots + 49152u + 4096$ |

**(v) Riley Polynomials at the component**

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $y^{100} - 5y^{99} + \cdots - 47y + 1$ |
| $c_2, c_4$ | $y^{100} - 53y^{99} + \cdots - 7y + 1$ |
| $c_3, c_7$ | $y^{100} - 36y^{99} + \cdots - 27136y + 1024$ |
| $c_5, c_{10}$ | $y^{100} + 42y^{99} + \cdots + 49152y + 4096$ |
| $c_6$ | $y^{100} + 48y^{99} + \cdots - 43646976y + 1048576$ |
| $c_8, c_9, c_{12}$ | $y^{100} - 88y^{99} + \cdots + 50y + 1$ |
| $c_{11}$ | $y^{100} + 22y^{99} + \cdots + 461373440y + 16777216$ |

**(vi) Complex Volumes and Cusp Shapes**

| Solutions to $I_1^u$ | $\sqrt{-1}(\text{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.792365 + 0.583090I$<br>$a = -0.108287 - 1.200450I$<br>$b = 0.930875 - 0.648990I$ | $-4.34285 - 5.74414I$ | 0 |
| $u = 0.792365 - 0.583090I$<br>$a = -0.108287 + 1.200450I$<br>$b = 0.930875 + 0.648990I$ | $-4.34285 + 5.74414I$ | 0 |
| $u = 0.916971 + 0.462976I$<br>$a = -0.49303 - 1.44425I$<br>$b = 0.631449 - 0.855660I$ | $-4.67169 + 1.91587I$ | 0 |
| $u = 0.916971 - 0.462976I$<br>$a = -0.49303 + 1.44425I$<br>$b = 0.631449 + 0.855660I$ | $-4.67169 - 1.91587I$ | 0 |
| $u = 0.854924 + 0.457908I$<br>$a = -0.197120 + 0.880397I$<br>$b = 0.740168 + 0.665579I$ | $-4.91605 - 0.63546I$ | 0 |
| $u = 0.854924 - 0.457908I$<br>$a = -0.197120 - 0.880397I$<br>$b = 0.740168 - 0.665579I$ | $-4.91605 + 0.63546I$ | 0 |
| $u = 0.985240 + 0.468511I$<br>$a = -0.090625 - 0.324021I$<br>$b = -0.994121 - 0.572049I$ | $-0.62795 + 2.80874I$ | 0 |
| $u = 0.985240 - 0.468511I$<br>$a = -0.090625 + 0.324021I$<br>$b = -0.994121 + 0.572049I$ | $-0.62795 - 2.80874I$ | 0 |
| $u = 0.245788 + 0.866914I$<br>$a = -0.97785 - 1.13640I$<br>$b = 1.096380 - 0.741421I$ | $-1.10857 - 12.68640I$ | 0 |
| $u = 0.245788 - 0.866914I$<br>$a = -0.97785 + 1.13640I$<br>$b = 1.096380 + 0.741421I$ | $-1.10857 + 12.68640I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.10155$<br>$a = -3.46719$<br>$b = 0.399241$ | $-3.66615$ | 0 |
| $u = 0.981965 + 0.530171I$<br>$a = 0.362459 + 0.478732I$<br>$b = 1.057480 + 0.710417I$ | $-3.35755 + 7.75902I$ | 0 |
| $u = 0.981965 - 0.530171I$<br>$a = 0.362459 - 0.478732I$<br>$b = 1.057480 - 0.710417I$ | $-3.35755 - 7.75902I$ | 0 |
| $u = 1.109740 + 0.184312I$<br>$a = 0.91419 + 1.42574I$<br>$b = 0.008956 + 0.667628I$ | $-2.33193 - 0.86861I$ | 0 |
| $u = 1.109740 - 0.184312I$<br>$a = 0.91419 - 1.42574I$<br>$b = 0.008956 - 0.667628I$ | $-2.33193 + 0.86861I$ | 0 |
| $u = 0.366611 + 0.787435I$<br>$a = 0.320115 - 0.066003I$<br>$b = 0.851525 + 0.600589I$ | $-3.05189 + 0.94281I$ | 0 |
| $u = 0.366611 - 0.787435I$<br>$a = 0.320115 + 0.066003I$<br>$b = 0.851525 - 0.600589I$ | $-3.05189 - 0.94281I$ | 0 |
| $u = 0.225159 + 0.838843I$<br>$a = 1.14281 + 1.01802I$<br>$b = -1.069060 + 0.620828I$ | $1.70469 - 7.47855I$ | 0 |
| $u = 0.225159 - 0.838843I$<br>$a = 1.14281 - 1.01802I$<br>$b = -1.069060 - 0.620828I$ | $1.70469 + 7.47855I$ | 0 |
| $u = 0.725807 + 0.461764I$<br>$a = 0.402301 + 0.983247I$<br>$b = -0.701413 + 0.531818I$ | $-1.60708 - 1.65045I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.725807 - 0.461764I$<br>$a = 0.402301 - 0.983247I$<br>$b = -0.701413 - 0.531818I$ | $-1.60708 + 1.65045I$ | 0 |
| $u = 0.248644 + 0.814575I$<br>$a = 0.208663 + 0.177564I$<br>$b = 0.626377 + 0.951799I$ | $-2.59413 - 6.47615I$ | 0 |
| $u = 0.248644 - 0.814575I$<br>$a = 0.208663 - 0.177564I$<br>$b = 0.626377 - 0.951799I$ | $-2.59413 + 6.47615I$ | 0 |
| $u = 0.261461 + 0.787835I$<br>$a = -1.45679 - 1.28675I$<br>$b = 0.854513 - 0.596814I$ | $-3.04441 - 3.78909I$ | 0 |
| $u = 0.261461 - 0.787835I$<br>$a = -1.45679 + 1.28675I$<br>$b = 0.854513 + 0.596814I$ | $-3.04441 + 3.78909I$ | 0 |
| $u = 1.151430 + 0.362450I$<br>$a = 0.074242 + 0.848861I$<br>$b = -1.113450 - 0.084513I$ | $1.85816 + 1.15737I$ | 0 |
| $u = 1.151430 - 0.362450I$<br>$a = 0.074242 - 0.848861I$<br>$b = -1.113450 + 0.084513I$ | $1.85816 - 1.15737I$ | 0 |
| $u = 0.096928 + 0.785410I$<br>$a = 1.335070 + 0.123554I$<br>$b = -1.190920 + 0.174139I$ | $5.07427 - 5.31122I$ | 0 |
| $u = 0.096928 - 0.785410I$<br>$a = 1.335070 - 0.123554I$<br>$b = -1.190920 - 0.174139I$ | $5.07427 + 5.31122I$ | 0 |
| $u = 0.246130 + 0.725103I$<br>$a = -0.0848543 - 0.0498703I$<br>$b = -0.415582 - 0.737311I$ | $-0.10772 - 2.32956I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\text{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.246130 - 0.725103I$<br>$a = -0.0848543 + 0.0498703I$<br>$b = -0.415582 + 0.737311I$ | $-0.10772 + 2.32956I$ | $0$ |
| $u = 0.463614 + 0.601800I$<br>$a = 0.012853 + 0.348824I$<br>$b = -0.667970 + 0.009377I$ | $-0.89045 - 2.01572I$ | $0. + 5.74366I$ |
| $u = 0.463614 - 0.601800I$<br>$a = 0.012853 - 0.348824I$<br>$b = -0.667970 - 0.009377I$ | $-0.89045 + 2.01572I$ | $0. - 5.74366I$ |
| $u = -1.233550 + 0.137329I$<br>$a = -0.191271 + 0.766083I$<br>$b = -1.174580 + 0.588727I$ | $-2.36040 - 4.80176I$ | $0$ |
| $u = -1.233550 - 0.137329I$<br>$a = -0.191271 - 0.766083I$<br>$b = -1.174580 - 0.588727I$ | $-2.36040 + 4.80176I$ | $0$ |
| $u = 0.037895 + 0.743132I$<br>$a = -1.42538 + 0.35004I$<br>$b = 1.181760 + 0.045592I$ | $5.34208 - 0.12901I$ | $4.42196 + 0.I$ |
| $u = 0.037895 - 0.743132I$<br>$a = -1.42538 - 0.35004I$<br>$b = 1.181760 - 0.045592I$ | $5.34208 + 0.12901I$ | $4.42196 + 0.I$ |
| $u = 1.222230 + 0.325361I$<br>$a = -0.06233 - 1.43523I$<br>$b = 1.128440 - 0.155903I$ | $1.69954 - 3.74158I$ | $0$ |
| $u = 1.222230 - 0.325361I$<br>$a = -0.06233 + 1.43523I$<br>$b = 1.128440 + 0.155903I$ | $1.69954 + 3.74158I$ | $0$ |
| $u = -1.252200 + 0.185808I$<br>$a = -0.010517 - 0.443621I$<br>$b = 1.172560 - 0.409152I$ | $-0.341204 + 0.562695I$ | $0$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-1.252200-0.185808I$<br>$a=-0.010517+0.443621I$<br>$b=1.172560+0.409152I$ | $-0.341204-0.562695I$ | 0 |
| $u=1.287280+0.148947I$<br>$a=1.36344+0.99627I$<br>$b=0.524112+0.620549I$ | $-2.83286-0.52713I$ | 0 |
| $u=1.287280-0.148947I$<br>$a=1.36344-0.99627I$<br>$b=0.524112-0.620549I$ | $-2.83286+0.52713I$ | 0 |
| $u=1.31120$<br>$a=1.32824$<br>$b=0.620006$ | $-2.89582$ | 0 |
| $u=-1.303090+0.182442I$<br>$a=0.070720-1.309680I$<br>$b=-0.360096-0.985799I$ | $-5.02002+0.85235I$ | 0 |
| $u=-1.303090-0.182442I$<br>$a=0.070720+1.309680I$<br>$b=-0.360096+0.985799I$ | $-5.02002-0.85235I$ | 0 |
| $u=-1.293320+0.293444I$<br>$a=-0.168265+0.657605I$<br>$b=1.246390+0.043739I$ | $1.19623+3.85652I$ | 0 |
| $u=-1.293320-0.293444I$<br>$a=-0.168265-0.657605I$<br>$b=1.246390-0.043739I$ | $1.19623-3.85652I$ | 0 |
| $u=1.324190+0.195201I$<br>$a=0.33756+2.77633I$<br>$b=-0.812746+0.636934I$ | $-5.93011-1.80289I$ | 0 |
| $u=1.324190-0.195201I$<br>$a=0.33756-2.77633I$<br>$b=-0.812746-0.636934I$ | $-5.93011+1.80289I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -1.332070 + 0.204154I$<br>$a = 0.957051 + 0.408621I$<br>$b = -0.885139 + 0.235664I$ | $-6.07717 + 3.20988I$ | 0 |
| $u = -1.332070 - 0.204154I$<br>$a = 0.957051 - 0.408621I$<br>$b = -0.885139 - 0.235664I$ | $-6.07717 - 3.20988I$ | 0 |
| $u = 1.331170 + 0.220010I$<br>$a = -1.62138 - 1.30155I$<br>$b = -0.642291 - 0.912589I$ | $-5.58043 - 4.45730I$ | 0 |
| $u = 1.331170 - 0.220010I$<br>$a = -1.62138 + 1.30155I$<br>$b = -0.642291 + 0.912589I$ | $-5.58043 + 4.45730I$ | 0 |
| $u = -1.333540 + 0.243178I$<br>$a = -0.386912 + 1.140080I$<br>$b = 0.045137 + 0.949523I$ | $-4.05693 + 5.10453I$ | 0 |
| $u = -1.333540 - 0.243178I$<br>$a = -0.386912 - 1.140080I$<br>$b = 0.045137 - 0.949523I$ | $-4.05693 - 5.10453I$ | 0 |
| $u = 1.332280 + 0.250714I$<br>$a = 0.00784 - 2.48123I$<br>$b = 1.028910 - 0.614240I$ | $-1.40402 - 5.45414I$ | 0 |
| $u = 1.332280 - 0.250714I$<br>$a = 0.00784 + 2.48123I$<br>$b = 1.028910 + 0.614240I$ | $-1.40402 + 5.45414I$ | 0 |
| $u = -0.170952 + 0.613820I$<br>$a = 1.25570 - 1.69291I$<br>$b = -1.093770 - 0.670282I$ | $0.65018 + 7.34518I$ | $0.51895 - 5.45269I$ |
| $u = -0.170952 - 0.613820I$<br>$a = 1.25570 + 1.69291I$<br>$b = -1.093770 + 0.670282I$ | $0.65018 - 7.34518I$ | $0.51895 + 5.45269I$ |

| Solutions to $I^u_1$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -1.323970 + 0.324415I$<br>$a = 0.183042 - 1.129600I$<br>$b = -1.247840 - 0.244639I$ | $0.61856 + 9.30284I$ | $0$ |
| $u = -1.323970 - 0.324415I$<br>$a = 0.183042 + 1.129600I$<br>$b = -1.247840 + 0.244639I$ | $0.61856 - 9.30284I$ | $0$ |
| $u = -0.099531 + 0.621357I$<br>$a = -1.48635 + 1.42762I$<br>$b = 1.060360 + 0.506724I$ | $3.11950 + 2.26469I$ | $3.95815 - 1.35279I$ |
| $u = -0.099531 - 0.621357I$<br>$a = -1.48635 - 1.42762I$<br>$b = 1.060360 - 0.506724I$ | $3.11950 - 2.26469I$ | $3.95815 + 1.35279I$ |
| $u = 0.113794 + 0.615400I$<br>$a = 0.185943 + 0.047421I$<br>$b = 0.088754 - 0.783282I$ | $0.49975 - 1.97192I$ | $0.59201 + 5.18081I$ |
| $u = 0.113794 - 0.615400I$<br>$a = 0.185943 - 0.047421I$<br>$b = 0.088754 + 0.783282I$ | $0.49975 + 1.97192I$ | $0.59201 - 5.18081I$ |
| $u = 1.377100 + 0.142626I$<br>$a = -1.83734 - 0.89104I$<br>$b = -0.884984 - 0.635023I$ | $-5.70432 + 3.16921I$ | $0$ |
| $u = 1.377100 - 0.142626I$<br>$a = -1.83734 + 0.89104I$<br>$b = -0.884984 + 0.635023I$ | $-5.70432 - 3.16921I$ | $0$ |
| $u = 1.364170 + 0.252445I$<br>$a = -0.18857 + 2.63975I$<br>$b = -1.073640 + 0.734262I$ | $-4.22710 - 10.53650I$ | $0$ |
| $u = 1.364170 - 0.252445I$<br>$a = -0.18857 - 2.63975I$<br>$b = -1.073640 - 0.734262I$ | $-4.22710 + 10.53650I$ | $0$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-1.39739+0.30031I$<br>$a=-0.952776+0.849121I$<br>$b=-0.476545+0.876372I$ | $-5.32452+6.07526I$ | 0 |
| $u=-1.39739-0.30031I$<br>$a=-0.952776-0.849121I$<br>$b=-0.476545-0.876372I$ | $-5.32452-6.07526I$ | 0 |
| $u=-1.40340+0.34734I$<br>$a=\ \ 0.28718-2.05993I$<br>$b=-1.100920-0.667509I$ | $-3.46457+11.75370I$ | 0 |
| $u=-1.40340-0.34734I$<br>$a=\ \ 0.28718+2.05993I$<br>$b=-1.100920+0.667509I$ | $-3.46457-11.75370I$ | 0 |
| $u=-1.41011+0.31923I$<br>$a=-0.63289+2.12092I$<br>$b=\ \ 0.931488+0.614497I$ | $-8.35832+7.79358I$ | 0 |
| $u=-1.41011-0.31923I$<br>$a=-0.63289-2.12092I$<br>$b=\ \ 0.931488-0.614497I$ | $-8.35832-7.79358I$ | 0 |
| $u=-1.40968+0.33237I$<br>$a=\ \ 1.20654-0.93297I$<br>$b=\ \ 0.655003-1.003640I$ | $-7.86542+10.61720I$ | 0 |
| $u=-1.40968-0.33237I$<br>$a=\ \ 1.20654+0.93297I$<br>$b=\ \ 0.655003+1.003640I$ | $-7.86542-10.61720I$ | 0 |
| $u=-0.070844+0.542854I$<br>$a=-0.663591-0.173609I$<br>$b=-0.512497+0.878097I$ | $-1.11676+1.63882I$ | $-1.15180-1.38360I$ |
| $u=-0.070844-0.542854I$<br>$a=-0.663591+0.173609I$<br>$b=-0.512497-0.878097I$ | $-1.11676-1.63882I$ | $-1.15180+1.38360I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -1.41825 + 0.35738I$<br>$a = -0.19419 + 2.22344I$<br>$b = 1.111790 + 0.773357I$ | $-6.3975 + 17.0949I$ | 0 |
| $u = -1.41825 - 0.35738I$<br>$a = -0.19419 - 2.22344I$<br>$b = 1.111790 - 0.773357I$ | $-6.3975 - 17.0949I$ | 0 |
| $u = -1.44935 + 0.20132I$<br>$a = -0.689559 - 0.441917I$<br>$b = -0.595033 - 0.126320I$ | $-7.03499 + 4.85145I$ | 0 |
| $u = -1.44935 - 0.20132I$<br>$a = -0.689559 + 0.441917I$<br>$b = -0.595033 + 0.126320I$ | $-7.03499 - 4.85145I$ | 0 |
| $u = -1.47182 + 0.03699I$<br>$a = -0.69034 - 1.63645I$<br>$b = -0.845947 - 0.756360I$ | $-8.89073 + 2.84281I$ | 0 |
| $u = -1.47182 - 0.03699I$<br>$a = -0.69034 + 1.63645I$<br>$b = -0.845947 + 0.756360I$ | $-8.89073 - 2.84281I$ | 0 |
| $u = -1.45081 + 0.29045I$<br>$a = 1.203110 - 0.440312I$<br>$b = 0.764537 - 0.621264I$ | $-8.88672 + 2.93045I$ | 0 |
| $u = -1.45081 - 0.29045I$<br>$a = 1.203110 + 0.440312I$<br>$b = 0.764537 + 0.621264I$ | $-8.88672 - 2.93045I$ | 0 |
| $u = -1.48199 + 0.00967I$<br>$a = 0.60989 - 1.90109I$<br>$b = 0.811592 - 0.838116I$ | $-12.66580 + 1.42958I$ | 0 |
| $u = -1.48199 - 0.00967I$<br>$a = 0.60989 + 1.90109I$<br>$b = 0.811592 + 0.838116I$ | $-12.66580 - 1.42958I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -1.51208 + 0.04921I$<br>$a = 0.94033 + 1.66888I$<br>$b = 0.947379 + 0.764253I$ | $-12.2192 + 7.4080I$ | $0$ |
| $u = -1.51208 - 0.04921I$<br>$a = 0.94033 - 1.66888I$<br>$b = 0.947379 - 0.764253I$ | $-12.2192 - 7.4080I$ | $0$ |
| $u = 0.023033 + 0.467596I$<br>$a = 2.55414 - 1.74263I$<br>$b = -0.675269 - 0.423151I$ | $-1.65128 - 0.65806I$ | $-0.515801 - 1.165772I$ |
| $u = 0.023033 - 0.467596I$<br>$a = 2.55414 + 1.74263I$<br>$b = -0.675269 + 0.423151I$ | $-1.65128 + 0.65806I$ | $-0.515801 + 1.165772I$ |
| $u = -0.299051 + 0.324781I$<br>$a = -1.50249 - 0.37524I$<br>$b = -0.998992 + 0.562705I$ | $-0.44144 - 4.99052I$ | $1.47251 + 5.10258I$ |
| $u = -0.299051 - 0.324781I$<br>$a = -1.50249 + 0.37524I$<br>$b = -0.998992 - 0.562705I$ | $-0.44144 + 4.99052I$ | $1.47251 - 5.10258I$ |
| $u = -0.240767 + 0.153669I$<br>$a = 2.02139 + 0.62079I$<br>$b = 0.898531 - 0.269343I$ | $1.51367 - 0.61388I$ | $6.21394 + 0.64261I$ |
| $u = -0.240767 - 0.153669I$<br>$a = 2.02139 - 0.62079I$<br>$b = 0.898531 + 0.269343I$ | $1.51367 + 0.61388I$ | $6.21394 - 0.64261I$ |
| $u = 0.065460 + 0.176095I$<br>$a = 4.22561 - 2.33746I$<br>$b = -0.371284 - 0.481806I$ | $-1.77841 - 0.66560I$ | $-4.00156 - 1.15467I$ |
| $u = 0.065460 - 0.176095I$<br>$a = 4.22561 + 2.33746I$<br>$b = -0.371284 + 0.481806I$ | $-1.77841 + 0.66560I$ | $-4.00156 + 1.15467I$ |

**II.** $\boldsymbol{I_2^u = \langle 2a^5 - 2a^4 + 7a^3 - 5a^2 + 3b + a - 4,\ a^6 + 4a^4 + a^3 + 4a^2 + 1,\ u - 1\rangle}$

**(i) Arc colorings**

$$a_8 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_{12} = \begin{pmatrix} 0 \\ 1 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$
$$a_1 = \begin{pmatrix} -1 \\ 0 \end{pmatrix}$$
$$a_4 = \begin{pmatrix} a \\ -\frac{2}{3}a^5 + \frac{2}{3}a^4 + \cdots - \frac{1}{3}a + \frac{4}{3} \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} 0 \\ 1 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} \frac{2}{3}a^5 + \frac{1}{3}a^4 + \cdots + \frac{4}{3}a + \frac{5}{3} \\ \frac{2}{3}a^5 + \frac{1}{3}a^4 + \cdots + \frac{4}{3}a + \frac{5}{3} \end{pmatrix}$$
$$a_3 = \begin{pmatrix} \frac{1}{3}a^5 - \frac{1}{3}a^4 + \cdots - \frac{1}{3}a - \frac{2}{3} \\ -\frac{1}{3}a^5 + \frac{1}{3}a^4 + \cdots - \frac{5}{3}a + \frac{2}{3} \end{pmatrix}$$
$$a_2 = \begin{pmatrix} \frac{1}{3}a^5 - \frac{1}{3}a^4 + \cdots - \frac{1}{3}a - \frac{2}{3} \\ a^5 + 3a^3 + 2a^2 + a + 1 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} 0 \\ \frac{2}{3}a^5 + \frac{1}{3}a^4 + \cdots + \frac{4}{3}a + \frac{5}{3} \end{pmatrix}$$
$$a_{11} = \begin{pmatrix} 0 \\ 1 \end{pmatrix}$$
$$a_5 = \begin{pmatrix} 0 \\ \frac{2}{3}a^5 + \frac{1}{3}a^4 + \cdots + \frac{4}{3}a + \frac{5}{3} \end{pmatrix}$$

**(ii) Obstruction class** $= 1$

**(iii) Cusp Shapes** $= -4a^5 - a^4 - 12a^3 - 8a^2 - 4a - 4$

**(iv) u-Polynomials at the component**

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $u^6 - 3u^5 + 5u^4 - 4u^3 + 2u^2 - u + 1$ |
| $c_2, c_7$ | $u^6 + u^5 - u^4 - 2u^3 + u + 1$ |
| $c_3, c_4$ | $u^6 - u^5 - u^4 + 2u^3 - u + 1$ |
| $c_5, c_{10}, c_{11}$ | $u^6$ |
| $c_6$ | $u^6 + 3u^5 + 5u^4 + 4u^3 + 2u^2 + u + 1$ |
| $c_8, c_9$ | $(u - 1)^6$ |
| $c_{12}$ | $(u + 1)^6$ |

**(v) Riley Polynomials at the component**

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_6$ | $y^6 + y^5 + 5y^4 + 6y^2 + 3y + 1$ |
| $c_2, c_3, c_4$ $c_7$ | $y^6 - 3y^5 + 5y^4 - 4y^3 + 2y^2 - y + 1$ |
| $c_5, c_{10}, c_{11}$ | $y^6$ |
| $c_8, c_9, c_{12}$ | $(y-1)^6$ |

**(vi) Complex Volumes and Cusp Shapes**

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.00000$<br>$a = -0.341164 + 0.940004I$<br>$b = -1.073950 + 0.558752I$ | $-1.64493 - 5.69302I$ | $-3.10838 + 7.09196I$ |
| $u = 1.00000$<br>$a = -0.341164 - 0.940004I$<br>$b = -1.073950 - 0.558752I$ | $-1.64493 + 5.69302I$ | $-3.10838 - 7.09196I$ |
| $u = 1.00000$<br>$a = 0.084211 + 0.566250I$<br>$b = 1.002190 + 0.295542I$ | $0.245672 + 0.924305I$ | $-1.11831 - 1.11590I$ |
| $u = 1.00000$<br>$a = 0.084211 - 0.566250I$<br>$b = 1.002190 - 0.295542I$ | $0.245672 - 0.924305I$ | $-1.11831 + 1.11590I$ |
| $u = 1.00000$<br>$a = 0.25695 + 1.72779I$<br>$b = -0.428243 + 0.664531I$ | $-3.53554 + 0.92430I$ | $-5.77331 + 0.83820I$ |
| $u = 1.00000$<br>$a = 0.25695 - 1.72779I$<br>$b = -0.428243 - 0.664531I$ | $-3.53554 - 0.92430I$ | $-5.77331 - 0.83820I$ |

**III.** $\boldsymbol{I_3^u = \langle b,\ -u^2 + a - u + 1,\ u^5 + u^4 - 2u^3 - u^2 + u - 1\rangle}$

**(i) Arc colorings**

$$a_8 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

$$a_{12} = \begin{pmatrix} 0 \\ u \end{pmatrix}$$

$$a_9 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$

$$a_1 = \begin{pmatrix} -u \\ -u^3 + u \end{pmatrix}$$

$$a_4 = \begin{pmatrix} u^2 + u - 1 \\ 0 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} -u^2 + 1 \\ -u^4 + 2u^2 \end{pmatrix}$$

$$a_7 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} u^2 + u - 1 \\ 0 \end{pmatrix}$$

$$a_2 = \begin{pmatrix} u^2 - 1 \\ -u^3 + u \end{pmatrix}$$

$$a_6 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} -u^4 + u^2 + 1 \\ -u^4 + 2u^2 \end{pmatrix}$$

$$a_5 = \begin{pmatrix} u \\ u^3 - u \end{pmatrix}$$

**(ii) Obstruction class** $= 1$

**(iii) Cusp Shapes** $= -2u^4 - 5u^3 + 2u^2 + 8u - 10$

**(iv) u-Polynomials at the component**

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1, c_2$ | $(u-1)^5$ |
| $c_3, c_6, c_7$ | $u^5$ |
| $c_4$ | $(u+1)^5$ |
| $c_5$ | $u^5 - u^4 + 2u^3 - u^2 + u - 1$ |
| $c_8, c_9$ | $u^5 + u^4 - 2u^3 - u^2 + u - 1$ |
| $c_{10}$ | $u^5 + u^4 + 2u^3 + u^2 + u + 1$ |
| $c_{11}$ | $u^5 + 3u^4 + 4u^3 + u^2 - u - 1$ |
| $c_{12}$ | $u^5 - u^4 - 2u^3 + u^2 + u + 1$ |

**(v) Riley Polynomials at the component**

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_2, c_4$ | $(y-1)^5$ |
| $c_3, c_6, c_7$ | $y^5$ |
| $c_5, c_{10}$ | $y^5+3y^4+4y^3+y^2-y-1$ |
| $c_8, c_9, c_{12}$ | $y^5-5y^4+8y^3-3y^2-y-1$ |
| $c_{11}$ | $y^5-y^4+8y^3-3y^2+3y-1$ |

**(vi) Complex Volumes and Cusp Shapes**

| Solutions to $I_3^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.21774$<br>$a = 1.70062$<br>$b = 0$ | $-4.04602$ | $-10.7190$ |
| $u = 0.309916 + 0.549911I$<br>$a = -0.896438 + 0.890762I$<br>$b = 0$ | $-1.97403 - 1.53058I$ | $-6.52924 + 5.40154I$ |
| $u = 0.309916 - 0.549911I$<br>$a = -0.896438 - 0.890762I$<br>$b = 0$ | $-1.97403 + 1.53058I$ | $-6.52924 - 5.40154I$ |
| $u = -1.41878 + 0.21917I$<br>$a = -0.453870 - 0.402731I$<br>$b = 0$ | $-7.51750 + 4.40083I$ | $-11.11126 - 1.16747I$ |
| $u = -1.41878 - 0.21917I$<br>$a = -0.453870 + 0.402731I$<br>$b = 0$ | $-7.51750 - 4.40083I$ | $-11.11126 + 1.16747I$ |

### IV. u-Polynomials

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $(u-1)^5(u^6-3u^5+5u^4-4u^3+2u^2-u+1)$ <br> $\cdot(u^{100}+53u^{99}+\cdots+7u+1)$ |
| $c_2$ | $((u-1)^5)(u^6+u^5+\cdots+u+1)(u^{100}-7u^{99}+\cdots+7u-1)$ |
| $c_3$ | $u^5(u^6-u^5+\cdots-u+1)(u^{100}-2u^{99}+\cdots+64u+32)$ |
| $c_4$ | $((u+1)^5)(u^6-u^5+\cdots-u+1)(u^{100}-7u^{99}+\cdots+7u-1)$ |
| $c_5$ | $u^6(u^5-u^4+\cdots+u-1)(u^{100}-2u^{99}+\cdots+256u-64)$ |
| $c_6$ | $u^5(u^6+3u^5+5u^4+4u^3+2u^2+u+1)$ <br> $\cdot(u^{100}-36u^{99}+\cdots-27136u+1024)$ |
| $c_7$ | $u^5(u^6+u^5+\cdots+u+1)(u^{100}-2u^{99}+\cdots+64u+32)$ |
| $c_8, c_9$ | $((u-1)^6)(u^5+u^4+\cdots+u-1)(u^{100}-8u^{99}+\cdots+2u+1)$ |
| $c_{10}$ | $u^6(u^5+u^4+\cdots+u+1)(u^{100}-2u^{99}+\cdots+256u-64)$ |
| $c_{11}$ | $u^6(u^5+3u^4+\cdots-u-1)(u^{100}+42u^{99}+\cdots+49152u+4096)$ |
| $c_{12}$ | $((u+1)^6)(u^5-u^4+\cdots+u+1)(u^{100}-8u^{99}+\cdots+2u+1)$ |

## V. Riley Polynomials

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $((y-1)^5)(y^6+y^5+\cdots+3y+1)(y^{100}-5y^{99}+\cdots-47y+1)$ |
| $c_2, c_4$ | $(y-1)^5(y^6-3y^5+5y^4-4y^3+2y^2-y+1)$ <br> $\cdot\,(y^{100}-53y^{99}+\cdots-7y+1)$ |
| $c_3, c_7$ | $y^5(y^6-3y^5+5y^4-4y^3+2y^2-y+1)$ <br> $\cdot\,(y^{100}-36y^{99}+\cdots-27136y+1024)$ |
| $c_5, c_{10}$ | $y^6(y^5+3y^4+\cdots-y-1)(y^{100}+42y^{99}+\cdots+49152y+4096)$ |
| $c_6$ | $y^5(y^6+y^5+5y^4+6y^2+3y+1)$ <br> $\cdot\,(y^{100}+48y^{99}+\cdots-43646976y+1048576)$ |
| $c_8, c_9, c_{12}$ | $((y-1)^6)(y^5-5y^4+\cdots-y-1)(y^{100}-88y^{99}+\cdots+50y+1)$ |
| $c_{11}$ | $y^6(y^5-y^4+8y^3-3y^2+3y-1)$ <br> $\cdot\,(y^{100}+22y^{99}+\cdots+461373440y+16777216)$ |