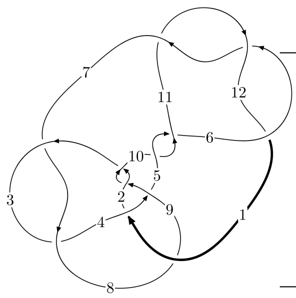
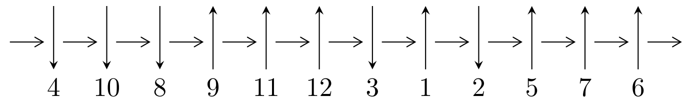
# $12a_{1177}$ $(K12a_{1177})$




A knot diagram[1]

**Linearized knot diagam**




**Solving Sequence**

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

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

$$\begin{aligned}
I_1^u = \langle &-4.26355 \times 10^{21} u^{36} - 4.65847 \times 10^{21} u^{35} + \cdots + 8.18871 \times 10^{21} b - 1.58097 \times 10^{21},\\
&6.44134 \times 10^{21} u^{36} + 4.23042 \times 10^{21} u^{35} + \cdots + 8.18871 \times 10^{21} a + 1.81600 \times 10^{21},\ u^{37} + u^{36} + \cdots + 2u^2 + 1\rangle\\
I_2^u = \langle &-1.64908 \times 10^{149} u^{59} + 3.34873 \times 10^{149} u^{58} + \cdots + 7.81855 \times 10^{149} b - 4.35814 \times 10^{151},\\
&- 6.45563 \times 10^{151} u^{59} + 1.26626 \times 10^{152} u^{58} + \cdots + 2.11883 \times 10^{152} a - 1.81648 \times 10^{154},\\
&u^{60} - u^{59} + \cdots - 152u + 271\rangle\\
I_3^u = \langle &-u^{20} + u^{19} + \cdots + b - 1,\ -u^{19} + u^{18} + \cdots + a - 1,\ u^{21} - u^{20} + \cdots + u - 1\rangle\\
I_4^u = \langle &932291063 u^{17} + 893351307 u^{16} + \cdots + 7145725436 b + 14866160218,\\
&18572309288 u^{17} + 15580732761 u^{16} + \cdots + 7860297973 a + 300923661828,\\
&u^{18} - 6u^{16} + \cdots + 26u - 11\rangle
\end{aligned}$$

* 4 irreducible components of $\dim_{\mathbb{C}} = 0$, with total 136 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.**

$I_1^u = \langle -4.26\times10^{21}u^{36} - 4.66\times10^{21}u^{35} + \cdots + 8.19\times10^{21}b - 1.58\times10^{21},\ 6.44\times10^{21}u^{36} + 4.23\times10^{21}u^{35} + \cdots + 8.19\times10^{21}a + 1.82\times10^{21},\ u^{37} + u^{36} + \cdots + 2u^2 + 1\rangle$

**(i) Arc colorings**

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

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

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

$$a_3 = \begin{pmatrix} -u \\ -u^3 + u \end{pmatrix}$$

$$a_5 = \begin{pmatrix} -0.786612u^{36} - 0.516616u^{35} + \cdots + 0.307274u - 0.221769 \\ 0.520662u^{36} + 0.568889u^{35} + \cdots - 0.0878633u + 0.193067 \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} 0.169413u^{36} - 0.278568u^{35} + \cdots + 0.100583u + 1.08723 \\ -0.193067u^{36} + 0.327595u^{35} + \cdots - 0.742279u - 1.08786 \end{pmatrix}$$

$$a_6 = \begin{pmatrix} -0.771491u^{36} + 0.281145u^{35} + \cdots + 0.204847u - 1.00896 \\ -0.582458u^{36} - 0.514755u^{35} + \cdots + 0.796684u + 0.548671 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} -1.30727u^{36} - 1.08551u^{35} + \cdots + 0.395137u - 0.414836 \\ 0.520662u^{36} + 0.568889u^{35} + \cdots - 0.0878633u + 0.193067 \end{pmatrix}$$

$$a_1 = \begin{pmatrix} -0.607890u^{36} - 0.486704u^{35} + \cdots + 0.388479u - 0.0924838 \\ 0.520662u^{36} + 0.568889u^{35} + \cdots - 0.0878633u + 0.193067 \end{pmatrix}$$

$$a_8 = \begin{pmatrix} -0.414836u^{36} + 0.892438u^{35} + \cdots - 0.327443u - 1.39514 \\ 0.193067u^{36} - 0.327595u^{35} + \cdots + 0.742279u + 1.08786 \end{pmatrix}$$

$$a_7 = \begin{pmatrix} -0.414836u^{36} + 0.892438u^{35} + \cdots - 0.327443u - 1.39514 \\ 0.193067u^{36} - 0.327595u^{35} + \cdots + 0.742279u + 1.08786 \end{pmatrix}$$

$$a_{12} = \begin{pmatrix} 0.456823u^{36} + 0.679879u^{35} + \cdots - 0.501075u - 1.20565 \\ -0.449008u^{36} - 0.538538u^{35} + \cdots - 1.03063u + 0.204677 \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= \frac{142665128918984539683337}{818871045829994877138 7}u^{36} + \frac{422001871784122493721 94}{818871045829994877138 7}u^{35} + \cdots + \frac{48911606298252852428 67}{818871045829994877138 7}u - \frac{36295754117365129264878}{8188710458299948771387}$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $u^{37} - 30u^{36} + \cdots + 159744u - 8192$ |
| $c_2, c_3, c_7$ $c_9$ | $u^{37} - u^{36} + \cdots - 2u^2 - 1$ |
| $c_4, c_8$ | $u^{37} - 6u^{35} + \cdots - u + 1$ |
| $c_5, c_{10}$ | $u^{37} - 7u^{36} + \cdots - 3368u + 464$ |
| $c_6, c_{11}, c_{12}$ | $u^{37} + 7u^{36} + \cdots + 24u + 8$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $y^{37} - 6y^{36} + \cdots - 16777216y - 67108864$ |
| $c_2, c_3, c_7$ $c_9$ | $y^{37} - 23y^{36} + \cdots - 4y - 1$ |
| $c_4, c_8$ | $y^{37} - 12y^{36} + \cdots + 25y - 1$ |
| $c_5, c_{10}$ | $y^{37} - 21y^{36} + \cdots - 1481536y - 215296$ |
| $c_6, c_{11}, c_{12}$ | $y^{37} + 31y^{36} + \cdots + 96y - 64$ |

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

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.786239 + 0.506891I$<br>$a = -0.05205 - 1.43237I$<br>$b = 0.564891 - 0.231667I$ | $-0.47617 - 1.67526I$ | $3.31637 + 3.88563I$ |
| $u = 0.786239 - 0.506891I$<br>$a = -0.05205 + 1.43237I$<br>$b = 0.564891 + 0.231667I$ | $-0.47617 + 1.67526I$ | $3.31637 - 3.88563I$ |
| $u = -0.938042 + 0.514832I$<br>$a = -0.11839 - 1.74298I$<br>$b = -0.527751 - 0.388617I$ | $1.95031 + 5.87839I$ | $4.68305 - 8.83918I$ |
| $u = -0.938042 - 0.514832I$<br>$a = -0.11839 + 1.74298I$<br>$b = -0.527751 + 0.388617I$ | $1.95031 - 5.87839I$ | $4.68305 + 8.83918I$ |
| $u = -0.871027 + 0.217583I$<br>$a = 1.13089 - 2.14076I$<br>$b = -0.275665 - 0.186662I$ | $-7.65556 + 1.16201I$ | $9.69224 - 3.73584I$ |
| $u = -0.871027 - 0.217583I$<br>$a = 1.13089 + 2.14076I$<br>$b = -0.275665 + 0.186662I$ | $-7.65556 - 1.16201I$ | $9.69224 + 3.73584I$ |
| $u = -0.197332 + 0.860026I$<br>$a = -0.493764 - 0.476709I$<br>$b = -1.077980 + 0.353331I$ | $2.88989 + 2.19276I$ | $5.78492 - 1.61701I$ |
| $u = -0.197332 - 0.860026I$<br>$a = -0.493764 + 0.476709I$<br>$b = -1.077980 - 0.353331I$ | $2.88989 - 2.19276I$ | $5.78492 + 1.61701I$ |
| $u = 0.867464 + 0.083394I$<br>$a = 0.529466 + 0.182358I$<br>$b = -1.342910 + 0.189263I$ | $0.61724 - 4.98585I$ | $-5.04944 + 5.32957I$ |
| $u = 0.867464 - 0.083394I$<br>$a = 0.529466 - 0.182358I$<br>$b = -1.342910 - 0.189263I$ | $0.61724 + 4.98585I$ | $-5.04944 - 5.32957I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.014480 + 0.500016I$<br>$a = 0.20956 - 1.88598I$<br>$b = 0.486016 - 0.467133I$ | $-3.05947 - 10.02590I$ | $-0.75769 + 10.58122I$ |
| $u = 1.014480 - 0.500016I$<br>$a = 0.20956 + 1.88598I$<br>$b = 0.486016 + 0.467133I$ | $-3.05947 + 10.02590I$ | $-0.75769 - 10.58122I$ |
| $u = 0.112842 + 0.850155I$<br>$a = 0.486442 - 0.375861I$<br>$b = 1.104810 + 0.459227I$ | $6.59902 + 2.08871I$ | $9.63522 - 2.30278I$ |
| $u = 0.112842 - 0.850155I$<br>$a = 0.486442 + 0.375861I$<br>$b = 1.104810 - 0.459227I$ | $6.59902 - 2.08871I$ | $9.63522 + 2.30278I$ |
| $u = -0.854222$<br>$a = -0.533319$<br>$b = 1.36822$ | $4.57429$ | $-2.43030$ |
| $u = -0.040212 + 0.829668I$<br>$a = -0.467034 - 0.291029I$<br>$b = -1.123270 + 0.557085I$ | $2.48071 - 6.37865I$ | $5.52659 + 5.53285I$ |
| $u = -0.040212 - 0.829668I$<br>$a = -0.467034 + 0.291029I$<br>$b = -1.123270 - 0.557085I$ | $2.48071 + 6.37865I$ | $5.52659 - 5.53285I$ |
| $u = 1.188220 + 0.324567I$<br>$a = 0.393074 + 1.111990I$<br>$b = -0.985784 + 0.826481I$ | $-4.69685 - 4.30202I$ | $-1.33639 + 3.29100I$ |
| $u = 1.188220 - 0.324567I$<br>$a = 0.393074 - 1.111990I$<br>$b = -0.985784 - 0.826481I$ | $-4.69685 + 4.30202I$ | $-1.33639 - 3.29100I$ |
| $u = -1.230060 + 0.209006I$<br>$a = -0.642023 + 1.250600I$<br>$b = 0.802751 + 0.762812I$ | $-10.76160 + 1.15123I$ | $-6.36296 - 3.58931I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -1.230060 - 0.209006I$<br>$a = -0.642023 - 1.250600I$<br>$b = 0.802751 - 0.762812I$ | $-10.76160 - 1.15123I$ | $-6.36296 + 3.58931I$ |
| $u = 0.631734 + 0.394223I$<br>$a = -0.346242 - 1.053410I$<br>$b = 0.495352 - 0.068506I$ | $-0.69024 - 1.62727I$ | $2.64679 + 4.87601I$ |
| $u = 0.631734 - 0.394223I$<br>$a = -0.346242 + 1.053410I$<br>$b = 0.495352 + 0.068506I$ | $-0.69024 + 1.62727I$ | $2.64679 - 4.87601I$ |
| $u = -1.252060 + 0.433441I$<br>$a = -0.181287 + 1.213950I$<br>$b = 1.04062 + 0.98120I$ | $-5.43992 + 8.56805I$ | $-2.09898 - 8.35054I$ |
| $u = -1.252060 - 0.433441I$<br>$a = -0.181287 - 1.213950I$<br>$b = 1.04062 - 0.98120I$ | $-5.43992 - 8.56805I$ | $-2.09898 + 8.35054I$ |
| $u = -1.30438 + 0.61058I$<br>$a = 0.097835 + 1.270040I$<br>$b = 1.16668 + 1.13599I$ | $-3.73598 + 9.12102I$ | $0. - 4.65522I$ |
| $u = -1.30438 - 0.61058I$<br>$a = 0.097835 - 1.270040I$<br>$b = 1.16668 - 1.13599I$ | $-3.73598 - 9.12102I$ | $0. + 4.65522I$ |
| $u = 1.38464 + 0.43559I$<br>$a = 0.14229 + 1.42555I$<br>$b = -0.95760 + 1.11622I$ | $-12.1564 - 10.3966I$ | $-6.47193 + 7.01607I$ |
| $u = 1.38464 - 0.43559I$<br>$a = 0.14229 - 1.42555I$<br>$b = -0.95760 - 1.11622I$ | $-12.1564 + 10.3966I$ | $-6.47193 - 7.01607I$ |
| $u = -0.221706 + 0.476004I$<br>$a = -0.033162 - 0.434804I$<br>$b = -0.513564 + 0.368891I$ | $0.879441 - 0.628295I$ | $7.91035 + 3.37637I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-0.221706-0.476004I$<br>$a=-0.033162+0.434804I$<br>$b=-0.513564-0.368891I$ | $0.879441+0.628295I$ | $7.91035-3.37637I$ |
| $u=\ \ 0.038612+0.501156I$<br>$a=\ \ 0.096662-0.249135I$<br>$b=\ \ 0.472964+0.818630I$ | $-3.56193+2.44936I$ | $0.40204-2.98462I$ |
| $u=\ \ 0.038612-0.501156I$<br>$a=\ \ 0.096662+0.249135I$<br>$b=\ \ 0.472964-0.818630I$ | $-3.56193-2.44936I$ | $0.40204+2.98462I$ |
| $u=\ \ 1.36064+0.64031I$<br>$a=-0.146569+1.344680I$<br>$b=-1.16515+1.19888I$ | $-0.89573-13.68010I$ | 0 |
| $u=\ \ 1.36064-0.64031I$<br>$a=-0.146569-1.344680I$<br>$b=-1.16515-1.19888I$ | $-0.89573+13.68010I$ | 0 |
| $u=-1.40294+0.64611I$<br>$a=\ \ 0.160954+1.401230I$<br>$b=\ \ 1.15149+1.23900I$ | $-5.6972+18.0402I$ | 0 |
| $u=-1.40294-0.64611I$<br>$a=\ \ 0.160954-1.401230I$<br>$b=\ \ 1.15149-1.23900I$ | $-5.6972-18.0402I$ | 0 |

**II. $I_2^u = \langle -1.65 \times 10^{149}u^{59} + 3.35 \times 10^{149}u^{58} + \cdots + 7.82 \times 10^{149}b - 4.36 \times 10^{151},\ -6.46 \times 10^{151}u^{59} + 1.27 \times 10^{152}u^{58} + \cdots + 2.12 \times 10^{152}a - 1.82 \times 10^{154},\ u^{60} - u^{59} + \cdots - 152u + 271 \rangle$**

**(i) Arc colorings**

$$a_2 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_9 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} -u \\ -u^3 + u \end{pmatrix}$$
$$a_5 = \begin{pmatrix} 0.304679u^{59} - 0.597623u^{58} + \cdots - 120.013u + 85.7306 \\ 0.210919u^{59} - 0.428306u^{58} + \cdots - 86.8024u + 55.7410 \end{pmatrix}$$
$$a_{11} = \begin{pmatrix} 0.212530u^{59} - 0.398757u^{58} + \cdots - 104.727u + 66.5187 \\ 0.0861476u^{59} - 0.151846u^{58} + \cdots - 50.7134u + 30.3048 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} -0.147270u^{59} + 0.330434u^{58} + \cdots + 62.1929u - 34.5388 \\ 0.0408018u^{59} - 0.0659039u^{58} + \cdots - 29.5324u + 14.4631 \end{pmatrix}$$
$$a_4 = \begin{pmatrix} 0.0937608u^{59} - 0.169317u^{58} + \cdots - 33.2105u + 29.9895 \\ 0.210919u^{59} - 0.428306u^{58} + \cdots - 86.8024u + 55.7410 \end{pmatrix}$$
$$a_1 = \begin{pmatrix} -0.147726u^{59} + 0.290344u^{58} + \cdots + 55.4703u - 45.1729 \\ -0.0744110u^{59} + 0.136591u^{58} + \cdots + 37.9043u - 21.2506 \end{pmatrix}$$
$$a_8 = \begin{pmatrix} -0.0422375u^{59} + 0.0735826u^{58} + \cdots + 19.0597u - 15.5910 \\ -0.0920046u^{59} + 0.187343u^{58} + \cdots + 39.5968u - 24.1190 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} -0.159880u^{59} + 0.312300u^{58} + \cdots + 65.4094u - 45.4178 \\ -0.103369u^{59} + 0.209046u^{58} + \cdots + 43.5317u - 27.1035 \end{pmatrix}$$
$$a_{12} = \begin{pmatrix} -0.0182647u^{59} + 0.0433689u^{58} + \cdots - 2.37838u + 1.23113 \\ -0.0692578u^{59} + 0.143295u^{58} + \cdots + 23.4970u - 14.3756 \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= 0.227141u^{59} - 0.403413u^{58} + \cdots - 118.008u + 71.1453$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $(u^3+u^2-1)^{20}$ |
| $c_2, c_3, c_7$ $c_9$ | $u^{60}+u^{59}+\cdots+152u+271$ |
| $c_4, c_8$ | $u^{60}+3u^{59}+\cdots-36u+19$ |
| $c_5, c_{10}$ | $(u^{10}-2u^9-u^8+5u^7-3u^6-4u^5+12u^4-13u^3+5u^2-u+2)^6$ |
| $c_6, c_{11}, c_{12}$ | $(u^{10}-u^9+5u^8-5u^7+9u^6-9u^5+6u^4-6u^3+u^2+1)^6$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $(y^3 - y^2 + 2y - 1)^{20}$ |
| $c_2, c_3, c_7$ $c_9$ | $y^{60} - 45y^{59} + \cdots + 1471732y + 73441$ |
| $c_4, c_8$ | $y^{60} + 15y^{59} + \cdots + 18996y + 361$ |
| $c_5, c_{10}$ | $(y^{10} - 6y^9 + \cdots + 19y + 4)^6$ |
| $c_6, c_{11}, c_{12}$ | $(y^{10} + 9y^9 + 33y^8 + 59y^7 + 41y^6 - 21y^5 - 44y^4 - 6y^3 + 13y^2 + 2y + 1)^6$ |

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

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.949017 + 0.391733I$<br>$a = -0.483459 - 1.011210I$<br>$b = 0.583332 - 0.666684I$ | $-1.46262 - 1.59643I$ | $0. - 2.46963I$ |
| $u = 0.949017 - 0.391733I$<br>$a = -0.483459 + 1.011210I$<br>$b = 0.583332 + 0.666684I$ | $-1.46262 + 1.59643I$ | $0. + 2.46963I$ |
| $u = 1.020530 + 0.161032I$<br>$a = -0.45536 - 1.74866I$<br>$b = -1.17709 - 1.63477I$ | $-1.17160 - 4.14585I$ | $-2.03817 + 3.97600I$ |
| $u = 1.020530 - 0.161032I$<br>$a = -0.45536 + 1.74866I$<br>$b = -1.17709 + 1.63477I$ | $-1.17160 + 4.14585I$ | $-2.03817 - 3.97600I$ |
| $u = -0.956646 + 0.064272I$<br>$a = 0.52931 + 2.36356I$<br>$b = -0.33169 + 1.52710I$ | $-4.32428 + 0.65027I$ | $-3.68528 + 0.18430I$ |
| $u = -0.956646 - 0.064272I$<br>$a = 0.52931 - 2.36356I$<br>$b = -0.33169 - 1.52710I$ | $-4.32428 - 0.65027I$ | $-3.68528 - 0.18430I$ |
| $u = -1.027300 + 0.318565I$<br>$a = 0.85428 + 1.15311I$<br>$b = 0.280199 + 0.250015I$ | $2.96598 + 1.31773I$ | $0$ |
| $u = -1.027300 - 0.318565I$<br>$a = 0.85428 - 1.15311I$<br>$b = 0.280199 - 0.250015I$ | $2.96598 - 1.31773I$ | $0$ |
| $u = -1.057720 + 0.214913I$<br>$a = 0.61197 - 1.80291I$<br>$b = 1.29735 - 1.66365I$ | $-5.66711 + 8.28632I$ | $-6.84391 - 6.14881I$ |
| $u = -1.057720 - 0.214913I$<br>$a = 0.61197 + 1.80291I$<br>$b = 1.29735 + 1.66365I$ | $-5.66711 - 8.28632I$ | $-6.84391 + 6.14881I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.591936 + 0.655690I$<br>$a = 0.204582 + 0.281777I$<br>$b = -1.086930 + 0.109518I$ | $2.96598 - 1.31773I$ | $4.49110 + 0.99655I$ |
| $u = -0.591936 - 0.655690I$<br>$a = 0.204582 - 0.281777I$<br>$b = -1.086930 - 0.109518I$ | $2.96598 + 1.31773I$ | $4.49110 - 0.99655I$ |
| $u = -1.065430 + 0.366634I$<br>$a = 0.09675 - 1.46464I$<br>$b = -0.854715 - 1.092930I$ | $-1.46262 + 4.05981I$ | $0. - 8.42852I$ |
| $u = -1.065430 - 0.366634I$<br>$a = 0.09675 + 1.46464I$<br>$b = -0.854715 + 1.092930I$ | $-1.46262 - 4.05981I$ | $0. + 8.42852I$ |
| $u = 0.095981 + 0.859804I$<br>$a = -0.469554 + 0.223461I$<br>$b = 0.498617 - 0.688972I$ | $-1.46262 - 4.05981I$ | $0.41153 + 8.42852I$ |
| $u = 0.095981 - 0.859804I$<br>$a = -0.469554 - 0.223461I$<br>$b = 0.498617 + 0.688972I$ | $-1.46262 + 4.05981I$ | $0.41153 - 8.42852I$ |
| $u = 0.496944 + 0.690303I$<br>$a = -0.211127 + 0.592953I$<br>$b = 1.102290 + 0.267379I$ | $-1.52952 + 5.45819I$ | $-0.31464 - 3.16937I$ |
| $u = 0.496944 - 0.690303I$<br>$a = -0.211127 - 0.592953I$<br>$b = 1.102290 - 0.267379I$ | $-1.52952 - 5.45819I$ | $-0.31464 + 3.16937I$ |
| $u = 1.136570 + 0.255121I$<br>$a = -0.86601 + 1.15426I$<br>$b = -0.271085 + 0.365359I$ | $-1.52952 - 5.45819I$ | $0$ |
| $u = 1.136570 - 0.255121I$<br>$a = -0.86601 - 1.15426I$<br>$b = -0.271085 - 0.365359I$ | $-1.52952 + 5.45819I$ | $0$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\text{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -1.129850 + 0.298665I$<br>$a = 0.695035 - 1.125510I$<br>$b = -0.193732 - 0.701189I$ | $-6.84786 + 0.51807I$ | 0 |
| $u = -1.129850 - 0.298665I$<br>$a = 0.695035 + 1.125510I$<br>$b = -0.193732 + 0.701189I$ | $-6.84786 - 0.51807I$ | 0 |
| $u = -0.306666 + 1.169970I$<br>$a = 0.137559 - 0.288978I$<br>$b = -0.642106 - 0.834586I$ | $-6.84786 + 5.13818I$ | 0 |
| $u = -0.306666 - 1.169970I$<br>$a = 0.137559 + 0.288978I$<br>$b = -0.642106 + 0.834586I$ | $-6.84786 - 5.13818I$ | 0 |
| $u = 1.189300 + 0.239410I$<br>$a = 0.04818 - 1.88316I$<br>$b = 0.87839 - 1.42398I$ | $-6.84786 - 5.13818I$ | 0 |
| $u = 1.189300 - 0.239410I$<br>$a = 0.04818 + 1.88316I$<br>$b = 0.87839 + 1.42398I$ | $-6.84786 + 5.13818I$ | 0 |
| $u = -1.253810 + 0.064221I$<br>$a = 0.443202 + 0.969300I$<br>$b = 1.04370 + 1.00006I$ | $-5.60020 - 1.23169I$ | 0 |
| $u = -1.253810 - 0.064221I$<br>$a = 0.443202 - 0.969300I$<br>$b = 1.04370 - 1.00006I$ | $-5.60020 + 1.23169I$ | 0 |
| $u = 0.848510 + 0.976049I$<br>$a = -0.407894 - 0.894438I$<br>$b = 0.471875 - 1.028600I$ | $-4.32428 + 0.65027I$ | 0 |
| $u = 0.848510 - 0.976049I$<br>$a = -0.407894 + 0.894438I$<br>$b = 0.471875 + 1.028600I$ | $-4.32428 - 0.65027I$ | 0 |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.303470 + 0.112078I$<br>$a = -0.94280 - 1.13531I$<br>$b = -1.51768 - 1.08588I$ | $-10.98540 - 2.31006I$ | 0 |
| $u = 1.303470 - 0.112078I$<br>$a = -0.94280 + 1.13531I$<br>$b = -1.51768 + 1.08588I$ | $-10.98540 + 2.31006I$ | 0 |
| $u = -0.655621 + 0.216382I$<br>$a = 0.90509 + 2.79934I$<br>$b = 0.036354 + 1.376510I$ | $-4.32428 - 6.30651I$ | $-3.68528 + 5.77459I$ |
| $u = -0.655621 - 0.216382I$<br>$a = 0.90509 - 2.79934I$<br>$b = 0.036354 - 1.376510I$ | $-4.32428 + 6.30651I$ | $-3.68528 - 5.77459I$ |
| $u = 1.091390 + 0.734445I$<br>$a = -0.531703 - 1.115870I$<br>$b = 0.337789 - 1.018500I$ | $-4.32428 - 6.30651I$ | 0 |
| $u = 1.091390 - 0.734445I$<br>$a = -0.531703 + 1.115870I$<br>$b = 0.337789 + 1.018500I$ | $-4.32428 + 6.30651I$ | 0 |
| $u = 0.148294 + 1.315270I$<br>$a = -0.313494 + 0.114021I$<br>$b = -0.798431 - 0.607771I$ | $2.96598 + 6.97397I$ | 0 |
| $u = 0.148294 - 1.315270I$<br>$a = -0.313494 - 0.114021I$<br>$b = -0.798431 + 0.607771I$ | $2.96598 - 6.97397I$ | 0 |
| $u = 1.277550 + 0.477103I$<br>$a = 0.50774 - 1.54041I$<br>$b = 1.30157 - 1.25383I$ | $2.96598 - 6.97397I$ | 0 |
| $u = 1.277550 - 0.477103I$<br>$a = 0.50774 + 1.54041I$<br>$b = 1.30157 + 1.25383I$ | $2.96598 + 6.97397I$ | 0 |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.090952 + 1.384330I$<br>$a = 0.333310 + 0.011702I$<br>$b = 0.827600 - 0.654612I$ | $-1.52952 - 11.11440I$ | 0 |
| $u = -0.090952 - 1.384330I$<br>$a = 0.333310 - 0.011702I$<br>$b = 0.827600 + 0.654612I$ | $-1.52952 + 11.11440I$ | 0 |
| $u = -1.317010 + 0.448694I$<br>$a = -0.53512 - 1.64564I$<br>$b = -1.30472 - 1.34226I$ | $-1.52952 + 11.11440I$ | 0 |
| $u = -1.317010 - 0.448694I$<br>$a = -0.53512 + 1.64564I$<br>$b = -1.30472 + 1.34226I$ | $-1.52952 - 11.11440I$ | 0 |
| $u = 1.39543 + 0.38171I$<br>$a = 0.037365 + 0.681468I$<br>$b = -0.465941 + 0.819143I$ | $-5.60020 - 1.23169I$ | 0 |
| $u = 1.39543 - 0.38171I$<br>$a = 0.037365 - 0.681468I$<br>$b = -0.465941 - 0.819143I$ | $-5.60020 + 1.23169I$ | 0 |
| $u = -1.49038 + 0.04106I$<br>$a = 1.352130 - 0.312952I$<br>$b = 1.85824 - 0.29901I$ | $-8.46186 - 3.47839I$ | 0 |
| $u = -1.49038 - 0.04106I$<br>$a = 1.352130 + 0.312952I$<br>$b = 1.85824 + 0.29901I$ | $-8.46186 + 3.47839I$ | 0 |
| $u = -1.27671 + 0.82477I$<br>$a = -0.285197 + 0.803525I$<br>$b = 0.131972 + 1.073020I$ | $-1.17160 + 4.14585I$ | 0 |
| $u = -1.27671 - 0.82477I$<br>$a = -0.285197 - 0.803525I$<br>$b = 0.131972 - 1.073020I$ | $-1.17160 - 4.14585I$ | 0 |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.35652 + 0.87787I$<br>$a = 0.313842 + 0.787115I$<br>$b = -0.078377 + 1.040940I$ | $-5.66711 - 8.28632I$ | $0$ |
| $u = 1.35652 - 0.87787I$<br>$a = 0.313842 - 0.787115I$<br>$b = -0.078377 - 1.040940I$ | $-5.66711 + 8.28632I$ | $0$ |
| $u = -0.004417 + 0.300026I$<br>$a = 2.08759 + 3.65698I$<br>$b = -0.437568 + 0.769612I$ | $-6.84786 + 0.51807I$ | $-5.35393 + 0.54188I$ |
| $u = -0.004417 - 0.300026I$<br>$a = 2.08759 - 3.65698I$<br>$b = -0.437568 - 0.769612I$ | $-6.84786 - 0.51807I$ | $-5.35393 - 0.54188I$ |
| $u = -1.63680 + 0.55171I$<br>$a = -0.256327 + 0.568035I$<br>$b = 0.157812 + 0.707626I$ | $-10.98540 + 2.31006I$ | $0$ |
| $u = -1.63680 - 0.55171I$<br>$a = -0.256327 - 0.568035I$<br>$b = 0.157812 - 0.707626I$ | $-10.98540 - 2.31006I$ | $0$ |
| $u = 0.127336 + 0.235183I$<br>$a = 0.82768 + 3.66897I$<br>$b = -0.059409 - 0.542206I$ | $-1.46262 + 1.59643I$ | $0.41153 + 2.46963I$ |
| $u = 0.127336 - 0.235183I$<br>$a = 0.82768 - 3.66897I$<br>$b = -0.059409 + 0.542206I$ | $-1.46262 - 1.59643I$ | $0.41153 - 2.46963I$ |
| $u = 1.92440 + 0.15962I$<br>$a = 0.301949 + 0.152335I$<br>$b = -0.087637 + 0.184649I$ | $-8.46186 + 3.47839I$ | $0$ |
| $u = 1.92440 - 0.15962I$<br>$a = 0.301949 - 0.152335I$<br>$b = -0.087637 - 0.184649I$ | $-8.46186 - 3.47839I$ | $0$ |

**III.**

$$I^u_3 = \langle -u^{20}+u^{19}+\cdots+b-1,\ -u^{19}+u^{18}+\cdots+a-1,\ u^{21}-u^{20}+\cdots+u-1\rangle$$

**(i) Arc colorings**

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

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

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

$$a_3 = \begin{pmatrix} -u \\ -u^3+u \end{pmatrix}$$

$$a_5 = \begin{pmatrix} u^{19}-u^{18}+\cdots-3u+1 \\ u^{20}-u^{19}+\cdots+8u+1 \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} -5u^{20}+5u^{19}+\cdots-6u+3 \\ -u^{20}+11u^{18}+\cdots-u-8 \end{pmatrix}$$

$$a_6 = \begin{pmatrix} 2u^{20}-10u^{19}+\cdots+33u-10 \\ -6u^{20}+5u^{19}+\cdots-16u-7 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} -u^{20}+2u^{19}+\cdots+43u^3-11u \\ u^{20}-u^{19}+\cdots+8u+1 \end{pmatrix}$$

$$a_1 = \begin{pmatrix} u^{20}-6u^{19}+\cdots+17u-5 \\ -u^{20}+u^{19}+\cdots-8u-1 \end{pmatrix}$$

$$a_8 = \begin{pmatrix} -u^{19}+2u^{18}+\cdots+43u^2-10 \\ u^{20}-11u^{18}+\cdots+u+8 \end{pmatrix}$$

$$a_7 = \begin{pmatrix} -u^{19}+2u^{18}+\cdots+42u^2-10 \\ u^{20}-11u^{18}+\cdots+u+8 \end{pmatrix}$$

$$a_{12} = \begin{pmatrix} -36u^{20}+17u^{19}+\cdots-41u-61 \\ 13u^{20}-5u^{19}+\cdots+14u+20 \end{pmatrix}$$

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

**(iii) Cusp Shapes**
$= -40u^{20}+34u^{19}+381u^{18}-319u^{17}-1499u^{16}+1270u^{15}+3294u^{14}-2889u^{13}-4717u^{12}+4263u^{11}+4746u^{10}-4354u^9-3290u^8+3085u^7+1604u^6-1431u^5-500u^4+414u^3+95u^2-57u$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $u^{21} - 9u^{20} + \cdots + 6u^2 - 1$ |
| $c_2, c_7$ | $u^{21} + u^{20} + \cdots + u + 1$ |
| $c_3, c_9$ | $u^{21} - u^{20} + \cdots + u - 1$ |
| $c_4, c_8$ | $u^{21} + u^{19} + \cdots + 2u^2 + 1$ |
| $c_5$ | $u^{21} - 6u^{19} + \cdots + 2u - 1$ |
| $c_6$ | $u^{21} + 10u^{19} + \cdots + 3u^2 - 1$ |
| $c_{10}$ | $u^{21} - 6u^{19} + \cdots + 2u + 1$ |
| $c_{11}, c_{12}$ | $u^{21} + 10u^{19} + \cdots - 3u^2 + 1$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $y^{21} - 5y^{20} + \cdots + 12y - 1$ |
| $c_2, c_3, c_7$ $c_9$ | $y^{21} - 21y^{20} + \cdots + 19y - 1$ |
| $c_4, c_8$ | $y^{21} + 2y^{20} + \cdots - 4y - 1$ |
| $c_5, c_{10}$ | $y^{21} - 12y^{20} + \cdots + 2y - 1$ |
| $c_6, c_{11}, c_{12}$ | $y^{21} + 20y^{20} + \cdots + 6y - 1$ |

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

| Solutions to $I_3^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.856036 + 0.576602I$<br>$a = 0.81416 - 1.46919I$<br>$b = 0.052448 - 1.117880I$ | $0.54548 + 4.58464I$ | $3.48780 - 6.53727I$ |
| $u = -0.856036 - 0.576602I$<br>$a = 0.81416 + 1.46919I$<br>$b = 0.052448 + 1.117880I$ | $0.54548 - 4.58464I$ | $3.48780 + 6.53727I$ |
| $u = 0.751882 + 0.581250I$<br>$a = -0.80538 - 1.39418I$<br>$b = 0.080602 - 1.224810I$ | $-2.76943 - 0.75968I$ | $0.74636 + 3.01079I$ |
| $u = 0.751882 - 0.581250I$<br>$a = -0.80538 + 1.39418I$<br>$b = 0.080602 + 1.224810I$ | $-2.76943 + 0.75968I$ | $0.74636 - 3.01079I$ |
| $u = -0.891534 + 0.236502I$<br>$a = 1.43236 - 2.01578I$<br>$b = -0.156384 - 0.514490I$ | $-7.97861 + 1.20750I$ | $-15.3765 - 6.3394I$ |
| $u = -0.891534 - 0.236502I$<br>$a = 1.43236 + 2.01578I$<br>$b = -0.156384 + 0.514490I$ | $-7.97861 - 1.20750I$ | $-15.3765 + 6.3394I$ |
| $u = 0.939172 + 0.585801I$<br>$a = -0.79058 - 1.50161I$<br>$b = -0.172630 - 1.063930I$ | $-3.98074 - 8.53235I$ | $-1.71885 + 7.62072I$ |
| $u = 0.939172 - 0.585801I$<br>$a = -0.79058 + 1.50161I$<br>$b = -0.172630 + 1.063930I$ | $-3.98074 + 8.53235I$ | $-1.71885 - 7.62072I$ |
| $u = 0.749002 + 0.339937I$<br>$a = -1.17638 - 1.34538I$<br>$b = 0.358070 - 0.842385I$ | $-2.05316 - 2.41016I$ | $-6.17082 + 3.86618I$ |
| $u = 0.749002 - 0.339937I$<br>$a = -1.17638 + 1.34538I$<br>$b = 0.358070 + 0.842385I$ | $-2.05316 + 2.41016I$ | $-6.17082 - 3.86618I$ |

| Solutions to $I_3^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-0.602435+0.391145I$<br>$a=\ 0.94702-1.09177I$<br>$b=-0.565251-1.149290I$ | $-4.68125+3.54794I$ | $-4.14026-4.31569I$ |
| $u=-0.602435-0.391145I$<br>$a=\ 0.94702+1.09177I$<br>$b=-0.565251+1.149290I$ | $-4.68125-3.54794I$ | $-4.14026+4.31569I$ |
| $u=\ 0.570751+0.057815I$<br>$a=-1.39693-0.22361I$<br>$b=\ 1.163530-0.233492I$ | $1.24666-4.78275I$ | $6.90631+2.29841I$ |
| $u=\ 0.570751-0.057815I$<br>$a=-1.39693+0.22361I$<br>$b=\ 1.163530+0.233492I$ | $1.24666+4.78275I$ | $6.90631-2.29841I$ |
| $u=-0.570103$<br>$a=\ 1.41472$<br>$b=-1.18397$ | $5.19724$ | $11.3100$ |
| $u=-1.45983+0.15027I$<br>$a=\ 0.274885-0.483709I$<br>$b=\ 0.782001-0.220049I$ | $-9.98663+1.50889I$ | $-5.72964+1.39769I$ |
| $u=-1.45983-0.15027I$<br>$a=\ 0.274885+0.483709I$<br>$b=\ 0.782001+0.220049I$ | $-9.98663-1.50889I$ | $-5.72964-1.39769I$ |
| $u=\ 1.46834$<br>$a=-0.198185$<br>$b=-0.787304$ | $-5.75131$ | $-8.43610$ |
| $u=-1.68158$<br>$a=\ 0.761529$<br>$b=\ 1.08690$ | $-3.69725$ | $8.76420$ |
| $u=\ 1.69070+0.06877I$<br>$a=-0.788190-0.144884I$<br>$b=-1.100200-0.092788I$ | $-7.69508+3.60581I$ | $2.67681-4.75349I$ |

| Solutions to $I_3^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.69070 - 0.06877I$<br>$a = -0.788190 + 0.144884I$<br>$b = -1.100200 + 0.092788I$ | $-7.69508 - 3.60581I$ | $2.67681 + 4.75349I$ |

**IV.** $\boldsymbol{I_4^u =}$
$\boldsymbol{\langle 9.32\times10^8u^{17}+8.93\times10^8u^{16}+\cdots+7.15\times10^8b+1.49\times10^{10},\ 1.86\times10^{10}u^{17}+1.56\times10^{10}u^{16}+\cdots+7.86\times10^9a+3.01\times10^{11},\ u^{18}-6u^{16}+\cdots+26u-11\rangle}$

**(i) Arc colorings**

$$a_2 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_9 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} -u \\ -u^3+u \end{pmatrix}$$
$$a_5 = \begin{pmatrix} -2.36280u^{17}-1.98221u^{16}+\cdots+42.9118u-38.2840 \\ -1.30468u^{17}-1.25019u^{16}+\cdots+25.5466u-20.8043 \end{pmatrix}$$
$$a_{11} = \begin{pmatrix} 2.36280u^{17}+1.98221u^{16}+\cdots-42.9118u+39.2840 \\ 1.30468u^{17}+1.25019u^{16}+\cdots-25.5466u+20.8043 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$
$$a_4 = \begin{pmatrix} -1.05812u^{17}-0.732017u^{16}+\cdots+17.3652u-17.4797 \\ -1.30468u^{17}-1.25019u^{16}+\cdots+25.5466u-20.8043 \end{pmatrix}$$
$$a_1 = \begin{pmatrix} 1.81634u^{17}+1.25032u^{16}+\cdots-28.5715u+26.6515 \\ 1.00788u^{17}+0.743283u^{16}+\cdots-9.73596u+10.2904 \end{pmatrix}$$
$$a_8 = \begin{pmatrix} -1.14912u^{17}-0.777687u^{16}+\cdots+14.0881u-13.7093 \\ -1.18839u^{17}-0.728436u^{16}+\cdots+18.1216u-17.8950 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} -2.04103u^{17}-1.28781u^{16}+\cdots+25.9391u-26.4832 \\ -0.673919u^{17}-0.325398u^{16}+\cdots+9.72281u-10.7326 \end{pmatrix}$$
$$a_{12} = \begin{pmatrix} 1.64365u^{17}+1.02927u^{16}+\cdots-31.3642u+30.1147 \\ 0.504440u^{17}+0.425894u^{16}+\cdots-5.88815u+7.85877 \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= \frac{2092315776}{714572543}u^{17}+\frac{1290870304}{714572543}u^{16}+\cdots-\frac{28672326560}{714572543}u+\frac{31839285294}{714572543}$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $(u^3+u^2-1)^6$ |
| $c_2, c_3, c_7$<br>$c_9$ | $u^{18}-6u^{16}+\cdots-26u-11$ |
| $c_4, c_8$ | $u^{18}+2u^{16}+\cdots-2u-1$ |
| $c_5, c_{10}$ | $(u+1)^{18}$ |
| $c_6, c_{11}, c_{12}$ | $(u^3+u+1)^6$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $(y^3 - y^2 + 2y - 1)^6$ |
| $c_2, c_3, c_7$ $c_9$ | $y^{18} - 12y^{17} + \cdots - 940y + 121$ |
| $c_4, c_8$ | $y^{18} + 4y^{17} + \cdots - 52y + 1$ |
| $c_5, c_{10}$ | $(y-1)^{18}$ |
| $c_6, c_{11}, c_{12}$ | $(y^3 + 2y^2 + y - 1)^6$ |

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

| Solutions to $I_4^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.975781 + 0.068356I$<br>$a = 0.23815 - 1.63160I$<br>$b = 1.00799 - 1.57767I$ | $-4.40332$ | $-5.01951 + 0.I$ |
| $u = -0.975781 - 0.068356I$<br>$a = 0.23815 + 1.63160I$<br>$b = 1.00799 + 1.57767I$ | $-4.40332$ | $-5.01951 + 0.I$ |
| $u = 0.866397 + 0.427657I$<br>$a = -0.79133 + 1.17259I$<br>$b = -0.318215 + 0.079336I$ | $-0.26574 + 2.82812I$ | $1.50976 - 2.97945I$ |
| $u = 0.866397 - 0.427657I$<br>$a = -0.79133 - 1.17259I$<br>$b = -0.318215 - 0.079336I$ | $-0.26574 - 2.82812I$ | $1.50976 + 2.97945I$ |
| $u = 0.725279 + 0.623782I$<br>$a = -0.116607 - 0.113262I$<br>$b = 1.086520 - 0.121018I$ | $-0.26574 - 2.82812I$ | $1.50976 + 2.97945I$ |
| $u = 0.725279 - 0.623782I$<br>$a = -0.116607 + 0.113262I$<br>$b = 1.086520 + 0.121018I$ | $-0.26574 + 2.82812I$ | $1.50976 - 2.97945I$ |
| $u = 0.788257 + 0.081685I$<br>$a = -0.82880 + 2.44549I$<br>$b = 0.175633 + 1.396450I$ | $-0.26574 + 2.82812I$ | $1.50976 - 2.97945I$ |
| $u = 0.788257 - 0.081685I$<br>$a = -0.82880 - 2.44549I$<br>$b = 0.175633 - 1.396450I$ | $-0.26574 - 2.82812I$ | $1.50976 + 2.97945I$ |
| $u = -0.227039 + 1.207920I$<br>$a = 0.284944 + 0.273008I$<br>$b = 0.748674 - 0.540556I$ | $-0.26574 - 2.82812I$ | $1.50976 + 2.97945I$ |
| $u = -0.227039 - 1.207920I$<br>$a = 0.284944 - 0.273008I$<br>$b = 0.748674 + 0.540556I$ | $-0.26574 + 2.82812I$ | $1.50976 - 2.97945I$ |

| Solutions to $I_4^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-0.935012+0.810213I$<br>$a=\ \ 0.524225-1.003350I$<br>$b=-0.406015-1.012790I$ | $-0.26574+2.82812I$ | $1.50976-2.97945I$ |
| $u=-0.935012-0.810213I$<br>$a=\ \ 0.524225+1.003350I$<br>$b=-0.406015+1.012790I$ | $-0.26574-2.82812I$ | $1.50976+2.97945I$ |
| $u=-1.217880+0.512150I$<br>$a=-0.45585-1.38682I$<br>$b=-1.28659-1.12457I$ | $-0.26574+2.82812I$ | $1.50976-2.97945I$ |
| $u=-1.217880-0.512150I$<br>$a=-0.45585+1.38682I$<br>$b=-1.28659+1.12457I$ | $-0.26574-2.82812I$ | $1.50976+2.97945I$ |
| $u=\ \ 1.170190+0.730249I$<br>$a=\ \ 0.249409+0.832856I$<br>$b=-0.214875+1.122590I$ | $-4.40332$ | $-5.01951+0.I$ |
| $u=\ \ 1.170190-0.730249I$<br>$a=\ \ 0.249409-0.832856I$<br>$b=-0.214875-1.122590I$ | $-4.40332$ | $-5.01951+0.I$ |
| $u=\ \ 1.48728$<br>$a=-1.24385$<br>$b=-1.75141$ | $-4.40332$ | $-5.01950$ |
| $u=-1.87610$<br>$a=-0.237180$<br>$b=\ \ 0.165185$ | $-4.40332$ | $-5.01950$ |

## V. u-Polynomials

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $((u^3+u^2-1)^{26})(u^{21}-9u^{20}+\cdots+6u^2-1)$ <br> $\cdot(u^{37}-30u^{36}+\cdots+159744u-8192)$ |
| $c_2, c_7$ | $(u^{18}-6u^{16}+\cdots-26u-11)(u^{21}+u^{20}+\cdots+u+1)$ <br> $\cdot(u^{37}-u^{36}+\cdots-2u^2-1)(u^{60}+u^{59}+\cdots+152u+271)$ |
| $c_3, c_9$ | $(u^{18}-6u^{16}+\cdots-26u-11)(u^{21}-u^{20}+\cdots+u-1)$ <br> $\cdot(u^{37}-u^{36}+\cdots-2u^2-1)(u^{60}+u^{59}+\cdots+152u+271)$ |
| $c_4, c_8$ | $(u^{18}+2u^{16}+\cdots-2u-1)(u^{21}+u^{19}+\cdots+2u^2+1)$ <br> $\cdot(u^{37}-6u^{35}+\cdots-u+1)(u^{60}+3u^{59}+\cdots-36u+19)$ |
| $c_5$ | $(u+1)^{18}$ <br> $\cdot(u^{10}-2u^9-u^8+5u^7-3u^6-4u^5+12u^4-13u^3+5u^2-u+2)^6$ <br> $\cdot(u^{21}-6u^{19}+\cdots+2u-1)(u^{37}-7u^{36}+\cdots-3368u+464)$ |
| $c_6$ | $(u^3+u+1)^6(u^{10}-u^9+5u^8-5u^7+9u^6-9u^5+6u^4-6u^3+u^2+1)^6$ <br> $\cdot(u^{21}+10u^{19}+\cdots+3u^2-1)(u^{37}+7u^{36}+\cdots+24u+8)$ |
| $c_{10}$ | $(u+1)^{18}$ <br> $\cdot(u^{10}-2u^9-u^8+5u^7-3u^6-4u^5+12u^4-13u^3+5u^2-u+2)^6$ <br> $\cdot(u^{21}-6u^{19}+\cdots+2u+1)(u^{37}-7u^{36}+\cdots-3368u+464)$ |
| $c_{11}, c_{12}$ | $(u^3+u+1)^6(u^{10}-u^9+5u^8-5u^7+9u^6-9u^5+6u^4-6u^3+u^2+1)^6$ <br> $\cdot(u^{21}+10u^{19}+\cdots-3u^2+1)(u^{37}+7u^{36}+\cdots+24u+8)$ |

### VI. Riley Polynomials

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $((y^3-y^2+2y-1)^{26})(y^{21}-5y^{20}+\cdots+12y-1)$<br>$\cdot(y^{37}-6y^{36}+\cdots-16777216y-67108864)$ |
| $c_2, c_3, c_7$<br>$c_9$ | $(y^{18}-12y^{17}+\cdots-940y+121)(y^{21}-21y^{20}+\cdots+19y-1)$<br>$\cdot(y^{37}-23y^{36}+\cdots-4y-1)(y^{60}-45y^{59}+\cdots+1471732y+73441)$ |
| $c_4, c_8$ | $(y^{18}+4y^{17}+\cdots-52y+1)(y^{21}+2y^{20}+\cdots-4y-1)$<br>$\cdot(y^{37}-12y^{36}+\cdots+25y-1)(y^{60}+15y^{59}+\cdots+18996y+361)$ |
| $c_5, c_{10}$ | $((y-1)^{18})(y^{10}-6y^9+\cdots+19y+4)^6(y^{21}-12y^{20}+\cdots+2y-1)$<br>$\cdot(y^{37}-21y^{36}+\cdots-1481536y-215296)$ |
| $c_6, c_{11}, c_{12}$ | $(y^3+2y^2+y-1)^6$<br>$\cdot(y^{10}+9y^9+33y^8+59y^7+41y^6-21y^5-44y^4-6y^3+13y^2+2y+1)^6$<br>$\cdot(y^{21}+20y^{20}+\cdots+6y-1)(y^{37}+31y^{36}+\cdots+96y-64)$ |