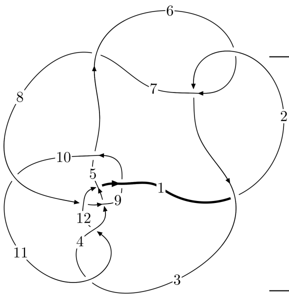
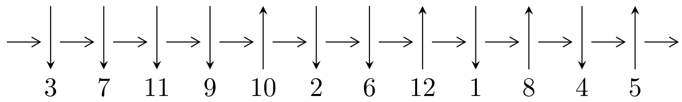
# $12a_{0672}$ $(K12a_{0672})$




A knot diagram[1]

**Linearized knot diagam**




**Solving Sequence**

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

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

$$\begin{aligned}
I_1^u = \langle &-1.12902 \times 10^{190} u^{139} + 9.34933 \times 10^{189} u^{138} + \cdots + 1.58755 \times 10^{189} b - 1.09247 \times 10^{190}, \\
&3.44317 \times 10^{189} u^{139} - 4.78461 \times 10^{189} u^{138} + \cdots + 1.58755 \times 10^{189} a + 2.42089 \times 10^{189}, \\
&u^{140} - 23u^{138} + \cdots + 3u + 1 \rangle \\
I_2^u = \langle &2u^{26} - 9u^{24} + \cdots + b + 1,\ -7u^{26} + 2u^{25} + \cdots + a - 5,\ u^{27} - 5u^{25} + \cdots + 2u + 1 \rangle \\
I_3^u = \langle &-u^2 + b,\ a - 1,\ u^9 - u^7 + u^5 - u - 1 \rangle \\
I_4^u = \langle &b - 1,\ a - 1,\ u + 1 \rangle
\end{aligned}$$

* 4 irreducible components of $\dim_{\mathbb{C}} = 0$, with total 177 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.** $\boldsymbol{I^u_1 = \langle -1.13 \times 10^{190} u^{139} + 9.35 \times 10^{189} u^{138} + \cdots + 1.59 \times 10^{189} b - 1.09 \times 10^{190},\ 3.44 \times 10^{189} u^{139} - 4.78 \times 10^{189} u^{138} + \cdots + 1.59 \times 10^{189} a + 2.42 \times 10^{189},\ u^{140} - 23u^{138} + \cdots + 3u + 1 \rangle}$

**(i) Arc colorings**

$$a_2 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_6 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} -u \\ -u^3 + u \end{pmatrix}$$
$$a_8 = \begin{pmatrix} -u^2 + 1 \\ u^2 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} -2.16886u^{139} + 3.01383u^{138} + \cdots + 8.23078u - 1.52492 \\ 7.11170u^{139} - 5.88917u^{138} + \cdots + 10.0353u + 6.88147 \end{pmatrix}$$
$$a_{11} = \begin{pmatrix} -2.44142u^{139} + 0.866654u^{138} + \cdots + 5.48517u - 1.49467 \\ 10.2142u^{139} - 7.71787u^{138} + \cdots + 19.1330u + 10.8573 \end{pmatrix}$$
$$a_1 = \begin{pmatrix} u^3 \\ u^5 - u^3 + u \end{pmatrix}$$
$$a_5 = \begin{pmatrix} 0.750500u^{139} - 1.39779u^{138} + \cdots - 3.01121u + 1.60235 \\ -10.5023u^{139} + 8.41153u^{138} + \cdots - 14.6571u - 11.6073 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} 0.943249u^{139} - 1.67414u^{138} + \cdots + 18.2542u + 3.74345 \\ 12.1315u^{139} - 8.89990u^{138} + \cdots + 19.8046u + 11.8666 \end{pmatrix}$$
$$a_4 = \begin{pmatrix} -0.673830u^{139} + 0.601372u^{138} + \cdots - 14.0653u + 1.43963 \\ -12.6642u^{139} + 10.6942u^{138} + \cdots - 26.6036u - 15.5682 \end{pmatrix}$$
$$a_{12} = \begin{pmatrix} 5.96244u^{139} + 1.79950u^{138} + \cdots - 1.90249u - 2.91637 \\ 12.5060u^{139} - 17.4576u^{138} + \cdots + 33.8666u + 16.1824 \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= -24.6097u^{139} + 19.1757u^{138} + \cdots - 68.5270u - 30.0952$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1, c_7$ | $u^{140} + 46u^{139} + \cdots + 27u + 1$ |
| $c_2, c_6$ | $u^{140} - 23u^{138} + \cdots + 3u + 1$ |
| $c_3, c_{11}$ | $u^{140} - 6u^{139} + \cdots - 52600u - 21104$ |
| $c_4$ | $u^{140} + 5u^{139} + \cdots + 35297u - 7759$ |
| $c_5$ | $u^{140} + u^{139} + \cdots + 8346945u + 492823$ |
| $c_8$ | $u^{140} + u^{139} + \cdots - 30u - 1$ |
| $c_9$ | $u^{140} + 4u^{139} + \cdots - 49356u + 1718$ |
| $c_{10}$ | $u^{140} - 6u^{139} + \cdots + 378931u - 19471$ |
| $c_{12}$ | $u^{140} - 5u^{138} + \cdots - 39u + 1$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_7$ | $y^{140} + 110y^{139} + \cdots - 551y + 1$ |
| $c_2, c_6$ | $y^{140} - 46y^{139} + \cdots - 27y + 1$ |
| $c_3, c_{11}$ | $y^{140} - 90y^{139} + \cdots - 46338922560y + 445378816$ |
| $c_4$ | $y^{140} - 27y^{139} + \cdots - 3984913835y + 60202081$ |
| $c_5$ | $y^{140} - 35y^{139} + \cdots - 12584572781083y + 242874509329$ |
| $c_8$ | $y^{140} + 17y^{139} + \cdots - 82y + 1$ |
| $c_9$ | $y^{140} + 4y^{139} + \cdots - 573798944y + 2951524$ |
| $c_{10}$ | $y^{140} - 10y^{139} + \cdots - 105927544083y + 379119841$ |
| $c_{12}$ | $y^{140} - 10y^{139} + \cdots - 447y + 1$ |

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

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.637272 + 0.774252I$<br>$a = 1.259990 - 0.002369I$<br>$b = -1.46338 + 0.19143I$ | $4.03902 - 0.85594I$ | 0 |
| $u = -0.637272 - 0.774252I$<br>$a = 1.259990 + 0.002369I$<br>$b = -1.46338 - 0.19143I$ | $4.03902 + 0.85594I$ | 0 |
| $u = 1.011350 + 0.012085I$<br>$a = -0.793113 + 0.223949I$<br>$b = 0.434213 + 0.174661I$ | $-6.37978 + 0.00238I$ | 0 |
| $u = 1.011350 - 0.012085I$<br>$a = -0.793113 - 0.223949I$<br>$b = 0.434213 - 0.174661I$ | $-6.37978 - 0.00238I$ | 0 |
| $u = 1.02392$<br>$a = -0.662890$<br>$b = 0.547273$ | $-6.37988$ | 0 |
| $u = 1.017280 + 0.184941I$<br>$a = -0.10014 - 1.71881I$<br>$b = 0.907707 - 1.026470I$ | $-2.61394 - 5.50337I$ | 0 |
| $u = 1.017280 - 0.184941I$<br>$a = -0.10014 + 1.71881I$<br>$b = 0.907707 + 1.026470I$ | $-2.61394 + 5.50337I$ | 0 |
| $u = 0.960574 + 0.067275I$<br>$a = 0.031287 - 1.341240I$<br>$b = -0.77872 - 1.36857I$ | $-6.79916 - 5.81167I$ | 0 |
| $u = 0.960574 - 0.067275I$<br>$a = 0.031287 + 1.341240I$<br>$b = -0.77872 + 1.36857I$ | $-6.79916 + 5.81167I$ | 0 |
| $u = 0.935095 + 0.212379I$<br>$a = -0.99923 - 1.11674I$<br>$b = 0.609100 - 0.820049I$ | $-2.75766 - 3.86610I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.935095 - 0.212379I$<br>$a = -0.99923 + 1.11674I$<br>$b = 0.609100 + 0.820049I$ | $-2.75766 + 3.86610I$ | 0 |
| $u = -0.745262 + 0.727310I$<br>$a = -1.32678 - 1.06529I$<br>$b = 0.29285 + 1.73891I$ | $-1.53936 - 5.19280I$ | 0 |
| $u = -0.745262 - 0.727310I$<br>$a = -1.32678 + 1.06529I$<br>$b = 0.29285 - 1.73891I$ | $-1.53936 + 5.19280I$ | 0 |
| $u = -0.879911 + 0.561119I$<br>$a = -1.44299 + 1.54598I$<br>$b = 0.932754 - 0.266761I$ | $-3.48917 + 5.68868I$ | 0 |
| $u = -0.879911 - 0.561119I$<br>$a = -1.44299 - 1.54598I$<br>$b = 0.932754 + 0.266761I$ | $-3.48917 - 5.68868I$ | 0 |
| $u = -0.942327 + 0.122868I$<br>$a = 0.449286 + 1.238000I$<br>$b = 1.21615 + 0.87500I$ | $-0.41690 + 1.63156I$ | 0 |
| $u = -0.942327 - 0.122868I$<br>$a = 0.449286 - 1.238000I$<br>$b = 1.21615 - 0.87500I$ | $-0.41690 - 1.63156I$ | 0 |
| $u = 0.779383 + 0.703759I$<br>$a = 0.594080 + 0.164147I$<br>$b = -0.284029 + 1.298440I$ | $-1.17235 - 5.37475I$ | 0 |
| $u = 0.779383 - 0.703759I$<br>$a = 0.594080 - 0.164147I$<br>$b = -0.284029 - 1.298440I$ | $-1.17235 + 5.37475I$ | 0 |
| $u = 1.028920 + 0.260799I$<br>$a = 0.202383 + 1.007000I$<br>$b = -1.027600 + 0.942415I$ | $-0.71138 - 8.15105I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.028920 - 0.260799I$<br>$a = 0.202383 - 1.007000I$<br>$b = -1.027600 - 0.942415I$ | $-0.71138 + 8.15105I$ | 0 |
| $u = -0.698027 + 0.608519I$<br>$a = 1.240040 - 0.212448I$<br>$b = 0.202084 - 0.411980I$ | $-1.78318 - 0.31648I$ | 0 |
| $u = -0.698027 - 0.608519I$<br>$a = 1.240040 + 0.212448I$<br>$b = 0.202084 + 0.411980I$ | $-1.78318 + 0.31648I$ | 0 |
| $u = 0.814503 + 0.701975I$<br>$a = 2.26007 + 1.41025I$<br>$b = -0.482272 - 0.358926I$ | $-1.59077 + 3.20105I$ | 0 |
| $u = 0.814503 - 0.701975I$<br>$a = 2.26007 - 1.41025I$<br>$b = -0.482272 + 0.358926I$ | $-1.59077 - 3.20105I$ | 0 |
| $u = 0.753855 + 0.775047I$<br>$a = 1.95414 + 1.03664I$<br>$b = -1.76398 - 0.64520I$ | $5.39914 + 0.65450I$ | 0 |
| $u = 0.753855 - 0.775047I$<br>$a = 1.95414 - 1.03664I$<br>$b = -1.76398 + 0.64520I$ | $5.39914 - 0.65450I$ | 0 |
| $u = -1.056330 + 0.255019I$<br>$a = -0.736586 - 0.502673I$<br>$b = -0.521953 + 0.416676I$ | $-0.81071 - 1.71202I$ | 0 |
| $u = -1.056330 - 0.255019I$<br>$a = -0.736586 + 0.502673I$<br>$b = -0.521953 - 0.416676I$ | $-0.81071 + 1.71202I$ | 0 |
| $u = 0.867566 + 0.659942I$<br>$a = 0.92138 - 1.11949I$<br>$b = 0.201058 + 1.214890I$ | $2.14246 - 2.56378I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.867566 - 0.659942I$<br>$a = 0.92138 + 1.11949I$<br>$b = 0.201058 - 1.214890I$ | $2.14246 + 2.56378I$ | 0 |
| $u = -0.842091 + 0.343705I$<br>$a = -0.82656 + 2.16593I$<br>$b = 0.502030 - 0.113865I$ | $-3.58332 + 5.58428I$ | 0 |
| $u = -0.842091 - 0.343705I$<br>$a = -0.82656 - 2.16593I$<br>$b = 0.502030 + 0.113865I$ | $-3.58332 - 5.58428I$ | 0 |
| $u = -0.723221 + 0.823322I$<br>$a = 1.37155 - 0.80169I$<br>$b = -1.24957 + 1.08257I$ | $4.04950 - 4.96120I$ | 0 |
| $u = -0.723221 - 0.823322I$<br>$a = 1.37155 + 0.80169I$<br>$b = -1.24957 - 1.08257I$ | $4.04950 + 4.96120I$ | 0 |
| $u = -0.903834 + 0.016154I$<br>$a = -1.16716 - 2.44769I$<br>$b = 0.474301 - 0.934610I$ | $-5.80281 - 4.37403I$ | 0 |
| $u = -0.903834 - 0.016154I$<br>$a = -1.16716 + 2.44769I$<br>$b = 0.474301 + 0.934610I$ | $-5.80281 + 4.37403I$ | 0 |
| $u = 0.825710 + 0.725196I$<br>$a = -2.37145 - 1.23965I$<br>$b = 1.49023 - 0.63141I$ | $0.76253 - 1.70916I$ | 0 |
| $u = 0.825710 - 0.725196I$<br>$a = -2.37145 + 1.23965I$<br>$b = 1.49023 + 0.63141I$ | $0.76253 + 1.70916I$ | 0 |
| $u = 0.755812 + 0.805461I$<br>$a = 1.51275 + 0.00873I$<br>$b = -1.239210 + 0.216436I$ | $4.70506 - 1.57922I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.755812 - 0.805461I$<br>$a = 1.51275 - 0.00873I$<br>$b = -1.239210 - 0.216436I$ | $4.70506 + 1.57922I$ | 0 |
| $u = -0.909980 + 0.626719I$<br>$a = 2.59745 - 0.58433I$<br>$b = -1.086080 - 0.753826I$ | $-3.72434 - 0.98515I$ | 0 |
| $u = -0.909980 - 0.626719I$<br>$a = 2.59745 + 0.58433I$<br>$b = -1.086080 + 0.753826I$ | $-3.72434 + 0.98515I$ | 0 |
| $u = -0.682246 + 0.872598I$<br>$a = -0.819823 + 0.713190I$<br>$b = 0.988583 - 0.825638I$ | $0.32816 - 5.72400I$ | 0 |
| $u = -0.682246 - 0.872598I$<br>$a = -0.819823 - 0.713190I$<br>$b = 0.988583 + 0.825638I$ | $0.32816 + 5.72400I$ | 0 |
| $u = 0.688053 + 0.882581I$<br>$a = -1.51131 - 0.78456I$<br>$b = 1.41721 + 0.87490I$ | $1.92917 + 13.82410I$ | 0 |
| $u = 0.688053 - 0.882581I$<br>$a = -1.51131 + 0.78456I$<br>$b = 1.41721 - 0.87490I$ | $1.92917 - 13.82410I$ | 0 |
| $u = 0.869980 + 0.708482I$<br>$a = -2.43913 + 2.34344I$<br>$b = -0.01244 - 3.15134I$ | $0.81893 - 2.71443I$ | 0 |
| $u = 0.869980 - 0.708482I$<br>$a = -2.43913 - 2.34344I$<br>$b = -0.01244 + 3.15134I$ | $0.81893 + 2.71443I$ | 0 |
| $u = -0.743353 + 0.852323I$<br>$a = -1.53534 + 1.10594I$<br>$b = 1.52043 - 0.80465I$ | $6.56077 - 7.34720I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.743353 - 0.852323I$<br>$a = -1.53534 - 1.10594I$<br>$b = 1.52043 + 0.80465I$ | $6.56077 + 7.34720I$ | 0 |
| $u = 0.808654 + 0.795047I$<br>$a = -0.84326 - 1.30185I$<br>$b = 1.14857 + 0.84874I$ | $3.37292 - 1.72822I$ | 0 |
| $u = 0.808654 - 0.795047I$<br>$a = -0.84326 + 1.30185I$<br>$b = 1.14857 - 0.84874I$ | $3.37292 + 1.72822I$ | 0 |
| $u = -0.778044 + 0.839237I$<br>$a = 1.48124 - 0.72700I$<br>$b = -0.995013 + 0.401193I$ | $3.97627 - 2.35525I$ | 0 |
| $u = -0.778044 - 0.839237I$<br>$a = 1.48124 + 0.72700I$<br>$b = -0.995013 - 0.401193I$ | $3.97627 + 2.35525I$ | 0 |
| $u = 0.755240 + 0.861550I$<br>$a = -0.744629 + 0.046044I$<br>$b = 0.857049 + 0.206186I$ | $6.69538 - 2.46683I$ | 0 |
| $u = 0.755240 - 0.861550I$<br>$a = -0.744629 - 0.046044I$<br>$b = 0.857049 - 0.206186I$ | $6.69538 + 2.46683I$ | 0 |
| $u = 0.681796 + 0.920876I$<br>$a = 1.37920 + 0.41022I$<br>$b = -1.135510 - 0.468563I$ | $1.77849 + 4.30367I$ | 0 |
| $u = 0.681796 - 0.920876I$<br>$a = 1.37920 - 0.41022I$<br>$b = -1.135510 + 0.468563I$ | $1.77849 - 4.30367I$ | 0 |
| $u = -0.826457 + 0.794325I$<br>$a = 1.202260 - 0.027016I$<br>$b = -0.984494 + 0.419369I$ | $6.94462 + 0.32347I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\text{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.826457 - 0.794325I$<br>$a = 1.202260 + 0.027016I$<br>$b = -0.984494 - 0.419369I$ | $6.94462 - 0.32347I$ | 0 |
| $u = -0.852687$<br>$a = 0.457434$<br>$b = -1.66923$ | $-3.61800$ | 0 |
| $u = 0.917783 + 0.695410I$<br>$a = -2.86701 - 0.05432I$<br>$b = 0.606389 - 0.484552I$ | $-1.91229 - 8.57330I$ | 0 |
| $u = 0.917783 - 0.695410I$<br>$a = -2.86701 + 0.05432I$<br>$b = 0.606389 + 0.484552I$ | $-1.91229 + 8.57330I$ | 0 |
| $u = -1.134300 + 0.207590I$<br>$a = 0.096639 - 1.075190I$<br>$b = -1.14181 - 0.89648I$ | $-5.4923 + 13.5525I$ | 0 |
| $u = -1.134300 - 0.207590I$<br>$a = 0.096639 + 1.075190I$<br>$b = -1.14181 + 0.89648I$ | $-5.4923 - 13.5525I$ | 0 |
| $u = 0.780067 + 0.855177I$<br>$a = 1.169240 - 0.256613I$<br>$b = -0.748320 - 0.368537I$ | $3.80136 + 3.65097I$ | 0 |
| $u = 0.780067 - 0.855177I$<br>$a = 1.169240 + 0.256613I$<br>$b = -0.748320 + 0.368537I$ | $3.80136 - 3.65097I$ | 0 |
| $u = 0.911894 + 0.713790I$<br>$a = 1.56209 + 1.20005I$<br>$b = -1.66376 - 0.55939I$ | $0.49607 - 3.78910I$ | 0 |
| $u = 0.911894 - 0.713790I$<br>$a = 1.56209 - 1.20005I$<br>$b = -1.66376 + 0.55939I$ | $0.49607 + 3.78910I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.142360 + 0.194064I$<br>$a = -0.021770 + 0.653476I$<br>$b = -0.548491 + 0.752756I$ | $-6.96686 - 5.37463I$ | 0 |
| $u = 1.142360 - 0.194064I$<br>$a = -0.021770 - 0.653476I$<br>$b = -0.548491 - 0.752756I$ | $-6.96686 + 5.37463I$ | 0 |
| $u = -0.961955 + 0.652383I$<br>$a = -0.720924 - 0.064504I$<br>$b = 0.122679 - 0.405902I$ | $-2.55925 + 5.34694I$ | 0 |
| $u = -0.961955 - 0.652383I$<br>$a = -0.720924 + 0.064504I$<br>$b = 0.122679 + 0.405902I$ | $-2.55925 - 5.34694I$ | 0 |
| $u = -0.821488 + 0.151520I$<br>$a = 0.88215 - 1.13546I$<br>$b = 0.01092 - 1.59339I$ | $-2.39930 + 0.35910I$ | 0 |
| $u = -0.821488 - 0.151520I$<br>$a = 0.88215 + 1.13546I$<br>$b = 0.01092 + 1.59339I$ | $-2.39930 - 0.35910I$ | 0 |
| $u = -0.956096 + 0.673027I$<br>$a = 0.253311 + 0.055704I$<br>$b = 0.150893 - 0.986242I$ | $-2.29376 + 5.19888I$ | 0 |
| $u = -0.956096 - 0.673027I$<br>$a = 0.253311 - 0.055704I$<br>$b = 0.150893 + 0.986242I$ | $-2.29376 - 5.19888I$ | 0 |
| $u = -0.220210 + 0.800606I$<br>$a = -0.382355 - 0.292702I$<br>$b = 0.598812 + 0.349617I$ | $-2.39895 + 2.29733I$ | 0 |
| $u = -0.220210 - 0.800606I$<br>$a = -0.382355 + 0.292702I$<br>$b = 0.598812 - 0.349617I$ | $-2.39895 - 2.29733I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.822610$<br>$a = 0.318844$<br>$b = 0.502826$ | $-1.19691$ | 0 |
| $u = 0.152222 + 0.806909I$<br>$a = -1.214810 + 0.533344I$<br>$b = 1.119620 - 0.651030I$ | $-1.13413 - 10.33050I$ | 0 |
| $u = 0.152222 - 0.806909I$<br>$a = -1.214810 - 0.533344I$<br>$b = 1.119620 + 0.651030I$ | $-1.13413 + 10.33050I$ | 0 |
| $u = -0.960838 + 0.701466I$<br>$a = -1.20259 - 1.18921I$<br>$b = -0.47405 + 1.83054I$ | $-2.19001 + 10.66420I$ | 0 |
| $u = -0.960838 - 0.701466I$<br>$a = -1.20259 + 1.18921I$<br>$b = -0.47405 - 1.83054I$ | $-2.19001 - 10.66420I$ | 0 |
| $u = 1.118710 + 0.423282I$<br>$a = -0.540688 + 0.645565I$<br>$b = -0.875083 - 0.618712I$ | $-4.20294 + 5.96067I$ | 0 |
| $u = 1.118710 - 0.423282I$<br>$a = -0.540688 - 0.645565I$<br>$b = -0.875083 + 0.618712I$ | $-4.20294 - 5.96067I$ | 0 |
| $u = 0.762326 + 0.243629I$<br>$a = 0.54841 - 1.76335I$<br>$b = 0.458839 + 0.009570I$ | $0.95809 - 2.33250I$ | 0 |
| $u = 0.762326 - 0.243629I$<br>$a = 0.54841 + 1.76335I$<br>$b = 0.458839 - 0.009570I$ | $0.95809 + 2.33250I$ | 0 |
| $u = -0.930379 + 0.764329I$<br>$a = -1.47065 + 1.24556I$<br>$b = 0.878778 + 0.494336I$ | $6.62280 + 5.53881I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.930379 - 0.764329I$<br>$a = -1.47065 - 1.24556I$<br>$b = 0.878778 - 0.494336I$ | $6.62280 - 5.53881I$ | 0 |
| $u = -0.275713 + 0.743369I$<br>$a = 1.71178 + 0.20982I$<br>$b = -0.824660 + 0.056725I$ | $-1.54045 - 1.72177I$ | 0 |
| $u = -0.275713 - 0.743369I$<br>$a = 1.71178 - 0.20982I$<br>$b = -0.824660 - 0.056725I$ | $-1.54045 + 1.72177I$ | 0 |
| $u = 0.944071 + 0.753450I$<br>$a = 2.06751 + 0.23061I$<br>$b = -1.16859 + 1.12275I$ | $2.95088 - 4.10114I$ | 0 |
| $u = 0.944071 - 0.753450I$<br>$a = 2.06751 - 0.23061I$<br>$b = -1.16859 - 1.12275I$ | $2.95088 + 4.10114I$ | 0 |
| $u = -1.184390 + 0.245273I$<br>$a = -0.262272 + 0.668229I$<br>$b = 0.784968 + 0.495560I$ | $-6.17296 + 3.76247I$ | 0 |
| $u = -1.184390 - 0.245273I$<br>$a = -0.262272 - 0.668229I$<br>$b = 0.784968 - 0.495560I$ | $-6.17296 - 3.76247I$ | 0 |
| $u = 0.969377 + 0.726084I$<br>$a = -2.37911 - 1.46880I$<br>$b = 1.77426 - 0.80381I$ | $4.74137 - 6.33735I$ | 0 |
| $u = 0.969377 - 0.726084I$<br>$a = -2.37911 + 1.46880I$<br>$b = 1.77426 + 0.80381I$ | $4.74137 + 6.33735I$ | 0 |
| $u = -0.861515 + 0.857109I$<br>$a = -1.240820 + 0.110008I$<br>$b = 1.031860 + 0.056520I$ | $5.09717 + 8.21953I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\text{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.861515 - 0.857109I$<br>$a = -1.240820 - 0.110008I$<br>$b = \quad 1.031860 - 0.056520I$ | $5.09717 - 8.21953I$ | 0 |
| $u = \quad 0.977299 + 0.739925I$<br>$a = -0.97138 - 1.37098I$<br>$b = \quad 1.194840 + 0.066259I$ | $4.02323 - 4.23290I$ | 0 |
| $u = \quad 0.977299 - 0.739925I$<br>$a = -0.97138 + 1.37098I$<br>$b = \quad 1.194840 - 0.066259I$ | $4.02323 + 4.23290I$ | 0 |
| $u = -0.919729 + 0.828173I$<br>$a = \quad 1.11885 - 0.97074I$<br>$b = -0.920706 - 0.035146I$ | $4.90974 - 1.98154I$ | 0 |
| $u = -0.919729 - 0.828173I$<br>$a = \quad 1.11885 + 0.97074I$<br>$b = -0.920706 + 0.035146I$ | $4.90974 + 1.98154I$ | 0 |
| $u = -1.033150 + 0.690623I$<br>$a = -0.89339 + 1.63972I$<br>$b = \quad 1.379040 + 0.302725I$ | $2.84875 + 6.42576I$ | 0 |
| $u = -1.033150 - 0.690623I$<br>$a = -0.89339 - 1.63972I$<br>$b = \quad 1.379040 - 0.302725I$ | $2.84875 - 6.42576I$ | 0 |
| $u = -0.980881 + 0.766272I$<br>$a = -1.89982 + 0.66124I$<br>$b = \quad 1.042310 + 0.536585I$ | $3.34146 + 8.35351I$ | 0 |
| $u = -0.980881 - 0.766272I$<br>$a = -1.89982 - 0.66124I$<br>$b = \quad 1.042310 - 0.536585I$ | $3.34146 - 8.35351I$ | 0 |
| $u = -1.001250 + 0.740017I$<br>$a = -2.32041 + 1.05029I$<br>$b = \quad 1.21937 + 1.18146I$ | $3.19831 + 10.82260I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-1.001250-0.740017I$<br>$a=-2.32041-1.05029I$<br>$b=\ \ 1.21937-1.18146I$ | $3.19831-10.82260I$ | 0 |
| $u=-1.142940+0.505496I$<br>$a=-0.380757-0.326254I$<br>$b=-0.302817+0.260530I$ | $-5.17244+2.46080I$ | 0 |
| $u=-1.142940-0.505496I$<br>$a=-0.380757+0.326254I$<br>$b=-0.302817-0.260530I$ | $-5.17244-2.46080I$ | 0 |
| $u=\ \ 0.983424+0.777778I$<br>$a=-1.35741-1.22628I$<br>$b=\ \ 0.671774-0.420681I$ | $3.16545-9.73007I$ | 0 |
| $u=\ \ 0.983424-0.777778I$<br>$a=-1.35741+1.22628I$<br>$b=\ \ 0.671774+0.420681I$ | $3.16545+9.73007I$ | 0 |
| $u=-1.002890+0.762770I$<br>$a=\ \ 2.20240-0.95778I$<br>$b=-1.55274-0.93729I$ | $5.7588+13.3676I$ | 0 |
| $u=-1.002890-0.762770I$<br>$a=\ \ 2.20240+0.95778I$<br>$b=-1.55274+0.93729I$ | $5.7588-13.3676I$ | 0 |
| $u=\ \ 1.000110+0.776193I$<br>$a=\ \ 0.775668+0.871906I$<br>$b=-0.711578+0.341181I$ | $5.93962-3.62411I$ | 0 |
| $u=\ \ 1.000110-0.776193I$<br>$a=\ \ 0.775668-0.871906I$<br>$b=-0.711578-0.341181I$ | $5.93962+3.62411I$ | 0 |
| $u=\ \ 1.190310+0.445821I$<br>$a=-0.037022-0.244141I$<br>$b=\ \ 0.589124+0.107887I$ | $-5.07547-4.72475I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.190310 - 0.445821I$<br>$a = -0.037022 + 0.244141I$<br>$b = 0.589124 - 0.107887I$ | $-5.07547 + 4.72475I$ | $0$ |
| $u = -1.039600 + 0.747334I$<br>$a = 1.55290 - 0.63818I$<br>$b = -0.969162 - 0.967994I$ | $-0.76957 + 11.74280I$ | $0$ |
| $u = -1.039600 - 0.747334I$<br>$a = 1.55290 + 0.63818I$<br>$b = -0.969162 + 0.967994I$ | $-0.76957 - 11.74280I$ | $0$ |
| $u = 1.041780 + 0.752591I$<br>$a = 2.08262 + 1.13547I$<br>$b = -1.43012 + 0.96234I$ | $0.8366 - 19.8900I$ | $0$ |
| $u = 1.041780 - 0.752591I$<br>$a = 2.08262 - 1.13547I$<br>$b = -1.43012 - 0.96234I$ | $0.8366 + 19.8900I$ | $0$ |
| $u = 0.001353 + 0.709077I$<br>$a = -0.910847 - 0.845959I$<br>$b = 0.984833 + 0.520825I$ | $2.63021 + 4.94426I$ | $1.18827 - 5.95348I$ |
| $u = 0.001353 - 0.709077I$<br>$a = -0.910847 + 0.845959I$<br>$b = 0.984833 - 0.520825I$ | $2.63021 - 4.94426I$ | $1.18827 + 5.95348I$ |
| $u = 1.058860 + 0.764070I$<br>$a = -1.59765 - 0.98872I$<br>$b = 1.167610 - 0.572615I$ | $0.60155 - 10.51070I$ | $0$ |
| $u = 1.058860 - 0.764070I$<br>$a = -1.59765 + 0.98872I$<br>$b = 1.167610 + 0.572615I$ | $0.60155 + 10.51070I$ | $0$ |
| $u = -0.070124 + 0.609912I$<br>$a = 1.204140 + 0.383720I$<br>$b = -1.009010 - 0.725980I$ | $0.84048 + 2.95141I$ | $1.19411 - 6.24218I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-0.070124-0.609912I$<br>$a=\ \ 1.204140-0.383720I$<br>$b=-1.009010+0.725980I$ | $0.84048-2.95141I$ | $1.19411+6.24218I$ |
| $u=-0.433846+0.045603I$<br>$a=\ \ 3.03223+0.18076I$<br>$b=\ \ 0.954581-0.287577I$ | $-2.35372+0.01785I$ | $-13.3158+9.1548I$ |
| $u=-0.433846-0.045603I$<br>$a=\ \ 3.03223-0.18076I$<br>$b=\ \ 0.954581+0.287577I$ | $-2.35372-0.01785I$ | $-13.3158-9.1548I$ |
| $u=\ \ 0.036970+0.417867I$<br>$a=\ \ 1.13295+1.25352I$<br>$b=-0.178046-0.646891I$ | $-0.21087+1.54585I$ | $-2.00440-3.59904I$ |
| $u=\ \ 0.036970-0.417867I$<br>$a=\ \ 1.13295-1.25352I$<br>$b=-0.178046+0.646891I$ | $-0.21087-1.54585I$ | $-2.00440+3.59904I$ |
| $u=\ \ 0.127912+0.323579I$<br>$a=\ \ 1.72370-1.12135I$<br>$b=-1.147850+0.179884I$ | $2.49814-0.01830I$ | $6.50419-0.26055I$ |
| $u=\ \ 0.127912-0.323579I$<br>$a=\ \ 1.72370+1.12135I$<br>$b=-1.147850-0.179884I$ | $2.49814+0.01830I$ | $6.50419+0.26055I$ |
| $u=-0.139509+0.207086I$<br>$a=-4.19951-0.76672I$<br>$b=\ \ 0.168910-1.002310I$ | $-3.61362+4.87141I$ | $-5.76056-5.46607I$ |
| $u=-0.139509-0.207086I$<br>$a=-4.19951+0.76672I$<br>$b=\ \ 0.168910+1.002310I$ | $-3.61362-4.87141I$ | $-5.76056+5.46607I$ |
| $u=\ \ 0.188479$<br>$a=\ \ 3.79660$<br>$b=-1.20821$ | $2.54627$ | $11.7520$ |

**II.**

$$I^u_2 = \langle 2u^{26}-9u^{24}+\cdots+b+1,\ -7u^{26}+2u^{25}+\cdots+a-5,\ u^{27}-5u^{25}+\cdots+2u+1\rangle$$

**(i) Arc colorings**

$$a_2 = \begin{pmatrix}0\\u\end{pmatrix}$$
$$a_6 = \begin{pmatrix}1\\0\end{pmatrix}$$
$$a_7 = \begin{pmatrix}1\\u^2\end{pmatrix}$$
$$a_3 = \begin{pmatrix}-u\\-u^3+u\end{pmatrix}$$
$$a_8 = \begin{pmatrix}-u^2+1\\u^2\end{pmatrix}$$
$$a_{10} = \begin{pmatrix}7u^{26}-2u^{25}+\cdots-13u+5\\-2u^{26}+9u^{24}+\cdots+3u-1\end{pmatrix}$$
$$a_{11} = \begin{pmatrix}3u^{26}-3u^{25}+\cdots-7u+2\\4u^{26}+u^{25}+\cdots+u-1\end{pmatrix}$$
$$a_1 = \begin{pmatrix}u^3\\u^5-u^3+u\end{pmatrix}$$
$$a_5 = \begin{pmatrix}u^{26}+7u^{25}+\cdots-16u-11\\4u^{26}-2u^{25}+\cdots-27u^2+5\end{pmatrix}$$
$$a_9 = \begin{pmatrix}8u^{26}-40u^{24}+\cdots-20u+1\\-u^{26}+u^{25}+\cdots+3u-2\end{pmatrix}$$
$$a_4 = \begin{pmatrix}u^{26}-3u^{25}+\cdots-u-3\\u^{26}-7u^{24}+\cdots-u+2\end{pmatrix}$$
$$a_{12} = \begin{pmatrix}4u^{26}-5u^{25}+\cdots+14u+8\\5u^{26}-3u^{25}+\cdots+3u+4\end{pmatrix}$$

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

**(iii) Cusp Shapes** $= 56u^{26}-16u^{25}-242u^{24}+28u^{23}+790u^{22}-93u^{21}-1678u^{20}+109u^{19}+2944u^{18}-243u^{17}-3835u^{16}+292u^{15}+4218u^{14}-591u^{13}-3238u^{12}+654u^{11}+1888u^{10}-840u^9-211u^8+580u^7-532u^6-349u^5+648u^4+98u^3-334u^2+39u+44$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $u^{27} - 10u^{26} + \cdots + 14u - 1$ |
| $c_2$ | $u^{27} - 5u^{25} + \cdots + 2u - 1$ |
| $c_3$ | $u^{27} + 2u^{26} + \cdots + 24u + 10$ |
| $c_4$ | $u^{27} + u^{26} + \cdots - 2u + 1$ |
| $c_5$ | $u^{27} + 3u^{26} + \cdots - 4u + 1$ |
| $c_6$ | $u^{27} - 5u^{25} + \cdots + 2u + 1$ |
| $c_7$ | $u^{27} + 10u^{26} + \cdots + 14u + 1$ |
| $c_8$ | $u^{27} - 5u^{26} + \cdots + 9u + 1$ |
| $c_9$ | $u^{27} + 3u^{26} + \cdots - 4u + 10$ |
| $c_{10}$ | $u^{27} - 10u^{26} + \cdots + 10u - 1$ |
| $c_{11}$ | $u^{27} - 2u^{26} + \cdots + 24u - 10$ |
| $c_{12}$ | $u^{27} - 2u^{26} + \cdots - u^2 + 1$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_7$ | $y^{27} + 18y^{26} + \cdots + 34y - 1$ |
| $c_2, c_6$ | $y^{27} - 10y^{26} + \cdots + 14y - 1$ |
| $c_3, c_{11}$ | $y^{27} - 18y^{26} + \cdots + 676y - 100$ |
| $c_4$ | $y^{27} - 7y^{26} + \cdots + 14y - 1$ |
| $c_5$ | $y^{27} + 9y^{26} + \cdots + 6y - 1$ |
| $c_8$ | $y^{27} + 17y^{26} + \cdots + 29y - 1$ |
| $c_9$ | $y^{27} + 11y^{26} + \cdots - 844y - 100$ |
| $c_{10}$ | $y^{27} + 14y^{26} + \cdots - 2y - 1$ |
| $c_{12}$ | $y^{27} + 6y^{26} + \cdots + 2y - 1$ |

### (vi) Complex Volumes and Cusp Shapes

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.853029 + 0.648068I$<br>$a = 2.49844 - 0.29745I$<br>$b = -0.147943 - 0.989455I$ | $-2.32180 - 2.25561I$ | $-6.46584 + 2.09687I$ |
| $u = -0.853029 - 0.648068I$<br>$a = 2.49844 + 0.29745I$<br>$b = -0.147943 + 0.989455I$ | $-2.32180 + 2.25561I$ | $-6.46584 - 2.09687I$ |
| $u = 0.756012 + 0.769419I$<br>$a = 1.48984 + 0.28062I$<br>$b = -1.380350 - 0.265692I$ | $5.33051 - 0.54518I$ | $2.00562 + 2.64295I$ |
| $u = 0.756012 - 0.769419I$<br>$a = 1.48984 - 0.28062I$<br>$b = -1.380350 + 0.265692I$ | $5.33051 + 0.54518I$ | $2.00562 - 2.64295I$ |
| $u = -0.879271 + 0.641510I$<br>$a = -1.108550 + 0.722103I$<br>$b = 0.229177 - 0.886007I$ | $-2.40619 + 7.28180I$ | $-5.66490 - 8.21445I$ |
| $u = -0.879271 - 0.641510I$<br>$a = -1.108550 - 0.722103I$<br>$b = 0.229177 + 0.886007I$ | $-2.40619 - 7.28180I$ | $-5.66490 + 8.21445I$ |
| $u = 0.839517 + 0.301720I$<br>$a = 0.13559 + 1.54167I$<br>$b = 0.039699 - 0.613575I$ | $-4.45291 + 3.45973I$ | $-8.14134 - 1.51472I$ |
| $u = 0.839517 - 0.301720I$<br>$a = 0.13559 - 1.54167I$<br>$b = 0.039699 + 0.613575I$ | $-4.45291 - 3.45973I$ | $-8.14134 + 1.51472I$ |
| $u = 0.867000 + 0.699939I$<br>$a = 2.15472 - 1.89128I$<br>$b = -0.05702 + 2.67443I$ | $0.75937 - 2.68723I$ | $-35.1129 - 15.8301I$ |
| $u = 0.867000 - 0.699939I$<br>$a = 2.15472 + 1.89128I$<br>$b = -0.05702 - 2.67443I$ | $0.75937 + 2.68723I$ | $-35.1129 + 15.8301I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.847137 + 0.232071I$<br>$a = -1.54632 - 2.15152I$<br>$b = 0.208901 - 0.852654I$ | $-4.57630 - 5.82037I$ | $-11.5622 + 9.4372I$ |
| $u = 0.847137 - 0.232071I$<br>$a = -1.54632 + 2.15152I$<br>$b = 0.208901 + 0.852654I$ | $-4.57630 + 5.82037I$ | $-11.5622 - 9.4372I$ |
| $u = -0.745527 + 0.869999I$<br>$a = 1.216160 - 0.404750I$<br>$b = -0.923191 + 0.651151I$ | $2.88007 - 4.19210I$ | $-3.10818 + 5.17926I$ |
| $u = -0.745527 - 0.869999I$<br>$a = 1.216160 + 0.404750I$<br>$b = -0.923191 - 0.651151I$ | $2.88007 + 4.19210I$ | $-3.10818 - 5.17926I$ |
| $u = 0.974203 + 0.722004I$<br>$a = -1.39689 - 1.42777I$<br>$b = 1.312570 - 0.400113I$ | $4.65883 - 5.11360I$ | $1.06462 + 3.67687I$ |
| $u = 0.974203 - 0.722004I$<br>$a = -1.39689 + 1.42777I$<br>$b = 1.312570 + 0.400113I$ | $4.65883 + 5.11360I$ | $1.06462 - 3.67687I$ |
| $u = 1.154600 + 0.381083I$<br>$a = -0.367093 - 0.551552I$<br>$b = 0.418495 - 0.218542I$ | $-5.35960 - 5.22603I$ | $-10.8017 + 11.2233I$ |
| $u = 1.154600 - 0.381083I$<br>$a = -0.367093 + 0.551552I$<br>$b = 0.418495 + 0.218542I$ | $-5.35960 + 5.22603I$ | $-10.8017 - 11.2233I$ |
| $u = 0.053816 + 0.780844I$<br>$a = 1.055010 - 0.476552I$<br>$b = -0.703324 - 0.024699I$ | $-1.77605 + 1.14317I$ | $-6.18909 - 0.95442I$ |
| $u = 0.053816 - 0.780844I$<br>$a = 1.055010 + 0.476552I$<br>$b = -0.703324 + 0.024699I$ | $-1.77605 - 1.14317I$ | $-6.18909 + 0.95442I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -1.131580 + 0.451556I$<br>$a = -0.0015284 + 0.0613624I$<br>$b = 0.409195 + 0.207235I$ | $-5.02699 + 2.84358I$ | $-4.52991 - 7.89589I$ |
| $u = -1.131580 - 0.451556I$<br>$a = -0.0015284 - 0.0613624I$<br>$b = 0.409195 - 0.207235I$ | $-5.02699 - 2.84358I$ | $-4.52991 + 7.89589I$ |
| $u = -1.003860 + 0.768171I$<br>$a = -1.83200 + 0.81291I$<br>$b = 0.888987 + 0.798269I$ | $2.07420 + 10.27290I$ | $-5.14062 - 9.39418I$ |
| $u = -1.003860 - 0.768171I$<br>$a = -1.83200 - 0.81291I$<br>$b = 0.888987 - 0.798269I$ | $2.07420 - 10.27290I$ | $-5.14062 + 9.39418I$ |
| $u = -0.661803 + 0.149727I$<br>$a = -2.17325 + 0.60427I$<br>$b = -1.14518 + 1.21822I$ | $-2.44308 + 0.15086I$ | $-62.6896 - 0.0416I$ |
| $u = -0.661803 - 0.149727I$<br>$a = -2.17325 - 0.60427I$<br>$b = -1.14518 - 1.21822I$ | $-2.44308 - 0.15086I$ | $-62.6896 + 0.0416I$ |
| $u = -0.434431$<br>$a = 1.75175$<br>$b = -1.30003$ | $2.29084$ | $-20.3280$ |

**III. $I^u_3 = \langle -u^2 + b,\ a - 1,\ u^9 - u^7 + u^5 - u - 1\rangle$**

**(i) Arc colorings**

$$a_2 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_6 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} -u \\ -u^3 + u \end{pmatrix}$$
$$a_8 = \begin{pmatrix} -u^2 + 1 \\ u^2 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$
$$a_{11} = \begin{pmatrix} u^6 - u^4 + 1 \\ -u^6 + u^2 \end{pmatrix}$$
$$a_1 = \begin{pmatrix} u^3 \\ u^5 - u^3 + u \end{pmatrix}$$
$$a_5 = \begin{pmatrix} u^2 + 1 \\ u^4 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} u^6 - u^4 + 1 \\ u^8 - 2u^6 + 2u^4 \end{pmatrix}$$
$$a_4 = \begin{pmatrix} u^6 - u^4 - u + 1 \\ -u^6 - u^3 + u^2 + u \end{pmatrix}$$
$$a_{12} = \begin{pmatrix} -u \\ -u^3 + u \end{pmatrix}$$

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

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

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1, c_5, c_7$ | $u^9 + 2u^8 + 3u^7 + 2u^6 - u^5 - 2u^4 - 2u^3 + u + 1$ |
| $c_2, c_6, c_{12}$ | $u^9 - u^7 + u^5 - u - 1$ |
| $c_3, c_{11}$ | $(u+1)^9$ |
| $c_4$ | $u^9 - 2u^8 - u^7 + 6u^6 - u^5 - 2u^4 - 2u^3 + u + 1$ |
| $c_8$ | $u^9 + 3u^7 + 4u^6 + 3u^5 - 8u^4 - 14u^3 - 12u^2 - 5u - 1$ |
| $c_9$ | $u^9 - u^7 + 3u^6 - u^5 - 2u^4 + 12u^3 + 15u^2 + 7u + 1$ |
| $c_{10}$ | $u^9 + 2u^8 - u^7 - 6u^6 - u^5 + 2u^4 - 2u^3 + u - 1$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_5, c_7$ | $y^9 + 2y^8 - y^7 - 6y^6 - y^5 + 2y^4 - 2y^3 + y - 1$ |
| $c_2, c_6, c_{12}$ | $y^9 - 2y^8 + 3y^7 - 2y^6 - y^5 + 2y^4 - 2y^3 + y - 1$ |
| $c_3, c_{11}$ | $(y-1)^9$ |
| $c_4, c_{10}$ | $y^9 - 6y^8 + 23y^7 - 46y^6 + 31y^5 + 2y^4 - 10y^3 + y - 1$ |
| $c_8$ | $y^9 + 6y^8 + 15y^7 - 26y^6 - 21y^5 - 82y^4 - 18y^3 - 20y^2 + y - 1$ |
| $c_9$ | $y^9 - 2y^8 - y^7 + 17y^6 + 3y^5 - 132y^4 + 184y^3 - 53y^2 + 19y - 1$ |

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

| Solutions to $I_3^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.745920 + 0.654548I$<br>$a = 1.00000$<br>$b = 0.127964 - 0.976481I$ | $-1.64493$ | $-6.00000$ |
| $u = -0.745920 - 0.654548I$<br>$a = 1.00000$<br>$b = 0.127964 + 0.976481I$ | $-1.64493$ | $-6.00000$ |
| $u = -0.861832 + 0.303378I$<br>$a = 1.00000$<br>$b = 0.650717 - 0.522922I$ | $-1.64493$ | $-6.00000$ |
| $u = -0.861832 - 0.303378I$<br>$a = 1.00000$<br>$b = 0.650717 + 0.522922I$ | $-1.64493$ | $-6.00000$ |
| $u = 0.119990 + 0.892898I$<br>$a = 1.00000$<br>$b = -0.782869 + 0.214277I$ | $-1.64493$ | $-6.00000$ |
| $u = 0.119990 - 0.892898I$<br>$a = 1.00000$<br>$b = -0.782869 - 0.214277I$ | $-1.64493$ | $-6.00000$ |
| $u = 1.10594$<br>$a = 1.00000$<br>$b = 1.22310$ | $-1.64493$ | $-6.00000$ |
| $u = 0.934793 + 0.693687I$<br>$a = 1.00000$<br>$b = 0.392636 + 1.296910I$ | $-1.64493$ | $-6.00000$ |
| $u = 0.934793 - 0.693687I$<br>$a = 1.00000$<br>$b = 0.392636 - 1.296910I$ | $-1.64493$ | $-6.00000$ |

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

**(i) Arc colorings**

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

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

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

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

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

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

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

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

$a_5 = \begin{pmatrix} 2 \\ 1 \end{pmatrix}$

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

$a_4 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$

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

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

**(iii) Cusp Shapes** $= 0$

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

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

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

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

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

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

## V. u-Polynomials

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $(u-1)(u^9+2u^8+3u^7+2u^6-u^5-2u^4-2u^3+u+1)$<br>$\cdot(u^{27}-10u^{26}+\cdots+14u-1)(u^{140}+46u^{139}+\cdots+27u+1)$ |
| $c_2$ | $(u-1)(u^9-u^7+u^5-u-1)(u^{27}-5u^{25}+\cdots+2u-1)$<br>$\cdot(u^{140}-23u^{138}+\cdots+3u+1)$ |
| $c_3$ | $u(u+1)^9(u^{27}+2u^{26}+\cdots+24u+10)$<br>$\cdot(u^{140}-6u^{139}+\cdots-52600u-21104)$ |
| $c_4$ | $(u-1)(u^9-2u^8-u^7+6u^6-u^5-2u^4-2u^3+u+1)$<br>$\cdot(u^{27}+u^{26}+\cdots-2u+1)(u^{140}+5u^{139}+\cdots+35297u-7759)$ |
| $c_5$ | $(u-1)(u^9+2u^8+3u^7+2u^6-u^5-2u^4-2u^3+u+1)$<br>$\cdot(u^{27}+3u^{26}+\cdots-4u+1)(u^{140}+u^{139}+\cdots+8346945u+492823)$ |
| $c_6$ | $(u+1)(u^9-u^7+u^5-u-1)(u^{27}-5u^{25}+\cdots+2u+1)$<br>$\cdot(u^{140}-23u^{138}+\cdots+3u+1)$ |
| $c_7$ | $(u+1)(u^9+2u^8+3u^7+2u^6-u^5-2u^4-2u^3+u+1)$<br>$\cdot(u^{27}+10u^{26}+\cdots+14u+1)(u^{140}+46u^{139}+\cdots+27u+1)$ |
| $c_8$ | $(u+1)(u^9+3u^7+4u^6+3u^5-8u^4-14u^3-12u^2-5u-1)$<br>$\cdot(u^{27}-5u^{26}+\cdots+9u+1)(u^{140}+u^{139}+\cdots-30u-1)$ |
| $c_9$ | $u(u^9-u^7+3u^6-u^5-2u^4+12u^3+15u^2+7u+1)$<br>$\cdot(u^{27}+3u^{26}+\cdots-4u+10)(u^{140}+4u^{139}+\cdots-49356u+1718)$ |
| $c_{10}$ | $(u-1)(u^9+2u^8-u^7-6u^6-u^5+2u^4-2u^3+u-1)$<br>$\cdot(u^{27}-10u^{26}+\cdots+10u-1)(u^{140}-6u^{139}+\cdots+378931u-19471)$ |
| $c_{11}$ | $u(u+1)^9(u^{27}-2u^{26}+\cdots+24u-10)$<br>$\cdot(u^{140}-6u^{139}+\cdots-52600u-21104)$ |
| $c_{12}$ | $(u-1)(u^9-u^7+u^5-u-1)(u^{27}-2u^{26}+\cdots-u^2+1)$<br>$\cdot(u^{140}-5u^{138}+\cdots-39u+1)$ |

## VI. Riley Polynomials

| Crossings | Riley Polynomials at each crossing |
| --- | --- |
| $c_1, c_7$ | $(y-1)(y^9+2y^8-y^7-6y^6-y^5+2y^4-2y^3+y-1)$ $\cdot(y^{27}+18y^{26}+\cdots+34y-1)(y^{140}+110y^{139}+\cdots-551y+1)$ |
| $c_2, c_6$ | $(y-1)(y^9-2y^8+3y^7-2y^6-y^5+2y^4-2y^3+y-1)$ $\cdot(y^{27}-10y^{26}+\cdots+14y-1)(y^{140}-46y^{139}+\cdots-27y+1)$ |
| $c_3, c_{11}$ | $y(y-1)^9(y^{27}-18y^{26}+\cdots+676y-100)$ $\cdot(y^{140}-90y^{139}+\cdots-46338922560y+445378816)$ |
| $c_4$ | $(y-1)(y^9-6y^8+23y^7-46y^6+31y^5+2y^4-10y^3+y-1)$ $\cdot(y^{27}-7y^{26}+\cdots+14y-1)$ $\cdot(y^{140}-27y^{139}+\cdots-3984913835y+60202081)$ |
| $c_5$ | $(y-1)(y^9+2y^8-y^7-6y^6-y^5+2y^4-2y^3+y-1)$ $\cdot(y^{27}+9y^{26}+\cdots+6y-1)$ $\cdot(y^{140}-35y^{139}+\cdots-12584572781083y+242874509329)$ |
| $c_8$ | $(y-1)(y^9+6y^8+\cdots+y-1)$ $\cdot(y^{27}+17y^{26}+\cdots+29y-1)(y^{140}+17y^{139}+\cdots-82y+1)$ |
| $c_9$ | $y(y^9-2y^8-y^7+17y^6+3y^5-132y^4+184y^3-53y^2+19y-1)$ $\cdot(y^{27}+11y^{26}+\cdots-844y-100)$ $\cdot(y^{140}+4y^{139}+\cdots-573798944y+2951524)$ |
| $c_{10}$ | $(y-1)(y^9-6y^8+23y^7-46y^6+31y^5+2y^4-10y^3+y-1)$ $\cdot(y^{27}+14y^{26}+\cdots-2y-1)$ $\cdot(y^{140}-10y^{139}+\cdots-105927544083y+379119841)$ |
| $c_{12}$ | $(y-1)(y^9-2y^8+3y^7-2y^6-y^5+2y^4-2y^3+y-1)$ $\cdot(y^{27}+6y^{26}+\cdots+2y-1)(y^{140}-10y^{139}+\cdots-447y+1)$ |