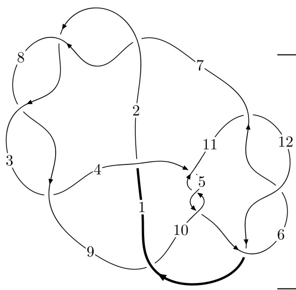
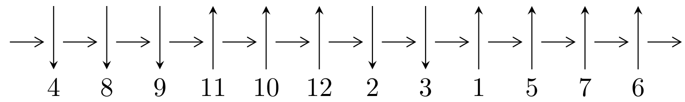
# $12a_{1142}$ ($K12a_{1142}$)




A knot diagram[1]

**Linearized knot diagam**




**Solving Sequence**

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

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

$$\begin{aligned}
I_1^u &= \langle b - u,\ -u^{24} - u^{23} + \cdots + 16a + 1,\ u^{25} + 16u^{23} + \cdots - u - 1\rangle \\
I_2^u &= \langle 31265112052u^{31} - 16257768219u^{30} + \cdots + 847523076866b - 8778222360, \\
&\quad - 11111041791u^{31} + 26118385624u^{30} + \cdots + 84752307686a + 287854854541, \\
&\quad u^{32} - u^{31} + \cdots - 7u + 2\rangle \\
I_3^u &= \langle b + u,\ a^4 - a^3 + a^2 + 1,\ u^2 + 1\rangle
\end{aligned}$$

* 3 irreducible components of $\dim_{\mathbb{C}} = 0$, with total 65 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.** $I^u_1 = \langle b - u,\ -u^{24} - u^{23} + \cdots + 16a + 1,\ u^{25} + 16u^{23} + \cdots - u - 1\rangle$

**(i) Arc colorings**

$$a_6 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_5 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$
$$a_{11} = \begin{pmatrix} u \\ u^3 + u \end{pmatrix}$$
$$a_1 = \begin{pmatrix} \frac{1}{16}u^{24} + \frac{1}{16}u^{23} + \cdots + \frac{23}{8}u - \frac{1}{16} \\ u \end{pmatrix}$$
$$a_4 = \begin{pmatrix} u^2 + 1 \\ u^4 + 2u^2 \end{pmatrix}$$
$$a_2 = \begin{pmatrix} \frac{1}{16}u^{24} + \frac{1}{16}u^{23} + \cdots + \frac{15}{8}u - \frac{1}{16} \\ \frac{1}{16}u^{24} + \frac{1}{16}u^{23} + \cdots + \frac{7}{8}u - \frac{1}{16} \end{pmatrix}$$
$$a_9 = \begin{pmatrix} \frac{1}{8}u^{24} + 2u^{22} + \cdots - \frac{3}{8}u - \frac{1}{8} \\ \frac{1}{16}u^{24} + \frac{1}{16}u^{23} + \cdots + \frac{7}{8}u - \frac{1}{16} \end{pmatrix}$$
$$a_3 = \begin{pmatrix} \frac{3}{16}u^{24} + \frac{3}{16}u^{23} + \cdots - \frac{5}{8}u - \frac{5}{16} \\ -\frac{1}{4}u^{24} + \frac{3}{8}u^{23} + \cdots - \frac{1}{8}u - \frac{5}{8} \end{pmatrix}$$
$$a_8 = \begin{pmatrix} \frac{3}{16}u^{24} - \frac{5}{16}u^{23} + \cdots + \frac{1}{8}u + \frac{23}{16} \\ -\frac{1}{8}u^{23} + \frac{1}{4}u^{22} + \cdots + \frac{1}{8}u + \frac{5}{8} \end{pmatrix}$$
$$a_{12} = \begin{pmatrix} \frac{1}{16}u^{24} + \frac{1}{16}u^{23} + \cdots + \frac{15}{8}u - \frac{1}{16} \\ u \end{pmatrix}$$
$$a_7 = \begin{pmatrix} -0.0625000u^{24} + 0.0625000u^{23} + \cdots - 2.12500u^2 + 0.937500 \\ -u^2 \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= -2u^{24} + \frac{5}{4}u^{23} + \cdots + \frac{5}{4}u - \frac{1}{2}$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $u^{25} - 7u^{24} + \cdots + 513u - 136$ |
| $c_2, c_3, c_7$<br>$c_8$ | $u^{25} + 3u^{24} + \cdots - 3u + 2$ |
| $c_4, c_5, c_6$<br>$c_{10}, c_{11}, c_{12}$ | $u^{25} + 16u^{23} + \cdots - u + 1$ |
| $c_9$ | $u^{25} - 15u^{24} + \cdots + 2387u - 362$ |

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

| Crossings | Riley Polynomials at each crossing |
| --- | --- |
| $c_1$ | $y^{25} - 5y^{24} + \cdots - 37119y - 18496$ |
| $c_2, c_3, c_7$<br>$c_8$ | $y^{25} - 29y^{24} + \cdots + y - 4$ |
| $c_4, c_5, c_6$<br>$c_{10}, c_{11}, c_{12}$ | $y^{25} + 32y^{24} + \cdots - 7y - 1$ |
| $c_9$ | $y^{25} + 11y^{24} + \cdots - 420031y - 131044$ |

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

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.561043 + 0.437348I$<br>$a = -1.68535 + 0.72480I$<br>$b = -0.561043 + 0.437348I$ | $-7.98772 - 5.54613I$ | $-2.08956 + 7.04826I$ |
| $u = -0.561043 - 0.437348I$<br>$a = -1.68535 - 0.72480I$<br>$b = -0.561043 - 0.437348I$ | $-7.98772 + 5.54613I$ | $-2.08956 - 7.04826I$ |
| $u = 0.638286$<br>$a = 1.54532$<br>$b = 0.638286$ | $-4.66650$ | $2.55840$ |
| $u = 0.521660 + 0.351950I$<br>$a = 1.52382 + 0.64449I$<br>$b = 0.521660 + 0.351950I$ | $-0.34952 + 3.61361I$ | $0.91371 - 9.39805I$ |
| $u = 0.521660 - 0.351950I$<br>$a = 1.52382 - 0.64449I$<br>$b = 0.521660 - 0.351950I$ | $-0.34952 - 3.61361I$ | $0.91371 + 9.39805I$ |
| $u = -0.200130 + 0.529662I$<br>$a = -1.05021 + 1.68712I$<br>$b = -0.200130 + 0.529662I$ | $-8.41951 + 2.51161I$ | $-3.21376 + 1.03660I$ |
| $u = -0.200130 - 0.529662I$<br>$a = -1.05021 - 1.68712I$<br>$b = -0.200130 - 0.529662I$ | $-8.41951 - 2.51161I$ | $-3.21376 - 1.03660I$ |
| $u = -0.09775 + 1.44695I$<br>$a = -0.581028 - 1.096330I$<br>$b = -0.09775 + 1.44695I$ | $-13.25460 - 4.79321I$ | $-7.77691 + 3.39473I$ |
| $u = -0.09775 - 1.44695I$<br>$a = -0.581028 + 1.096330I$<br>$b = -0.09775 - 1.44695I$ | $-13.25460 + 4.79321I$ | $-7.77691 - 3.39473I$ |
| $u = 0.02846 + 1.45258I$<br>$a = 0.171580 - 1.155960I$<br>$b = 0.02846 + 1.45258I$ | $-6.93212 + 2.05900I$ | $-4.36476 - 3.38495I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.02846 - 1.45258I$<br>$a = 0.171580 + 1.155960I$<br>$b = 0.02846 - 1.45258I$ | $-6.93212 - 2.05900I$ | $-4.36476 + 3.38495I$ |
| $u = -0.464935 + 0.201716I$<br>$a = -1.289760 + 0.413307I$<br>$b = -0.464935 + 0.201716I$ | $0.912372 - 0.622752I$ | $7.19624 + 2.63067I$ |
| $u = -0.464935 - 0.201716I$<br>$a = -1.289760 - 0.413307I$<br>$b = -0.464935 - 0.201716I$ | $0.912372 + 0.622752I$ | $7.19624 - 2.63067I$ |
| $u = 0.166735 + 0.405495I$<br>$a = 0.68732 + 1.26329I$<br>$b = 0.166735 + 0.405495I$ | $-1.020640 - 0.969548I$ | $-2.52284 + 1.35231I$ |
| $u = 0.166735 - 0.405495I$<br>$a = 0.68732 - 1.26329I$<br>$b = 0.166735 - 0.405495I$ | $-1.020640 + 0.969548I$ | $-2.52284 - 1.35231I$ |
| $u = 0.27079 + 1.54625I$<br>$a = 1.040560 - 0.311629I$<br>$b = 0.27079 + 1.54625I$ | $-11.13940 + 6.44106I$ | $-3.32238 - 2.71115I$ |
| $u = 0.27079 - 1.54625I$<br>$a = 1.040560 + 0.311629I$<br>$b = 0.27079 - 1.54625I$ | $-11.13940 - 6.44106I$ | $-3.32238 + 2.71115I$ |
| $u = -0.31312 + 1.55281I$<br>$a = -1.136180 - 0.202662I$<br>$b = -0.31312 + 1.55281I$ | $-13.0092 - 10.4518I$ | $-6.37304 + 7.21331I$ |
| $u = -0.31312 - 1.55281I$<br>$a = -1.136180 + 0.202662I$<br>$b = -0.31312 - 1.55281I$ | $-13.0092 + 10.4518I$ | $-6.37304 - 7.21331I$ |
| $u = -0.21804 + 1.58247I$<br>$a = -0.814184 - 0.307816I$<br>$b = -0.21804 + 1.58247I$ | $-14.4736 - 3.0731I$ | $-8.36964 + 0.I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.21804 - 1.58247I$<br>$a = -0.814184 + 0.307816I$<br>$b = -0.21804 - 1.58247I$ | $-14.4736 + 3.0731I$ | $-8.36964 + 0.I$ |
| $u = 0.34476 + 1.56544I$<br>$a = 1.182290 - 0.106671I$<br>$b = 0.34476 + 1.56544I$ | $18.3511 + 13.0389I$ | $-8.43014 - 5.93322I$ |
| $u = 0.34476 - 1.56544I$<br>$a = 1.182290 + 0.106671I$<br>$b = 0.34476 - 1.56544I$ | $18.3511 - 13.0389I$ | $-8.43014 + 5.93322I$ |
| $u = 0.20347 + 1.64400I$<br>$a = 0.678475 - 0.143846I$<br>$b = 0.20347 + 1.64400I$ | $16.0652 + 1.5629I$ | $-9.92611 - 0.62064I$ |
| $u = 0.20347 - 1.64400I$<br>$a = 0.678475 + 0.143846I$<br>$b = 0.20347 - 1.64400I$ | $16.0652 - 1.5629I$ | $-9.92611 + 0.62064I$ |

**II.**
$\boldsymbol{I_2^u = \langle 3.13\times10^{10}u^{31} - 1.63\times10^{10}u^{30} + \cdots + 8.48\times10^{10}b - 8.78\times10^{9},\ -1.11\times10^{10}u^{31} + 2.61\times10^{10}u^{30} + \cdots + 8.48\times10^{10}a + 2.88\times10^{11},\ u^{32} - u^{31} + \cdots - 7u + 2\rangle}$

**(i) Arc colorings**

$$a_6 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_5 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$
$$a_{11} = \begin{pmatrix} u \\ u^3 + u \end{pmatrix}$$
$$a_1 = \begin{pmatrix} 0.131100u^{31} - 0.308173u^{30} + \cdots + 2.64660u - 3.39642 \\ -0.368900u^{31} + 0.191827u^{30} + \cdots - 2.85340u + 0.103575 \end{pmatrix}$$
$$a_4 = \begin{pmatrix} u^2 + 1 \\ u^4 + 2u^2 \end{pmatrix}$$
$$a_2 = \begin{pmatrix} 0.257094u^{31} - 0.416002u^{30} + \cdots + 3.69092u - 3.68254 \\ -0.652251u^{31} + 0.451316u^{30} + \cdots - 4.12999u + 0.211450 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} 0.0315636u^{31} - 0.0452649u^{30} + \cdots + 0.291482u - 2.93870 \\ -0.0995366u^{31} + 0.262908u^{30} + \cdots - 1.35511u + 0.457721 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} -0.458023u^{31} + 0.342355u^{30} + \cdots - 6.00927u + 2.47313 \\ 0.0217054u^{31} - 0.180440u^{30} + \cdots + 4.15577u - 0.559030 \end{pmatrix}$$
$$a_8 = \begin{pmatrix} 0.220688u^{31} - 0.0368277u^{30} + \cdots - 0.676663u - 2.74045 \\ 0.269259u^{31} + 0.0522139u^{30} + \cdots - 2.98024u + 1.30099 \end{pmatrix}$$
$$a_{12} = \begin{pmatrix} \frac{1}{2}u^{31} - \frac{1}{2}u^{30} + \cdots + \frac{11}{2}u - \frac{7}{2} \\ -0.368900u^{31} + 0.191827u^{30} + \cdots - 2.85340u + 0.103575 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} -0.0517875u^{31} - 0.317112u^{30} + \cdots - 10.4579u - 1.49089 \\ -0.177073u^{31} + 0.446436u^{30} + \cdots - 2.47872u + 1.73780 \end{pmatrix}$$

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

**(iii) Cusp Shapes**
$= -\frac{27044210812}{42376153843}u^{31} - \frac{8739385902}{42376153843}u^{30} + \cdots - \frac{295063087682}{42376153843}u + \frac{92212569266}{42376153843}$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $(u^{16} - 5u^{15} + \cdots + 8u - 7)^2$ |
| $c_2, c_3, c_7$<br>$c_8$ | $(u^{16} - u^{15} + \cdots + 2u^2 - 1)^2$ |
| $c_4, c_5, c_6$<br>$c_{10}, c_{11}, c_{12}$ | $u^{32} + u^{31} + \cdots + 7u + 2$ |
| $c_9$ | $(u^{16} + 5u^{15} + \cdots - 4u + 1)^2$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $(y^{16} - 7y^{15} + \cdots - 344y + 49)^2$ |
| $c_2, c_3, c_7$ <br> $c_8$ | $(y^{16} - 19y^{15} + \cdots - 4y + 1)^2$ |
| $c_4, c_5, c_6$ <br> $c_{10}, c_{11}, c_{12}$ | $y^{32} + 27y^{31} + \cdots - 5y + 4$ |
| $c_9$ | $(y^{16} + 13y^{15} + \cdots - 48y + 1)^2$ |

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

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.880391 + 0.506625I$<br>$a = 1.017130 - 0.972732I$<br>$b = 0.16383 - 1.46376I$ | $-6.29225 - 6.07197I$ | $-4.61575 + 7.02814I$ |
| $u = -0.880391 - 0.506625I$<br>$a = 1.017130 + 0.972732I$<br>$b = 0.16383 + 1.46376I$ | $-6.29225 + 6.07197I$ | $-4.61575 - 7.02814I$ |
| $u = -0.774157 + 0.692338I$<br>$a = 0.741176 - 0.809846I$<br>$b = 0.02347 - 1.45170I$ | $-6.89084 + 0.48968I$ | $-6.35607 - 1.43137I$ |
| $u = -0.774157 - 0.692338I$<br>$a = 0.741176 + 0.809846I$<br>$b = 0.02347 + 1.45170I$ | $-6.89084 - 0.48968I$ | $-6.35607 + 1.43137I$ |
| $u = 0.777840 + 0.542265I$<br>$a = -0.977635 - 0.812403I$<br>$b = -0.11249 - 1.41553I$ | $-4.30716 + 2.57669I$ | $-0.69244 - 2.71681I$ |
| $u = 0.777840 - 0.542265I$<br>$a = -0.977635 + 0.812403I$<br>$b = -0.11249 + 1.41553I$ | $-4.30716 - 2.57669I$ | $-0.69244 + 2.71681I$ |
| $u = 0.192406 + 1.054070I$<br>$a = 0.0248167 - 0.1359550I$<br>$b = 0.192406 - 1.054070I$ | $-4.05396$ | $-9.09362 + 0.I$ |
| $u = 0.192406 - 1.054070I$<br>$a = 0.0248167 + 0.1359550I$<br>$b = 0.192406 + 1.054070I$ | $-4.05396$ | $-9.09362 + 0.I$ |
| $u = 0.949812 + 0.504302I$<br>$a = -1.00934 - 1.06834I$<br>$b = -0.18803 - 1.50441I$ | $-14.4043 + 8.2886I$ | $-6.57708 - 5.27135I$ |
| $u = 0.949812 - 0.504302I$<br>$a = -1.00934 + 1.06834I$<br>$b = -0.18803 + 1.50441I$ | $-14.4043 - 8.2886I$ | $-6.57708 + 5.27135I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\text{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.060795 + 1.080160I$<br>$a = 0.211903 + 0.762923I$<br>$b = 0.159960 - 0.159944I$ | $-1.40282 - 1.52971I$ | $2.72737 + 5.08772I$ |
| $u = -0.060795 - 1.080160I$<br>$a = 0.211903 - 0.762923I$<br>$b = 0.159960 + 0.159944I$ | $-1.40282 + 1.52971I$ | $2.72737 - 5.08772I$ |
| $u = 0.195301 + 1.117820I$<br>$a = -0.601834 + 0.773671I$<br>$b = -0.450162 - 0.094431I$ | $-7.98944 + 3.12434I$ | $-1.94060 - 3.66013I$ |
| $u = 0.195301 - 1.117820I$<br>$a = -0.601834 - 0.773671I$<br>$b = -0.450162 + 0.094431I$ | $-7.98944 - 3.12434I$ | $-1.94060 + 3.66013I$ |
| $u = 0.840396 + 0.765707I$<br>$a = -0.642609 - 0.918714I$<br>$b = 0.00756 - 1.51110I$ | $-15.1904 - 2.2836I$ | $-7.92472 + 0.30826I$ |
| $u = 0.840396 - 0.765707I$<br>$a = -0.642609 + 0.918714I$<br>$b = 0.00756 + 1.51110I$ | $-15.1904 + 2.2836I$ | $-7.92472 - 0.30826I$ |
| $u = -0.344556 + 1.164540I$<br>$a = -0.110939 - 0.374956I$<br>$b = -0.344556 - 1.164540I$ | $-11.2964$ | $-8.14780 + 0.I$ |
| $u = -0.344556 - 1.164540I$<br>$a = -0.110939 + 0.374956I$<br>$b = -0.344556 + 1.164540I$ | $-11.2964$ | $-8.14780 + 0.I$ |
| $u = -0.11249 + 1.41553I$<br>$a = 0.833628 + 0.159750I$<br>$b = 0.777840 - 0.542265I$ | $-4.30716 - 2.57669I$ | $-0.69244 + 2.71681I$ |
| $u = -0.11249 - 1.41553I$<br>$a = 0.833628 - 0.159750I$<br>$b = 0.777840 + 0.542265I$ | $-4.30716 + 2.57669I$ | $-0.69244 - 2.71681I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.02347 + 1.45170I$<br>$a = -0.785289 - 0.003672I$<br>$b = -0.774157 - 0.692338I$ | $-6.89084 - 0.48968I$ | $-6.35607 + 1.43137I$ |
| $u = 0.02347 - 1.45170I$<br>$a = -0.785289 + 0.003672I$<br>$b = -0.774157 + 0.692338I$ | $-6.89084 + 0.48968I$ | $-6.35607 - 1.43137I$ |
| $u = 0.16383 + 1.46376I$<br>$a = -0.955911 + 0.168093I$<br>$b = -0.880391 - 0.506625I$ | $-6.29225 + 6.07197I$ | $-4.61575 - 7.02814I$ |
| $u = 0.16383 - 1.46376I$<br>$a = -0.955911 - 0.168093I$<br>$b = -0.880391 + 0.506625I$ | $-6.29225 - 6.07197I$ | $-4.61575 + 7.02814I$ |
| $u = 0.00756 + 1.51110I$<br>$a = 0.837083 - 0.103955I$<br>$b = 0.840396 - 0.765707I$ | $-15.1904 + 2.2836I$ | $-7.92472 - 0.30826I$ |
| $u = 0.00756 - 1.51110I$<br>$a = 0.837083 + 0.103955I$<br>$b = 0.840396 + 0.765707I$ | $-15.1904 - 2.2836I$ | $-7.92472 + 0.30826I$ |
| $u = -0.18803 + 1.50441I$<br>$a = 1.031610 + 0.150184I$<br>$b = 0.949812 - 0.504302I$ | $-14.4043 - 8.2886I$ | $-6.57708 + 5.27135I$ |
| $u = -0.18803 - 1.50441I$<br>$a = 1.031610 - 0.150184I$<br>$b = 0.949812 + 0.504302I$ | $-14.4043 + 8.2886I$ | $-6.57708 - 5.27135I$ |
| $u = -0.450162 + 0.094431I$<br>$a = 2.32309 - 0.67146I$<br>$b = 0.195301 - 1.117820I$ | $-7.98944 - 3.12434I$ | $-1.94060 + 3.66013I$ |
| $u = -0.450162 - 0.094431I$<br>$a = 2.32309 + 0.67146I$<br>$b = 0.195301 + 1.117820I$ | $-7.98944 + 3.12434I$ | $-1.94060 - 3.66013I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = \quad 0.159960 + 0.159944I$<br>$a = -3.18688 + 2.04561I$<br>$b = -0.060795 - 1.080160I$ | $-1.40282 + 1.52971I$ | $2.72737 - 5.08772I$ |
| $u = \quad 0.159960 - 0.159944I$<br>$a = -3.18688 - 2.04561I$<br>$b = -0.060795 + 1.080160I$ | $-1.40282 - 1.52971I$ | $2.72737 + 5.08772I$ |

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

**(i) Arc colorings**

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

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

**(iii) Cusp Shapes** $= 4a^2 - 4a - 4$

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

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

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

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

### (vi) Complex Volumes and Cusp Shapes

| Solutions to $I_3^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.000000I$<br>$a = -0.351808 + 0.720342I$<br>$b = -1.000000I$ | $-3.07886 + 1.41510I$ | $-4.17326 - 4.90874I$ |
| $u = 1.000000I$<br>$a = -0.351808 - 0.720342I$<br>$b = -1.000000I$ | $-3.07886 - 1.41510I$ | $-4.17326 + 4.90874I$ |
| $u = 1.000000I$<br>$a = 0.851808 + 0.911292I$<br>$b = -1.000000I$ | $-10.08060 - 3.16396I$ | $-7.82674 + 2.56480I$ |
| $u = 1.000000I$<br>$a = 0.851808 - 0.911292I$<br>$b = -1.000000I$ | $-10.08060 + 3.16396I$ | $-7.82674 - 2.56480I$ |
| $u = -1.000000I$<br>$a = -0.351808 + 0.720342I$<br>$b = 1.000000I$ | $-3.07886 + 1.41510I$ | $-4.17326 - 4.90874I$ |
| $u = -1.000000I$<br>$a = -0.351808 - 0.720342I$<br>$b = 1.000000I$ | $-3.07886 - 1.41510I$ | $-4.17326 + 4.90874I$ |
| $u = -1.000000I$<br>$a = 0.851808 + 0.911292I$<br>$b = 1.000000I$ | $-10.08060 - 3.16396I$ | $-7.82674 + 2.56480I$ |
| $u = -1.000000I$<br>$a = 0.851808 - 0.911292I$<br>$b = 1.000000I$ | $-10.08060 + 3.16396I$ | $-7.82674 - 2.56480I$ |

**IV. u-Polynomials**

| Crossings | u-Polynomials at each crossing |
| --- | --- |
| $c_1$ | $((u^4+u^3+u^2+1)^2)(u^{16}-5u^{15}+\cdots+8u-7)^2$ <br> $\cdot\,(u^{25}-7u^{24}+\cdots+513u-136)$ |
| $c_2, c_3, c_7$ <br> $c_8$ | $(u^8-5u^6+7u^4-2u^2+1)(u^{16}-u^{15}+\cdots+2u^2-1)^2$ <br> $\cdot\,(u^{25}+3u^{24}+\cdots-3u+2)$ |
| $c_4, c_5, c_6$ <br> $c_{10}, c_{11}, c_{12}$ | $((u^2+1)^4)(u^{25}+16u^{23}+\cdots-u+1)(u^{32}+u^{31}+\cdots+7u+2)$ |
| $c_9$ | $(u^8-u^6+3u^4-2u^2+1)(u^{16}+5u^{15}+\cdots-4u+1)^2$ <br> $\cdot\,(u^{25}-15u^{24}+\cdots+2387u-362)$ |

## V. Riley Polynomials

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $((y^4+y^3+3y^2+2y+1)^2)(y^{16}-7y^{15}+\cdots-344y+49)^2$ <br> $\cdot\,(y^{25}-5y^{24}+\cdots-37119y-18496)$ |
| $c_2, c_3, c_7$ <br> $c_8$ | $((y^4-5y^3+7y^2-2y+1)^2)(y^{16}-19y^{15}+\cdots-4y+1)^2$ <br> $\cdot\,(y^{25}-29y^{24}+\cdots+y-4)$ |
| $c_4, c_5, c_6$ <br> $c_{10}, c_{11}, c_{12}$ | $((y+1)^8)(y^{25}+32y^{24}+\cdots-7y-1)(y^{32}+27y^{31}+\cdots-5y+4)$ |
| $c_9$ | $((y^4-y^3+3y^2-2y+1)^2)(y^{16}+13y^{15}+\cdots-48y+1)^2$ <br> $\cdot\,(y^{25}+11y^{24}+\cdots-420031y-131044)$ |