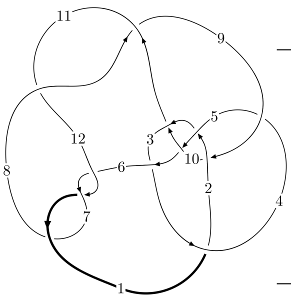
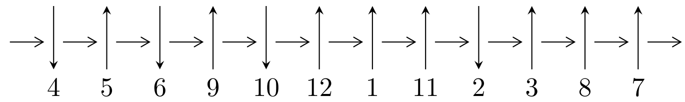
# $12a_{0807}$ ($K12a_{0807}$)




A knot diagram[1]

**Linearized knot diagam**




**Solving Sequence**

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

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

$$\begin{aligned}
I_1^u &= \langle 49791514u^{59} + 185733104u^{58} + \cdots + 664747b + 436245750, \\
&\qquad 5475421u^{59} + 31624832u^{58} + \cdots + 7312217a + 58998547,\ u^{60} + 5u^{59} + \cdots - 38u + 11\rangle \\
I_2^u &= \langle -2861u^{38}a - 1053u^{38} + \cdots - 2113a - 517,\ -u^{38}a + u^{38} + \cdots - 3a - 5,\ u^{39} - 2u^{38} + \cdots + 2u - 1\rangle \\
I_3^u &= \langle 3u^{21} - 2u^{20} + \cdots + b - 2,\ -u^{21} + u^{20} + \cdots + a + 4,\ u^{22} - 2u^{21} + \cdots + u + 1\rangle \\
I_4^u &= \langle b^2 + b - 1,\ a - 1,\ u + 1\rangle
\end{aligned}$$

$$I_1^v = \langle a,\ b + 1,\ v - 1\rangle$$

* 5 irreducible components of $\dim_{\mathbb{C}} = 0$, with total 163 representations.

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[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.** $\boldsymbol{I_1^u = \langle 4.98 \times 10^7 u^{59} + 1.86 \times 10^8 u^{58} + \cdots + 6.65 \times 10^5 b + 4.36 \times 10^8,\ 5.48 \times 10^6 u^{59} + 3.16 \times 10^7 u^{58} + \cdots + 7.31 \times 10^6 a + 5.90 \times 10^7,\ u^{60} + 5u^{59} + \cdots - 38u + 11 \rangle}$

**(i) Arc colorings**

$$a_1 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_8 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$
$$a_{12} = \begin{pmatrix} -u \\ -u^3 + u \end{pmatrix}$$
$$a_3 = \begin{pmatrix} -0.748805u^{59} - 4.32493u^{58} + \cdots + 52.3418u - 8.06849 \\ -74.9030u^{59} - 279.404u^{58} + \cdots + 2793.44u - 656.258 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} -u^2 + 1 \\ -u^4 + 2u^2 \end{pmatrix}$$
$$a_4 = \begin{pmatrix} 42.7214u^{59} + 157.014u^{58} + \cdots - 1466.48u + 353.804 \\ -102.962u^{59} - 379.700u^{58} + \cdots + 3682.85u - 871.934 \end{pmatrix}$$
$$a_2 = \begin{pmatrix} -34.9557u^{59} - 124.857u^{58} + \cdots + 1080.98u - 269.488 \\ 46.2308u^{59} + 165.630u^{58} + \cdots - 1559.60u + 373.881 \end{pmatrix}$$
$$a_{11} = \begin{pmatrix} u^3 - 2u \\ -u^3 + u \end{pmatrix}$$
$$a_9 = \begin{pmatrix} u^6 - 3u^4 + 2u^2 + 1 \\ -u^6 + 2u^4 - u^2 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} 4.60523u^{59} + 17.8774u^{58} + \cdots - 165.454u + 35.6621 \\ -42.1101u^{59} - 161.731u^{58} + \cdots + 1740.73u - 400.478 \end{pmatrix}$$
$$a_5 = \begin{pmatrix} 7.80133u^{59} + 27.2592u^{58} + \cdots - 208.204u + 54.6615 \\ -73.4028u^{59} - 275.257u^{58} + \cdots + 2770.22u - 651.201 \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= -\frac{121118688}{664747}u^{59} - \frac{439577769}{664747}u^{58} + \cdots + \frac{4220306946}{664747}u - \frac{1004828410}{664747}$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1, c_3$ | $u^{60} + 8u^{59} + \cdots - 27u + 1$ |
| $c_2$ | $u^{60} + 34u^{59} + \cdots - 87u - 11$ |
| $c_4, c_{10}$ | $u^{60} + 17u^{56} + \cdots + 7u + 1$ |
| $c_5, c_9$ | $u^{60} - u^{59} + \cdots + 4u - 1$ |
| $c_6, c_7, c_{12}$ | $u^{60} - 5u^{59} + \cdots + 38u + 11$ |
| $c_8, c_{11}$ | $u^{60} + 15u^{59} + \cdots - 25484u - 1639$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_3$ | $y^{60} - 44y^{59} + \cdots - 175y + 1$ |
| $c_2$ | $y^{60} + 58y^{58} + \cdots - 1409y + 121$ |
| $c_4, c_{10}$ | $y^{60} + 34y^{58} + \cdots - 55y + 1$ |
| $c_5, c_9$ | $y^{60} - 25y^{59} + \cdots - 66y + 1$ |
| $c_6, c_7, c_{12}$ | $y^{60} - 51y^{59} + \cdots - 674y + 121$ |
| $c_8, c_{11}$ | $y^{60} + 41y^{59} + \cdots - 39182108y + 2686321$ |

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

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.060897 + 0.868711I$<br>$a = 1.74244 + 0.72857I$<br>$b = -1.61713 - 0.67161I$ | $-8.13893 - 2.83634I$ | $-3.79343 + 3.27629I$ |
| $u = 0.060897 - 0.868711I$<br>$a = 1.74244 - 0.72857I$<br>$b = -1.61713 + 0.67161I$ | $-8.13893 + 2.83634I$ | $-3.79343 - 3.27629I$ |
| $u = 0.128834 + 0.848151I$<br>$a = 3.09604 - 0.05310I$<br>$b = -2.55532 + 0.53851I$ | $-5.9522 + 14.9479I$ | $0. - 8.67429I$ |
| $u = 0.128834 - 0.848151I$<br>$a = 3.09604 + 0.05310I$<br>$b = -2.55532 - 0.53851I$ | $-5.9522 - 14.9479I$ | $0. + 8.67429I$ |
| $u = 0.095160 + 0.812795I$<br>$a = -3.40389 + 0.06404I$<br>$b = 2.60895 - 0.21567I$ | $-6.77759 + 6.06790I$ | $-6.89903 - 8.29238I$ |
| $u = 0.095160 - 0.812795I$<br>$a = -3.40389 - 0.06404I$<br>$b = 2.60895 + 0.21567I$ | $-6.77759 - 6.06790I$ | $-6.89903 + 8.29238I$ |
| $u = 1.139700 + 0.336402I$<br>$a = 1.40739 + 0.67616I$<br>$b = -1.16674 + 1.01101I$ | $-3.09648 + 1.54338I$ | 0 |
| $u = 1.139700 - 0.336402I$<br>$a = 1.40739 - 0.67616I$<br>$b = -1.16674 - 1.01101I$ | $-3.09648 - 1.54338I$ | 0 |
| $u = 0.121157 + 0.797619I$<br>$a = -2.01479 - 1.24838I$<br>$b = 1.55370 + 0.68878I$ | $-6.18372 + 2.58960I$ | $-4.84200 - 1.19126I$ |
| $u = 0.121157 - 0.797619I$<br>$a = -2.01479 + 1.24838I$<br>$b = 1.55370 - 0.68878I$ | $-6.18372 - 2.58960I$ | $-4.84200 + 1.19126I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.123550 + 0.412628I$<br>$a = -0.72460 - 1.64385I$<br>$b = 2.25070 + 0.01928I$ | $-2.90687 - 10.41390I$ | $0$ |
| $u = 1.123550 - 0.412628I$<br>$a = -0.72460 + 1.64385I$<br>$b = 2.25070 - 0.01928I$ | $-2.90687 + 10.41390I$ | $0$ |
| $u = -1.205960 + 0.012637I$<br>$a = -0.103629 - 0.111372I$<br>$b = 0.787825 + 0.838109I$ | $2.13388 - 0.44264I$ | $0$ |
| $u = -1.205960 - 0.012637I$<br>$a = -0.103629 + 0.111372I$<br>$b = 0.787825 - 0.838109I$ | $2.13388 + 0.44264I$ | $0$ |
| $u = -0.011128 + 0.786562I$<br>$a = -2.68629 - 0.56383I$<br>$b = 1.94930 + 0.99862I$ | $-5.66611 - 0.17773I$ | $-4.38219 - 0.43593I$ |
| $u = -0.011128 - 0.786562I$<br>$a = -2.68629 + 0.56383I$<br>$b = 1.94930 - 0.99862I$ | $-5.66611 + 0.17773I$ | $-4.38219 + 0.43593I$ |
| $u = 1.166760 + 0.357089I$<br>$a = 0.97029 + 1.86168I$<br>$b = -2.17056 + 0.36127I$ | $-3.50603 - 1.83244I$ | $0$ |
| $u = 1.166760 - 0.357089I$<br>$a = 0.97029 - 1.86168I$<br>$b = -2.17056 - 0.36127I$ | $-3.50603 + 1.83244I$ | $0$ |
| $u = 0.548543 + 0.502233I$<br>$a = 0.206746 + 0.433608I$<br>$b = 0.745089 + 0.097408I$ | $-0.86790 + 10.42950I$ | $3.00610 - 9.66598I$ |
| $u = 0.548543 - 0.502233I$<br>$a = 0.206746 - 0.433608I$<br>$b = 0.745089 - 0.097408I$ | $-0.86790 - 10.42950I$ | $3.00610 + 9.66598I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.431078 + 0.588336I$<br>$a = 0.023424 + 0.774923I$<br>$b = -0.107206 + 0.378275I$ | $-1.26191 - 6.52666I$ | $1.65444 + 4.13374I$ |
| $u = 0.431078 - 0.588336I$<br>$a = 0.023424 - 0.774923I$<br>$b = -0.107206 - 0.378275I$ | $-1.26191 + 6.52666I$ | $1.65444 - 4.13374I$ |
| $u = -1.250750 + 0.253692I$<br>$a = -0.602712 + 0.147425I$<br>$b = 1.166760 + 0.424599I$ | $1.80106 - 1.18068I$ | 0 |
| $u = -1.250750 - 0.253692I$<br>$a = -0.602712 - 0.147425I$<br>$b = 1.166760 - 0.424599I$ | $1.80106 + 1.18068I$ | 0 |
| $u = -0.077320 + 0.719425I$<br>$a = 1.32124 - 0.56354I$<br>$b = -1.066300 - 0.127595I$ | $-1.73557 - 2.28005I$ | $2.10056 + 2.97528I$ |
| $u = -0.077320 - 0.719425I$<br>$a = 1.32124 + 0.56354I$<br>$b = -1.066300 + 0.127595I$ | $-1.73557 + 2.28005I$ | $2.10056 - 2.97528I$ |
| $u = 1.206360 + 0.420533I$<br>$a = -1.030210 - 0.819652I$<br>$b = 1.26332 - 1.06914I$ | $-4.61140 + 7.45006I$ | 0 |
| $u = 1.206360 - 0.420533I$<br>$a = -1.030210 + 0.819652I$<br>$b = 1.26332 + 1.06914I$ | $-4.61140 - 7.45006I$ | 0 |
| $u = 1.27903$<br>$a = 1.93254$<br>$b = 0.333489$ | 2.37328 | 0 |
| $u = -1.261350 + 0.340608I$<br>$a = 0.411479 - 1.290950I$<br>$b = -2.32788 + 0.56589I$ | $-1.79214 - 3.88409I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-1.261350-0.340608I$<br>$a=\ \ 0.411479+1.290950I$<br>$b=-2.32788-0.56589I$ | $-1.79214+3.88409I$ | 0 |
| $u=-0.385617+0.575805I$<br>$a=\ \ 0.355886+0.193509I$<br>$b=\ \ 0.088406-0.407822I$ | $0.93949-1.79577I$ | $8.38505-1.97163I$ |
| $u=-0.385617-0.575805I$<br>$a=\ \ 0.355886-0.193509I$<br>$b=\ \ 0.088406+0.407822I$ | $0.93949+1.79577I$ | $8.38505+1.97163I$ |
| $u=\ \ 1.278460+0.340753I$<br>$a=\ \ 1.26291+1.54365I$<br>$b=-1.52939+1.35909I$ | $-1.65511+4.23939I$ | 0 |
| $u=\ \ 1.278460-0.340753I$<br>$a=\ \ 1.26291-1.54365I$<br>$b=-1.52939-1.35909I$ | $-1.65511-4.23939I$ | 0 |
| $u=-1.350340+0.079844I$<br>$a=\ \ 0.354882-0.159748I$<br>$b=\ \ 0.55689+1.39046I$ | $3.39876-4.42651I$ | 0 |
| $u=-1.350340-0.079844I$<br>$a=\ \ 0.354882+0.159748I$<br>$b=\ \ 0.55689-1.39046I$ | $3.39876+4.42651I$ | 0 |
| $u=\ \ 1.317550+0.310044I$<br>$a=-0.263784-1.093550I$<br>$b=\ \ 0.991089-0.453216I$ | $2.64360+6.02566I$ | 0 |
| $u=\ \ 1.317550-0.310044I$<br>$a=-0.263784+1.093550I$<br>$b=\ \ 0.991089+0.453216I$ | $2.64360-6.02566I$ | 0 |
| $u=\ \ 1.35461$<br>$a=-0.906395$<br>$b=-0.361301$ | $6.51449$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -1.311420 + 0.396696I$<br>$a = -0.189189 + 1.092900I$<br>$b = 1.76017 - 0.21463I$ | $-3.85452 - 1.69969I$ | 0 |
| $u = -1.311420 - 0.396696I$<br>$a = -0.189189 - 1.092900I$<br>$b = 1.76017 + 0.21463I$ | $-3.85452 + 1.69969I$ | 0 |
| $u = -1.330390 + 0.355574I$<br>$a = 1.26040 - 1.73128I$<br>$b = -2.83443 - 0.72331I$ | $-2.30463 - 10.27760I$ | 0 |
| $u = -1.330390 - 0.355574I$<br>$a = 1.26040 + 1.73128I$<br>$b = -2.83443 + 0.72331I$ | $-2.30463 + 10.27760I$ | 0 |
| $u = -1.38309$<br>$a = 0.187317$<br>$b = 1.04622$ | $3.23568$ | 0 |
| $u = -1.346470 + 0.343806I$<br>$a = 0.20565 - 1.42562I$<br>$b = -1.73002 + 0.40643I$ | $-1.56255 - 6.70988I$ | 0 |
| $u = -1.346470 - 0.343806I$<br>$a = 0.20565 + 1.42562I$<br>$b = -1.73002 - 0.40643I$ | $-1.56255 + 6.70988I$ | 0 |
| $u = -1.354300 + 0.371721I$<br>$a = -1.20650 + 1.73448I$<br>$b = 2.62599 + 0.98286I$ | $-1.2861 - 19.3357I$ | 0 |
| $u = -1.354300 - 0.371721I$<br>$a = -1.20650 - 1.73448I$<br>$b = 2.62599 - 0.98286I$ | $-1.2861 + 19.3357I$ | 0 |
| $u = -1.41652 + 0.11414I$<br>$a = -0.669108 + 0.142685I$<br>$b = -0.682724 - 0.737781I$ | $5.40592 - 12.35690I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-1.41652-0.11414I$<br>$a=-0.669108-0.142685I$<br>$b=-0.682724+0.737781I$ | $5.40592+12.35690I$ | $0$ |
| $u=-1.41428+0.17772I$<br>$a=\ \ 0.134372+0.588151I$<br>$b=-0.272154+0.118060I$ | $4.63496+3.89220I$ | $0$ |
| $u=-1.41428-0.17772I$<br>$a=\ \ 0.134372-0.588151I$<br>$b=-0.272154-0.118060I$ | $4.63496-3.89220I$ | $0$ |
| $u=\ \ 1.44039+0.21474I$<br>$a=-0.309129-0.085453I$<br>$b=-0.134108-0.270569I$ | $6.80384+4.70309I$ | $0$ |
| $u=\ \ 1.44039-0.21474I$<br>$a=-0.309129+0.085453I$<br>$b=-0.134108+0.270569I$ | $6.80384-4.70309I$ | $0$ |
| $u=\ \ 0.403727+0.360380I$<br>$a=-0.263367-1.336380I$<br>$b=-0.475150+0.280630I$ | $-2.00858+3.05776I$ | $-2.14055-8.96943I$ |
| $u=\ \ 0.403727-0.360380I$<br>$a=-0.263367+1.336380I$<br>$b=-0.475150-0.280630I$ | $-2.00858-3.05776I$ | $-2.14055+8.96943I$ |
| $u=\ \ 0.359656+0.302824I$<br>$a=\ \ 1.024700-0.936645I$<br>$b=-0.472574-0.106407I$ | $-2.06170-0.42298I$ | $-2.32972-0.96462I$ |
| $u=\ \ 0.359656-0.302824I$<br>$a=\ \ 1.024700+0.936645I$<br>$b=-0.472574+0.106407I$ | $-2.06170+0.42298I$ | $-2.32972+0.96462I$ |
| $u=-0.462483$<br>$a=\ \ 0.619787$<br>$b=\ \ 0.568615$ | $1.01644$ | $10.3330$ |

**II. $I_2^u = \langle -2861u^{38}a - 1053u^{38} + \cdots - 2113a - 517,\ -u^{38}a + u^{38} + \cdots - 3a - 5,\ u^{39} - 2u^{38} + \cdots + 2u - 1 \rangle$**

**(i) Arc colorings**

$$a_1 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_8 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$
$$a_{12} = \begin{pmatrix} -u \\ -u^3 + u \end{pmatrix}$$
$$a_3 = \begin{pmatrix} a \\ 7.18844au^{38} + 2.64573u^{38} + \cdots + 5.30905a + 1.29899 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} -u^2 + 1 \\ -u^4 + 2u^2 \end{pmatrix}$$
$$a_4 = \begin{pmatrix} -4.36683au^{38} + 0.929648u^{38} + \cdots - 2.32161a + 1.92462 \\ 9.67588au^{38} + 2.36935u^{38} + \cdots + 7.18844a + 1.64573 \end{pmatrix}$$
$$a_2 = \begin{pmatrix} -0.798995au^{38} + 0.422111u^{38} + \cdots - 2.07035a + 0.452261 \\ 3.57538au^{38} - 3.84171u^{38} + \cdots + 3.22362a - 3.58040 \end{pmatrix}$$
$$a_{11} = \begin{pmatrix} u^3 - 2u \\ -u^3 + u \end{pmatrix}$$
$$a_9 = \begin{pmatrix} u^6 - 3u^4 + 2u^2 + 1 \\ -u^6 + 2u^4 - u^2 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} 2.22362au^{38} - 3.58040u^{38} + \cdots + 0.846734a - 4.87186 \\ -3.03266au^{38} - 1.21859u^{38} + \cdots - 2.21357a + 0.801508 \end{pmatrix}$$
$$a_5 = \begin{pmatrix} -3.21357au^{38} + 1.80151u^{38} + \cdots - 1.55025a + 1.39447 \\ 7.18844au^{38} + 4.64573u^{38} + \cdots + 5.30905a + 3.29899 \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= 11u^{38} - 9u^{37} + \cdots + 13u + 23$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1, c_3$ | $u^{78} - 3u^{77} + \cdots - 2666u + 199$ |
| $c_2$ | $(u^{39} - 19u^{38} + \cdots + 3u - 2)^2$ |
| $c_4, c_{10}$ | $u^{78} - 2u^{77} + \cdots + 35u + 1$ |
| $c_5, c_9$ | $u^{78} - 2u^{77} + \cdots + 15u + 1$ |
| $c_6, c_7, c_{12}$ | $(u^{39} + 2u^{38} + \cdots + 2u + 1)^2$ |
| $c_8, c_{11}$ | $(u^{39} - 9u^{38} + \cdots + 41u - 8)^2$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_3$ | $y^{78} + 13y^{77} + \cdots - 2946466y + 39601$ |
| $c_2$ | $(y^{39} - 3y^{38} + \cdots + 85y - 4)^2$ |
| $c_4, c_{10}$ | $y^{78} + 4y^{77} + \cdots - 251y + 1$ |
| $c_5, c_9$ | $y^{78} + 16y^{77} + \cdots - 159y + 1$ |
| $c_6, c_7, c_{12}$ | $(y^{39} - 32y^{38} + \cdots + 14y - 1)^2$ |
| $c_8, c_{11}$ | $(y^{39} + 29y^{38} + \cdots + 1473y - 64)^2$ |

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

| Solutions to $I_2^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.123651 + 0.855009I$<br>$a = -1.77146 - 0.28783I$<br>$b = 1.355350 + 0.397482I$ | $-4.43189 - 6.50037I$ | $3.53586 + 10.69545I$ |
| $u = -0.123651 + 0.855009I$<br>$a = 2.68416 - 0.08902I$<br>$b = -2.40063 - 0.44845I$ | $-4.43189 - 6.50037I$ | $3.53586 + 10.69545I$ |
| $u = -0.123651 - 0.855009I$<br>$a = -1.77146 + 0.28783I$<br>$b = 1.355350 - 0.397482I$ | $-4.43189 + 6.50037I$ | $3.53586 - 10.69545I$ |
| $u = -0.123651 - 0.855009I$<br>$a = 2.68416 + 0.08902I$<br>$b = -2.40063 + 0.44845I$ | $-4.43189 + 6.50037I$ | $3.53586 - 10.69545I$ |
| $u = -0.063917 + 0.838666I$<br>$a = 2.25814 - 1.13574I$<br>$b = -2.20893 + 1.16309I$ | $-7.20996 - 5.30080I$ | $-6.54147 + 5.87182I$ |
| $u = -0.063917 + 0.838666I$<br>$a = -3.01341 - 0.84137I$<br>$b = 2.27518 + 0.86812I$ | $-7.20996 - 5.30080I$ | $-6.54147 + 5.87182I$ |
| $u = -0.063917 - 0.838666I$<br>$a = 2.25814 + 1.13574I$<br>$b = -2.20893 - 1.16309I$ | $-7.20996 + 5.30080I$ | $-6.54147 - 5.87182I$ |
| $u = -0.063917 - 0.838666I$<br>$a = -3.01341 + 0.84137I$<br>$b = 2.27518 - 0.86812I$ | $-7.20996 + 5.30080I$ | $-6.54147 - 5.87182I$ |
| $u = -1.133230 + 0.422673I$<br>$a = 0.381507 - 0.944409I$<br>$b = -1.052720 + 0.111590I$ | $-1.33992 + 1.91665I$ | $7.11970 - 8.94516I$ |
| $u = -1.133230 + 0.422673I$<br>$a = -0.64409 + 1.36564I$<br>$b = 2.18676 + 0.19276I$ | $-1.33992 + 1.91665I$ | $7.11970 - 8.94516I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-1.133230-0.422673I$<br>$a=\ \ 0.381507+0.944409I$<br>$b=-1.052720-0.111590I$ | $-1.33992-1.91665I$ | $7.11970+8.94516I$ |
| $u=-1.133230-0.422673I$<br>$a=-0.64409-1.36564I$<br>$b=\ \ 2.18676-0.19276I$ | $-1.33992-1.91665I$ | $7.11970+8.94516I$ |
| $u=-0.757825+0.192035I$<br>$a=\ \ 0.862379+0.191207I$<br>$b=\ \ 0.357929-0.065164I$ | $0.481717+0.049103I$ | $13.22495-2.86756I$ |
| $u=-0.757825+0.192035I$<br>$a=-0.367173+0.260313I$<br>$b=\ \ 1.42082-0.18186I$ | $0.481717+0.049103I$ | $13.22495-2.86756I$ |
| $u=-0.757825-0.192035I$<br>$a=\ \ 0.862379-0.191207I$<br>$b=\ \ 0.357929+0.065164I$ | $0.481717-0.049103I$ | $13.22495+2.86756I$ |
| $u=-0.757825-0.192035I$<br>$a=-0.367173-0.260313I$<br>$b=\ \ 1.42082+0.18186I$ | $0.481717-0.049103I$ | $13.22495+2.86756I$ |
| $u=\ \ 0.049569+0.770909I$<br>$a=\ \ 0.07625+2.42180I$<br>$b=-0.215843-1.013410I$ | $-2.37878+5.47730I$ | $1.04994-8.31805I$ |
| $u=\ \ 0.049569+0.770909I$<br>$a=-3.71600+0.97162I$<br>$b=\ \ 3.06226-1.06664I$ | $-2.37878+5.47730I$ | $1.04994-8.31805I$ |
| $u=\ \ 0.049569-0.770909I$<br>$a=\ \ 0.07625-2.42180I$<br>$b=-0.215843+1.013410I$ | $-2.37878-5.47730I$ | $1.04994+8.31805I$ |
| $u=\ \ 0.049569-0.770909I$<br>$a=-3.71600-0.97162I$<br>$b=\ \ 3.06226+1.06664I$ | $-2.37878-5.47730I$ | $1.04994+8.31805I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-0.506814+0.542713I$<br>$a=\ \ 0.481931-0.063254I$<br>$b=\ \ 0.377429-0.519249I$ | $1.05104-1.97403I$ | $16.0074+7.0550I$ |
| $u=-0.506814+0.542713I$<br>$a=\ \ 0.127230+0.318204I$<br>$b=-0.144855-0.286684I$ | $1.05104-1.97403I$ | $16.0074+7.0550I$ |
| $u=-0.506814-0.542713I$<br>$a=\ \ 0.481931+0.063254I$<br>$b=\ \ 0.377429+0.519249I$ | $1.05104+1.97403I$ | $16.0074-7.0550I$ |
| $u=-0.506814-0.542713I$<br>$a=\ \ 0.127230-0.318204I$<br>$b=-0.144855+0.286684I$ | $1.05104+1.97403I$ | $16.0074-7.0550I$ |
| $u=-1.206090+0.389767I$<br>$a=-1.25389+1.13808I$<br>$b=\ \ 1.55489+1.67996I$ | $-3.69786+0.88565I$ | $-3.87253-2.40555I$ |
| $u=-1.206090+0.389767I$<br>$a=\ \ 0.43407-1.76270I$<br>$b=-2.10776+0.41811I$ | $-3.69786+0.88565I$ | $-3.87253-2.40555I$ |
| $u=-1.206090-0.389767I$<br>$a=-1.25389-1.13808I$<br>$b=\ \ 1.55489-1.67996I$ | $-3.69786-0.88565I$ | $-3.87253+2.40555I$ |
| $u=-1.206090-0.389767I$<br>$a=\ \ 0.43407+1.76270I$<br>$b=-2.10776-0.41811I$ | $-3.69786-0.88565I$ | $-3.87253+2.40555I$ |
| $u=\ \ 1.233670+0.316469I$<br>$a=-1.15724+0.96995I$<br>$b=\ \ 0.421855-0.995500I$ | $1.25464-1.55345I$ | $4.26613+4.65636I$ |
| $u=\ \ 1.233670+0.316469I$<br>$a=\ \ 0.32061+2.14479I$<br>$b=-3.21372-0.03357I$ | $1.25464-1.55345I$ | $4.26613+4.65636I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.233670 - 0.316469I$<br>$a = -1.15724 - 0.96995I$<br>$b = 0.421855 + 0.995500I$ | $1.25464 + 1.55345I$ | $4.26613 - 4.65636I$ |
| $u = 1.233670 - 0.316469I$<br>$a = 0.32061 - 2.14479I$<br>$b = -3.21372 + 0.03357I$ | $1.25464 + 1.55345I$ | $4.26613 - 4.65636I$ |
| $u = 1.273050 + 0.106169I$<br>$a = 0.608908 - 0.637834I$<br>$b = 0.296458 - 1.362430I$ | $3.32972 + 5.12862I$ | $3.60822 - 7.93881I$ |
| $u = 1.273050 + 0.106169I$<br>$a = 0.327473 - 1.231730I$<br>$b = 0.41014 + 1.38736I$ | $3.32972 + 5.12862I$ | $3.60822 - 7.93881I$ |
| $u = 1.273050 - 0.106169I$<br>$a = 0.608908 + 0.637834I$<br>$b = 0.296458 + 1.362430I$ | $3.32972 - 5.12862I$ | $3.60822 + 7.93881I$ |
| $u = 1.273050 - 0.106169I$<br>$a = 0.327473 + 1.231730I$<br>$b = 0.41014 - 1.38736I$ | $3.32972 - 5.12862I$ | $3.60822 + 7.93881I$ |
| $u = 0.007878 + 0.698911I$<br>$a = 0.412394 - 0.002485I$<br>$b = -0.533870 - 0.726362I$ | $-1.02896 - 2.54522I$ | $3.65939 + 1.47176I$ |
| $u = 0.007878 + 0.698911I$<br>$a = 3.23412 - 1.35354I$<br>$b = -1.86056 + 0.74398I$ | $-1.02896 - 2.54522I$ | $3.65939 + 1.47176I$ |
| $u = 0.007878 - 0.698911I$<br>$a = 0.412394 + 0.002485I$<br>$b = -0.533870 + 0.726362I$ | $-1.02896 + 2.54522I$ | $3.65939 - 1.47176I$ |
| $u = 0.007878 - 0.698911I$<br>$a = 3.23412 + 1.35354I$<br>$b = -1.86056 - 0.74398I$ | $-1.02896 + 2.54522I$ | $3.65939 - 1.47176I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-1.288800+0.298775I$<br>$a=\ \ 0.0834285-0.1010380I$<br>$b=\ \ 1.053860-0.550749I$ | $3.03679-1.08193I$ | $9.39220+0.I$ |
| $u=-1.288800+0.298775I$<br>$a=-1.87346+1.27639I$<br>$b=\ \ 2.09459+1.34584I$ | $3.03679-1.08193I$ | $9.39220+0.I$ |
| $u=-1.288800-0.298775I$<br>$a=\ \ 0.0834285+0.1010380I$<br>$b=\ \ 1.053860+0.550749I$ | $3.03679+1.08193I$ | $9.39220+0.I$ |
| $u=-1.288800-0.298775I$<br>$a=-1.87346-1.27639I$<br>$b=\ \ 2.09459-1.34584I$ | $3.03679+1.08193I$ | $9.39220+0.I$ |
| $u=-1.324220+0.023221I$<br>$a=-1.004440+0.507659I$<br>$b=-0.67432+1.84418I$ | $6.27729-4.23327I$ | $13.4928+5.6612I$ |
| $u=-1.324220+0.023221I$<br>$a=\ \ 1.192020-0.491264I$<br>$b=-0.073206+1.385530I$ | $6.27729-4.23327I$ | $13.4928+5.6612I$ |
| $u=-1.324220-0.023221I$<br>$a=-1.004440-0.507659I$<br>$b=-0.67432-1.84418I$ | $6.27729+4.23327I$ | $13.4928-5.6612I$ |
| $u=-1.324220-0.023221I$<br>$a=\ \ 1.192020+0.491264I$<br>$b=-0.073206-1.385530I$ | $6.27729+4.23327I$ | $13.4928-5.6612I$ |
| $u=\ \ 1.299180+0.291471I$<br>$a=-0.127194-0.519240I$<br>$b=\ \ 0.101917-0.905492I$ | $3.04618+6.08935I$ | $9.11052-5.32314I$ |
| $u=\ \ 1.299180+0.291471I$<br>$a=-0.58286-1.84086I$<br>$b=\ \ 1.88079-0.04494I$ | $3.04618+6.08935I$ | $9.11052-5.32314I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.299180 - 0.291471I$<br>$a = -0.127194 + 0.519240I$<br>$b = 0.101917 + 0.905492I$ | $3.04618 - 6.08935I$ | $9.11052 + 5.32314I$ |
| $u = 1.299180 - 0.291471I$<br>$a = -0.58286 + 1.84086I$<br>$b = 1.88079 + 0.04494I$ | $3.04618 - 6.08935I$ | $9.11052 + 5.32314I$ |
| $u = -1.303360 + 0.334319I$<br>$a = 1.15816 + 1.12222I$<br>$b = 0.006325 - 1.085460I$ | $1.85272 - 9.46925I$ | $0. + 10.60799I$ |
| $u = -1.303360 + 0.334319I$<br>$a = 1.61855 - 1.77976I$<br>$b = -2.89602 - 1.91883I$ | $1.85272 - 9.46925I$ | $0. + 10.60799I$ |
| $u = -1.303360 - 0.334319I$<br>$a = 1.15816 - 1.12222I$<br>$b = 0.006325 + 1.085460I$ | $1.85272 + 9.46925I$ | $0. - 10.60799I$ |
| $u = -1.303360 - 0.334319I$<br>$a = 1.61855 + 1.77976I$<br>$b = -2.89602 + 1.91883I$ | $1.85272 + 9.46925I$ | $0. - 10.60799I$ |
| $u = 1.36287$<br>$a = -0.974911$<br>$b = -0.855309$ | $6.48774$ | $13.8410$ |
| $u = 1.36287$<br>$a = -0.873301$<br>$b = 0.0714531$ | $6.48774$ | $13.8410$ |
| $u = 1.313580 + 0.373944I$<br>$a = 0.02364 - 1.49562I$<br>$b = 2.63616 + 0.57247I$ | $-2.90240 + 9.65793I$ | $0$ |
| $u = 1.313580 + 0.373944I$<br>$a = 1.59640 + 1.39253I$<br>$b = -2.30070 + 1.28293I$ | $-2.90240 + 9.65793I$ | $0$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.313580 - 0.373944I$<br>$a = 0.02364 + 1.49562I$<br>$b = 2.63616 - 0.57247I$ | $-2.90240 - 9.65793I$ | 0 |
| $u = 1.313580 - 0.373944I$<br>$a = 1.59640 - 1.39253I$<br>$b = -2.30070 - 1.28293I$ | $-2.90240 - 9.65793I$ | 0 |
| $u = 1.352090 + 0.376162I$<br>$a = 0.912749 + 0.851853I$<br>$b = -1.48397 + 0.70255I$ | $0.20827 + 10.92560I$ | 0 |
| $u = 1.352090 + 0.376162I$<br>$a = -0.96319 - 1.60889I$<br>$b = 2.36793 - 0.95704I$ | $0.20827 + 10.92560I$ | 0 |
| $u = 1.352090 - 0.376162I$<br>$a = 0.912749 - 0.851853I$<br>$b = -1.48397 - 0.70255I$ | $0.20827 - 10.92560I$ | 0 |
| $u = 1.352090 - 0.376162I$<br>$a = -0.96319 + 1.60889I$<br>$b = 2.36793 + 0.95704I$ | $0.20827 - 10.92560I$ | 0 |
| $u = 1.40890 + 0.13092I$<br>$a = -0.713500 - 0.184447I$<br>$b = -0.272694 + 0.261424I$ | $7.17527 + 4.13148I$ | 0 |
| $u = 1.40890 + 0.13092I$<br>$a = 0.125998 - 0.164559I$<br>$b = 0.094521 - 0.700099I$ | $7.17527 + 4.13148I$ | 0 |
| $u = 1.40890 - 0.13092I$<br>$a = -0.713500 + 0.184447I$<br>$b = -0.272694 - 0.261424I$ | $7.17527 - 4.13148I$ | 0 |
| $u = 1.40890 - 0.13092I$<br>$a = 0.125998 + 0.164559I$<br>$b = 0.094521 + 0.700099I$ | $7.17527 - 4.13148I$ | 0 |

| Solutions to $I_2^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.218111 + 0.511499I$<br>$a = -0.096291 + 0.207038I$<br>$b = -0.582754 - 0.545183I$ | $-1.06178 - 3.07962I$ | $-0.39349 + 8.73887I$ |
| $u = -0.218111 + 0.511499I$<br>$a = 1.70766 - 1.62859I$<br>$b = -0.685003 - 0.101681I$ | $-1.06178 - 3.07962I$ | $-0.39349 + 8.73887I$ |
| $u = -0.218111 - 0.511499I$<br>$a = -0.096291 - 0.207038I$<br>$b = -0.582754 + 0.545183I$ | $-1.06178 + 3.07962I$ | $-0.39349 - 8.73887I$ |
| $u = -0.218111 - 0.511499I$<br>$a = 1.70766 + 1.62859I$<br>$b = -0.685003 + 0.101681I$ | $-1.06178 + 3.07962I$ | $-0.39349 - 8.73887I$ |
| $u = 0.306674 + 0.085981I$<br>$a = 0.77627 - 1.78794I$<br>$b = 0.74393 + 1.20863I$ | $1.31871 + 3.86348I$ | $13.1636 - 8.7518I$ |
| $u = 0.306674 + 0.085981I$<br>$a = -2.69574 - 2.71187I$<br>$b = -0.599614 + 0.140224I$ | $1.31871 + 3.86348I$ | $13.1636 - 8.7518I$ |
| $u = 0.306674 - 0.085981I$<br>$a = 0.77627 + 1.78794I$<br>$b = 0.74393 - 1.20863I$ | $1.31871 - 3.86348I$ | $13.1636 + 8.7518I$ |
| $u = 0.306674 - 0.085981I$<br>$a = -2.69574 + 2.71187I$<br>$b = -0.599614 - 0.140224I$ | $1.31871 - 3.86348I$ | $13.1636 + 8.7518I$ |

**III.**

$$\boldsymbol{I^u_3 = \langle 3u^{21} - 2u^{20} + \cdots + b - 2,\ -u^{21} + u^{20} + \cdots + a + 4,\ u^{22} - 2u^{21} + \cdots + u + 1\rangle}$$

**(i) Arc colorings**

$$a_1 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$

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

$$a_7 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$

$$a_{12} = \begin{pmatrix} -u \\ -u^3 + u \end{pmatrix}$$

$$a_3 = \begin{pmatrix} u^{21} - u^{20} + \cdots - 2u - 4 \\ -3u^{21} + 2u^{20} + \cdots + 21u^2 + 2 \end{pmatrix}$$

$$a_6 = \begin{pmatrix} -u^2 + 1 \\ -u^4 + 2u^2 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} 3u^{21} - 3u^{20} + \cdots - u - 5 \\ -6u^{21} + 4u^{20} + \cdots + 3u + 4 \end{pmatrix}$$

$$a_2 = \begin{pmatrix} u^{20} - u^{19} + \cdots - 11u - 2 \\ -2u^{21} + u^{20} + \cdots + 4u + 2 \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} u^3 - 2u \\ -u^3 + u \end{pmatrix}$$

$$a_9 = \begin{pmatrix} u^6 - 3u^4 + 2u^2 + 1 \\ -u^6 + 2u^4 - u^2 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} u^{20} - u^{19} + \cdots - 11u + 1 \\ -4u^{21} + 3u^{20} + \cdots + 10u + 4 \end{pmatrix}$$

$$a_5 = \begin{pmatrix} 2u^{21} - 2u^{20} + \cdots - 2u - 4 \\ -3u^{21} + 2u^{20} + \cdots - u + 2 \end{pmatrix}$$

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

**(iii) Cusp Shapes**

$= -18u^{21} + 12u^{20} + 164u^{19} - 73u^{18} - 631u^{17} + 113u^{16} + 1249u^{15} + 212u^{14} - 1109u^{13} - 922u^{12} - 246u^{11} + 972u^{10} + 1326u^9 + 140u^8 - 690u^7 - 782u^6 - 335u^5 + 134u^4 + 253u^3 + 234u^2 + 51u + 19$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1, c_3$ | $u^{22} - 7u^{21} + \cdots - 10u + 1$ |
| $c_2$ | $u^{22} + 15u^{21} + \cdots + 62u + 5$ |
| $c_4, c_{10}$ | $u^{22} + u^{21} + \cdots + 5u^2 + 1$ |
| $c_5, c_9$ | $u^{22} + 5u^{20} + \cdots - u + 1$ |
| $c_6, c_7$ | $u^{22} - 2u^{21} + \cdots + u + 1$ |
| $c_8$ | $u^{22} + 6u^{21} + \cdots + 21u + 5$ |
| $c_{11}$ | $u^{22} - 6u^{21} + \cdots - 21u + 5$ |
| $c_{12}$ | $u^{22} + 2u^{21} + \cdots - u + 1$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_3$ | $y^{22} + 11y^{21} + \cdots - 2y + 1$ |
| $c_2$ | $y^{22} + 3y^{21} + \cdots - 84y + 25$ |
| $c_4, c_{10}$ | $y^{22} + 7y^{21} + \cdots + 10y + 1$ |
| $c_5, c_9$ | $y^{22} + 10y^{21} + \cdots + 7y + 1$ |
| $c_6, c_7, c_{12}$ | $y^{22} - 20y^{21} + \cdots + 23y + 1$ |
| $c_8, c_{11}$ | $y^{22} + 12y^{21} + \cdots + 529y + 25$ |

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

| Solutions to $I^u_3$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-0.083765+0.835376I$<br>$a=-2.53587-0.25325I$<br>$b=\ \ 2.09538+0.30590I$ | $-5.58210-5.56224I$ | $-0.33278+5.61076I$ |
| $u=-0.083765-0.835376I$<br>$a=-2.53587+0.25325I$<br>$b=\ \ 2.09538-0.30590I$ | $-5.58210+5.56224I$ | $-0.33278-5.61076I$ |
| $u=-0.475591+0.593446I$<br>$a=-0.242359+0.230281I$<br>$b=-0.154285+0.239343I$ | $0.59401-2.04789I$ | $-6.78919+8.33532I$ |
| $u=-0.475591-0.593446I$<br>$a=-0.242359-0.230281I$<br>$b=-0.154285-0.239343I$ | $0.59401+2.04789I$ | $-6.78919-8.33532I$ |
| $u=-1.179230+0.391528I$<br>$a=\ \ 0.59508-1.38345I$<br>$b=-1.73243-0.23268I$ | $-2.22170+1.14853I$ | $2.14445-1.86985I$ |
| $u=-1.179230-0.391528I$<br>$a=\ \ 0.59508+1.38345I$<br>$b=-1.73243+0.23268I$ | $-2.22170-1.14853I$ | $2.14445+1.86985I$ |
| $u=\ \ 0.011243+0.717282I$<br>$a=\ \ 2.12798+1.49333I$<br>$b=-1.68397-0.42028I$ | $-1.64583+3.75609I$ | $0.57652-6.79053I$ |
| $u=\ \ 0.011243-0.717282I$<br>$a=\ \ 2.12798-1.49333I$<br>$b=-1.68397+0.42028I$ | $-1.64583-3.75609I$ | $0.57652+6.79053I$ |
| $u=\ \ 1.300670+0.072382I$<br>$a=\ \ 0.256368+0.166926I$<br>$b=-0.30681-1.72598I$ | $4.80274+4.89641I$ | $9.74683-7.87967I$ |
| $u=\ \ 1.300670-0.072382I$<br>$a=\ \ 0.256368-0.166926I$<br>$b=-0.30681+1.72598I$ | $4.80274-4.89641I$ | $9.74683+7.87967I$ |

| Solutions to $I_3^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.273250 + 0.294154I$<br>$a = -1.192430 - 0.456556I$<br>$b = 1.92456 - 0.89194I$ | $2.27717 - 0.10563I$ | $6.12462 + 3.49316I$ |
| $u = 1.273250 - 0.294154I$<br>$a = -1.192430 + 0.456556I$<br>$b = 1.92456 + 0.89194I$ | $2.27717 + 0.10563I$ | $6.12462 - 3.49316I$ |
| $u = -1.311820 + 0.109771I$<br>$a = -0.355234 - 1.013560I$<br>$b = -0.423319 - 0.141616I$ | $4.72723 + 2.17924I$ | $8.35049 - 2.29721I$ |
| $u = -1.311820 - 0.109771I$<br>$a = -0.355234 + 1.013560I$<br>$b = -0.423319 + 0.141616I$ | $4.72723 - 2.17924I$ | $8.35049 + 2.29721I$ |
| $u = -1.289130 + 0.294586I$<br>$a = 0.17593 + 1.69035I$<br>$b = 1.51498 + 0.02014I$ | $2.41432 - 7.40770I$ | $5.29212 + 9.89233I$ |
| $u = -1.289130 - 0.294586I$<br>$a = 0.17593 - 1.69035I$<br>$b = 1.51498 - 0.02014I$ | $2.41432 + 7.40770I$ | $5.29212 - 9.89233I$ |
| $u = 1.324580 + 0.368590I$<br>$a = 1.07391 + 1.27879I$<br>$b = -2.26492 + 0.82769I$ | $-1.17021 + 9.88984I$ | $4.50443 - 8.10827I$ |
| $u = 1.324580 - 0.368590I$<br>$a = 1.07391 - 1.27879I$<br>$b = -2.26492 - 0.82769I$ | $-1.17021 - 9.88984I$ | $4.50443 + 8.10827I$ |
| $u = 1.44830 + 0.20263I$<br>$a = 0.269630 + 0.177889I$<br>$b = 0.1028190 + 0.0400194I$ | $6.74015 + 4.85997I$ | $-3.8232 - 25.0005I$ |
| $u = 1.44830 - 0.20263I$<br>$a = 0.269630 - 0.177889I$<br>$b = 0.1028190 - 0.0400194I$ | $6.74015 - 4.85997I$ | $-3.8232 + 25.0005I$ |

| Solutions to $I_3^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.018493 + 0.294318I$<br>$a = -3.17301 - 0.51149I$<br>$b = \quad 0.428003 - 0.695837I$ | $0.57876 - 3.67907I$ | $0.70568 + 5.96025I$ |
| $u = -0.018493 - 0.294318I$<br>$a = -3.17301 + 0.51149I$<br>$b = \quad 0.428003 + 0.695837I$ | $0.57876 + 3.67907I$ | $0.70568 - 5.96025I$ |

## IV. $I_4^u = \langle b^2 + b - 1,\ a - 1,\ u + 1 \rangle$

**(i) Arc colorings**

$$a_1 = \begin{pmatrix} 0 \\ -1 \end{pmatrix}$$
$$a_8 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$
$$a_{12} = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} 1 \\ b \end{pmatrix}$$
$$a_6 = \begin{pmatrix} 0 \\ 1 \end{pmatrix}$$
$$a_4 = \begin{pmatrix} 1 \\ b+1 \end{pmatrix}$$
$$a_2 = \begin{pmatrix} 1 \\ b \end{pmatrix}$$
$$a_{11} = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} b+1 \\ -b+1 \end{pmatrix}$$
$$a_5 = \begin{pmatrix} b+2 \\ b+1 \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= -5$

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

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

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

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

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

| Solutions to $I_4^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -1.00000$<br>$a = \ \ 1.00000$<br>$b = \ \ 0.618034$ | 0 | $-5.00000$ |
| $u = -1.00000$<br>$a = \ \ 1.00000$<br>$b = -1.61803$ | 0 | $-5.00000$ |

## V. $\boldsymbol{I_1^v = \langle a,\ b+1,\ v-1\rangle}$

**(i) Arc colorings**

$a_1 = \begin{pmatrix}1\\0\end{pmatrix}$

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

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

$a_{12} = \begin{pmatrix}1\\0\end{pmatrix}$

$a_3 = \begin{pmatrix}0\\-1\end{pmatrix}$

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

$a_4 = \begin{pmatrix}1\\-1\end{pmatrix}$

$a_2 = \begin{pmatrix}0\\1\end{pmatrix}$

$a_{11} = \begin{pmatrix}1\\0\end{pmatrix}$

$a_9 = \begin{pmatrix}1\\0\end{pmatrix}$

$a_{10} = \begin{pmatrix}1\\1\end{pmatrix}$

$a_5 = \begin{pmatrix}0\\-1\end{pmatrix}$

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

**(iii) Cusp Shapes** $= -6$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1, c_3, c_4$<br>$c_5, c_9, c_{10}$ | $u+1$ |
| $c_2, c_6, c_7$<br>$c_8, c_{11}, c_{12}$ | $u$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_3, c_4$<br>$c_5, c_9, c_{10}$ | $y - 1$ |
| $c_2, c_6, c_7$<br>$c_8, c_{11}, c_{12}$ | $y$ |

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

| Solutions to $I_1^v$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $v = 1.00000$<br>$a = 0$<br>$b = -1.00000$ | $-1.64493$ | $-6.00000$ |

## VI. u-Polynomials

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1, c_3$ | $((u-1)^2)(u+1)(u^{22}-7u^{21}+\cdots-10u+1)(u^{60}+8u^{59}+\cdots-27u+1)$ $\cdot(u^{78}-3u^{77}+\cdots-2666u+199)$ |
| $c_2$ | $u^3(u^{22}+15u^{21}+\cdots+62u+5)(u^{39}-19u^{38}+\cdots+3u-2)^2$ $\cdot(u^{60}+34u^{59}+\cdots-87u-11)$ |
| $c_4, c_{10}$ | $(u+1)(u^2+u-1)(u^{22}+u^{21}+\cdots+5u^2+1)(u^{60}+17u^{56}+\cdots+7u+1)$ $\cdot(u^{78}-2u^{77}+\cdots+35u+1)$ |
| $c_5, c_9$ | $(u+1)(u^2+u-1)(u^{22}+5u^{20}+\cdots-u+1)(u^{60}-u^{59}+\cdots+4u-1)$ $\cdot(u^{78}-2u^{77}+\cdots+15u+1)$ |
| $c_6, c_7$ | $u(u+1)^2(u^{22}-2u^{21}+\cdots+u+1)(u^{39}+2u^{38}+\cdots+2u+1)^2$ $\cdot(u^{60}-5u^{59}+\cdots+38u+11)$ |
| $c_8$ | $u^3(u^{22}+6u^{21}+\cdots+21u+5)(u^{39}-9u^{38}+\cdots+41u-8)^2$ $\cdot(u^{60}+15u^{59}+\cdots-25484u-1639)$ |
| $c_{11}$ | $u^3(u^{22}-6u^{21}+\cdots-21u+5)(u^{39}-9u^{38}+\cdots+41u-8)^2$ $\cdot(u^{60}+15u^{59}+\cdots-25484u-1639)$ |
| $c_{12}$ | $u(u-1)^2(u^{22}+2u^{21}+\cdots-u+1)(u^{39}+2u^{38}+\cdots+2u+1)^2$ $\cdot(u^{60}-5u^{59}+\cdots+38u+11)$ |

## VII. Riley Polynomials

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_3$ | $((y-1)^3)(y^{22}+11y^{21}+\cdots-2y+1)(y^{60}-44y^{59}+\cdots-175y+1)$ $\cdot\,(y^{78}+13y^{77}+\cdots-2946466y+39601)$ |
| $c_2$ | $y^3(y^{22}+3y^{21}+\cdots-84y+25)(y^{39}-3y^{38}+\cdots+85y-4)^2$ $\cdot\,(y^{60}+58y^{58}+\cdots-1409y+121)$ |
| $c_4, c_{10}$ | $(y-1)(y^2-3y+1)(y^{22}+7y^{21}+\cdots+10y+1)$ $\cdot\,(y^{60}+34y^{58}+\cdots-55y+1)(y^{78}+4y^{77}+\cdots-251y+1)$ |
| $c_5, c_9$ | $(y-1)(y^2-3y+1)(y^{22}+10y^{21}+\cdots+7y+1)$ $\cdot\,(y^{60}-25y^{59}+\cdots-66y+1)(y^{78}+16y^{77}+\cdots-159y+1)$ |
| $c_6, c_7, c_{12}$ | $y(y-1)^2(y^{22}-20y^{21}+\cdots+23y+1)$ $\cdot\,((y^{39}-32y^{38}+\cdots+14y-1)^2)(y^{60}-51y^{59}+\cdots-674y+121)$ |
| $c_8, c_{11}$ | $y^3(y^{22}+12y^{21}+\cdots+529y+25)(y^{39}+29y^{38}+\cdots+1473y-64)^2$ $\cdot\,(y^{60}+41y^{59}+\cdots-39182108y+2686321)$ |