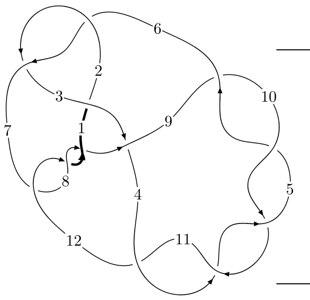
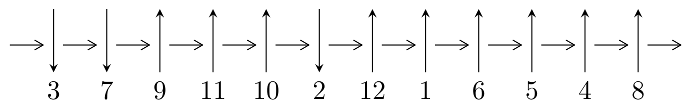
# $12a_{0594}$ ($K12a_{0594}$)




A knot diagram[1]

**Linearized knot diagam**




**Solving Sequence**

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

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

$$\begin{aligned}
I_1^u = \langle &-278579575u^{38} + 801007023u^{37} + \cdots + 960147928b + 4668885888, \\
&-506726616u^{38} + 1536859595u^{37} + \cdots + 960147928a + 7944281003,\ u^{39} - 2u^{38} + \cdots + 13u - 8\rangle \\
I_2^u = \langle &-u^6 + 2u^4 - u^2 + b,\ -u^6 + u^4 + a + 1, \\
&u^{15} - 5u^{13} + u^{12} + 10u^{11} - 4u^{10} - 10u^9 + 6u^8 + 5u^7 - 5u^6 - u^5 + 3u^4 + u^3 - u^2 - u + 1\rangle \\
I_3^u = \langle &2b - a + 1,\ a^2 - 2a + 13,\ u + 1\rangle \\
I_4^u = \langle &2b - a + 1,\ a^2 - 2a + 5,\ u - 1\rangle \\
I_5^u = \langle &b,\ a - 1,\ u + 1\rangle
\end{aligned}$$

* 5 irreducible components of $\dim_{\mathbb{C}} = 0$, with total 59 representations.

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

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

**I.**

$\boldsymbol{I_1^u = \langle -2.79\times 10^{8}u^{38} + 8.01\times 10^{8}u^{37} + \cdots + 9.60\times 10^{8}b + 4.67\times 10^{9},\ -5.07\times 10^{8}u^{38} + 1.54\times 10^{9}u^{37} + \cdots + 9.60\times 10^{8}a + 7.94\times 10^{9},\ u^{39} - 2u^{38} + \cdots + 13u - 8\rangle}$

**(i) Arc colorings**

$$a_2 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_6 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} -u \\ -u^3 + u \end{pmatrix}$$
$$a_1 = \begin{pmatrix} u^3 \\ u^5 - u^3 + u \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} 0.527759u^{38} - 1.60065u^{37} + \cdots + 10.7329u - 8.27402 \\ 0.290142u^{38} - 0.834254u^{37} + \cdots + 7.56410u - 4.86267 \end{pmatrix}$$
$$a_5 = \begin{pmatrix} 0.785150u^{38} - 0.610681u^{37} + \cdots + 11.4919u - 1.16835 \\ 0.354400u^{38} - 0.130647u^{37} + \cdots + 2.97397u + 2.89166 \end{pmatrix}$$
$$a_{11} = \begin{pmatrix} -0.848153u^{38} + 2.71323u^{37} + \cdots - 15.2658u + 5.19809 \\ -0.487224u^{38} + 1.44307u^{37} + \cdots - 12.6317u + 7.27384 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} 0.237617u^{38} - 0.766395u^{37} + \cdots + 3.16882u - 3.41134 \\ 0.290142u^{38} - 0.834254u^{37} + \cdots + 7.56410u - 4.86267 \end{pmatrix}$$
$$a_4 = \begin{pmatrix} 0.150856u^{38} + 0.0217381u^{37} + \cdots - 17.3547u + 9.46883 \\ 0.170865u^{38} - 0.242768u^{37} + \cdots - 12.7382u + 5.24191 \end{pmatrix}$$
$$a_8 = \begin{pmatrix} 0.508134u^{38} - 1.24630u^{37} + \cdots + 5.04688u - 6.94472 \\ 0.466487u^{38} - 1.22328u^{37} + \cdots + 7.11369u - 4.38047 \end{pmatrix}$$
$$a_{12} = \begin{pmatrix} 0.546702u^{38} - 2.31337u^{37} + \cdots + 5.56221u - 1.82639 \\ 0.230030u^{38} - 1.40951u^{37} + \cdots + 12.5505u - 4.06507 \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= \frac{1009740537}{480073964}u^{38} - \frac{2449057759}{480073964}u^{37} + \cdots + \frac{13839136571}{480073964}u + \frac{1544450212}{120018491}$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $u^{39} + 16u^{38} + \cdots + 841u + 64$ |
| $c_2, c_6$ | $u^{39} - 2u^{38} + \cdots + 13u - 8$ |
| $c_3$ | $u^{39} + 2u^{38} + \cdots - 434u - 82$ |
| $c_4, c_5, c_9$<br>$c_{10}, c_{11}$ | $u^{39} + 2u^{38} + \cdots - 6u - 2$ |
| $c_7, c_8, c_{12}$ | $u^{39} + 2u^{38} + \cdots - 3u - 8$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $y^{39} + 20y^{38} + \cdots + 20945y - 4096$ |
| $c_2, c_6$ | $y^{39} - 16y^{38} + \cdots + 841y - 64$ |
| $c_3$ | $y^{39} + 2y^{38} + \cdots - 278552y - 6724$ |
| $c_4, c_5, c_9$ <br> $c_{10}, c_{11}$ | $y^{39} + 50y^{38} + \cdots + 8y - 4$ |
| $c_7, c_8, c_{12}$ | $y^{39} - 40y^{38} + \cdots - 535y - 64$ |

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

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.510187 + 0.854260I$<br>$a = 0.459599 + 0.050441I$<br>$b = -0.601563 - 0.109572I$ | $7.19513 + 1.98650I$ | $12.18743 - 1.52305I$ |
| $u = 0.510187 - 0.854260I$<br>$a = 0.459599 - 0.050441I$<br>$b = -0.601563 + 0.109572I$ | $7.19513 - 1.98650I$ | $12.18743 + 1.52305I$ |
| $u = -0.622477 + 0.793703I$<br>$a = 0.715601 - 0.679477I$<br>$b = -0.417743 - 0.676425I$ | $5.47691 + 1.45533I$ | $8.53847 - 4.19348I$ |
| $u = -0.622477 - 0.793703I$<br>$a = 0.715601 + 0.679477I$<br>$b = -0.417743 + 0.676425I$ | $5.47691 - 1.45533I$ | $8.53847 + 4.19348I$ |
| $u = 0.340675 + 0.952778I$<br>$a = 0.461846 - 1.211810I$<br>$b = -0.09622 - 1.69407I$ | $-5.17058 + 7.10896I$ | $5.57947 - 3.18452I$ |
| $u = 0.340675 - 0.952778I$<br>$a = 0.461846 + 1.211810I$<br>$b = -0.09622 + 1.69407I$ | $-5.17058 - 7.10896I$ | $5.57947 + 3.18452I$ |
| $u = -0.409576 + 0.898054I$<br>$a = 0.444383 + 0.626707I$<br>$b = -0.372437 + 0.928150I$ | $4.02432 - 5.28034I$ | $7.11448 + 4.34651I$ |
| $u = -0.409576 - 0.898054I$<br>$a = 0.444383 - 0.626707I$<br>$b = -0.372437 - 0.928150I$ | $4.02432 + 5.28034I$ | $7.11448 - 4.34651I$ |
| $u = -0.893825 + 0.408631I$<br>$a = 0.56327 - 3.33333I$<br>$b = 0.02030 - 1.76094I$ | $-12.19790 + 1.67763I$ | $3.69120 - 4.54232I$ |
| $u = -0.893825 - 0.408631I$<br>$a = 0.56327 + 3.33333I$<br>$b = 0.02030 + 1.76094I$ | $-12.19790 - 1.67763I$ | $3.69120 + 4.54232I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.880857 + 0.533899I$<br>$a = 0.46350 + 1.87403I$<br>$b = 0.098417 + 1.194680I$ | $-1.54593 - 2.15130I$ | $4.04314 + 3.05891I$ |
| $u = 0.880857 - 0.533899I$<br>$a = 0.46350 - 1.87403I$<br>$b = 0.098417 - 1.194680I$ | $-1.54593 + 2.15130I$ | $4.04314 - 3.05891I$ |
| $u = -0.892947 + 0.364874I$<br>$a = -0.098814 + 0.170736I$<br>$b = -0.264285 + 0.451533I$ | $-1.36259 + 1.28896I$ | $1.24891 - 0.92411I$ |
| $u = -0.892947 - 0.364874I$<br>$a = -0.098814 - 0.170736I$<br>$b = -0.264285 - 0.451533I$ | $-1.36259 - 1.28896I$ | $1.24891 + 0.92411I$ |
| $u = 1.073090 + 0.243180I$<br>$a = -0.20763 - 1.90178I$<br>$b = -0.131098 - 1.030410I$ | $-5.77927 - 0.03027I$ | $-4.62865 - 0.08924I$ |
| $u = 1.073090 - 0.243180I$<br>$a = -0.20763 + 1.90178I$<br>$b = -0.131098 + 1.030410I$ | $-5.77927 + 0.03027I$ | $-4.62865 + 0.08924I$ |
| $u = 0.980860 + 0.516874I$<br>$a = 0.601891 + 0.724041I$<br>$b = -0.513688 + 0.161476I$ | $-0.27159 - 4.03311I$ | $6.10073 + 7.35963I$ |
| $u = 0.980860 - 0.516874I$<br>$a = 0.601891 - 0.724041I$<br>$b = -0.513688 - 0.161476I$ | $-0.27159 + 4.03311I$ | $6.10073 - 7.35963I$ |
| $u = 0.807984 + 0.807298I$<br>$a = 0.93590 + 1.21554I$<br>$b = -0.03886 + 1.59336I$ | $-2.08218 - 2.94056I$ | $6.18654 + 2.75292I$ |
| $u = 0.807984 - 0.807298I$<br>$a = 0.93590 - 1.21554I$<br>$b = -0.03886 - 1.59336I$ | $-2.08218 + 2.94056I$ | $6.18654 - 2.75292I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.587388 + 0.621753I$<br>$a = -0.417391 - 0.020298I$<br>$b = -0.01628 - 1.67009I$ | $-9.77106 - 1.29915I$ | $3.64577 + 3.61671I$ |
| $u = 0.587388 - 0.621753I$<br>$a = -0.417391 + 0.020298I$<br>$b = -0.01628 + 1.67009I$ | $-9.77106 + 1.29915I$ | $3.64577 - 3.61671I$ |
| $u = -1.153580 + 0.222471I$<br>$a = -0.20810 + 3.24218I$<br>$b = -0.03306 + 1.72517I$ | $-15.6341 - 0.6387I$ | $-4.65488 - 0.03706I$ |
| $u = -1.153580 - 0.222471I$<br>$a = -0.20810 - 3.24218I$<br>$b = -0.03306 - 1.72517I$ | $-15.6341 + 0.6387I$ | $-4.65488 + 0.03706I$ |
| $u = -1.063930 + 0.555566I$<br>$a = 1.47957 - 1.38271I$<br>$b = -0.310928 - 0.963275I$ | $-3.72446 + 6.84807I$ | $0.27874 - 7.93372I$ |
| $u = -1.063930 - 0.555566I$<br>$a = 1.47957 + 1.38271I$<br>$b = -0.310928 + 0.963275I$ | $-3.72446 - 6.84807I$ | $0.27874 + 7.93372I$ |
| $u = -1.008430 + 0.658829I$<br>$a = 0.103228 - 0.321231I$<br>$b = 0.472850 - 0.562157I$ | $4.30632 + 4.00074I$ | $7.24813 - 1.07966I$ |
| $u = -1.008430 - 0.658829I$<br>$a = 0.103228 + 0.321231I$<br>$b = 0.472850 + 0.562157I$ | $4.30632 - 4.00074I$ | $7.24813 + 1.07966I$ |
| $u = 1.115460 + 0.583045I$<br>$a = 2.22473 + 2.04920I$<br>$b = -0.08101 + 1.70763I$ | $-13.1673 - 8.4053I$ | $-0.71469 + 6.01805I$ |
| $u = 1.115460 - 0.583045I$<br>$a = 2.22473 - 2.04920I$<br>$b = -0.08101 - 1.70763I$ | $-13.1673 + 8.4053I$ | $-0.71469 - 6.01805I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.087820 + 0.664251I$<br>$a = -0.350032 - 0.695239I$<br>$b = 0.612419 - 0.190625I$ | $5.45311 - 7.62050I$ | $9.27378 + 6.71287I$ |
| $u = 1.087820 - 0.664251I$<br>$a = -0.350032 + 0.695239I$<br>$b = 0.612419 + 0.190625I$ | $5.45311 + 7.62050I$ | $9.27378 - 6.71287I$ |
| $u = -0.623171 + 0.365194I$<br>$a = -0.543839 - 0.239201I$<br>$b = 0.032741 + 0.707498I$ | $-1.17941 + 1.46032I$ | $3.60067 - 5.27194I$ |
| $u = -0.623171 - 0.365194I$<br>$a = -0.543839 + 0.239201I$<br>$b = 0.032741 - 0.707498I$ | $-1.17941 - 1.46032I$ | $3.60067 + 5.27194I$ |
| $u = -1.146680 + 0.648201I$<br>$a = -1.15783 + 1.54546I$<br>$b = 0.375338 + 0.995318I$ | $1.80213 + 10.96520I$ | $4.26192 - 8.20321I$ |
| $u = -1.146680 - 0.648201I$<br>$a = -1.15783 - 1.54546I$<br>$b = 0.375338 - 0.995318I$ | $1.80213 - 10.96520I$ | $4.26192 + 8.20321I$ |
| $u = 1.190740 + 0.638471I$<br>$a = -1.89201 - 2.31261I$<br>$b = 0.10134 - 1.71568I$ | $-7.7538 - 12.8923I$ | $2.81039 + 6.85603I$ |
| $u = 1.190740 - 0.638471I$<br>$a = -1.89201 + 2.31261I$<br>$b = 0.10134 + 1.71568I$ | $-7.7538 + 12.8923I$ | $2.81039 - 6.85603I$ |
| $u = 0.479115$<br>$a = -1.28073$<br>$b = 0.327545$ | 0.778698 | 14.3770 |

**II.** $\boldsymbol{I_2^u = \langle -u^6 + 2u^4 - u^2 + b,\ -u^6 + u^4 + a + 1,\ u^{15} - 5u^{13} + \cdots - u + 1\rangle}$

**(i) Arc colorings**

$$a_2 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_6 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} -u \\ -u^3 + u \end{pmatrix}$$
$$a_1 = \begin{pmatrix} u^3 \\ u^5 - u^3 + u \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} u^6 - u^4 - 1 \\ u^6 - 2u^4 + u^2 \end{pmatrix}$$
$$a_5 = \begin{pmatrix} u^{12} - 3u^{10} + 3u^8 - 2u^6 + 2u^4 - u^2 + 1 \\ u^{12} - 4u^{10} + 6u^8 - 4u^6 + u^4 \end{pmatrix}$$
$$a_{11} = \begin{pmatrix} -u^{13} + 4u^{11} - 5u^9 + 2u^7 - u \\ u^{12} - 4u^{10} + u^9 + 6u^8 - 3u^7 - 5u^6 + 3u^5 + 3u^4 - u^3 - u^2 + 1 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} u^4 - u^2 - 1 \\ u^6 - 2u^4 + u^2 \end{pmatrix}$$
$$a_4 = \begin{pmatrix} u^7 - 2u^5 \\ u^9 - 3u^7 + 3u^5 - 2u^3 + u \end{pmatrix}$$
$$a_8 = \begin{pmatrix} -u^2 - 1 \\ -u^4 \end{pmatrix}$$
$$a_{12} = \begin{pmatrix} -u \\ -u^3 + u \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= 4u^{12} - 16u^{10} + 24u^8 - 20u^6 + 12u^4 - 4u^3 - 4u^2 + 4u + 10$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $u^{15}+10u^{14}+\cdots+3u+1$ |
| $c_2, c_6, c_7$<br>$c_8, c_{12}$ | $u^{15}-5u^{13}+\cdots-u+1$ |
| $c_3$ | $(u^5-u^4+u^2+u-1)^3$ |
| $c_4, c_5, c_9$<br>$c_{10}, c_{11}$ | $(u^5-u^4+4u^3-3u^2+3u-1)^3$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $y^{15} - 10y^{14} + \cdots - 9y - 1$ |
| $c_2, c_6, c_7$<br>$c_8, c_{12}$ | $y^{15} - 10y^{14} + \cdots + 3y - 1$ |
| $c_3$ | $(y^5 - y^4 + 4y^3 - 3y^2 + 3y - 1)^3$ |
| $c_4, c_5, c_9$<br>$c_{10}, c_{11}$ | $(y^5 + 7y^4 + 16y^3 + 13y^2 + 3y - 1)^3$ |

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

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.906686 + 0.468417I$<br>$a = -1.72729 + 0.71115I$<br>$b = 0.233677 + 0.885557I$ | $-1.81981 + 2.21397I$ | $3.11432 - 4.22289I$ |
| $u = -0.906686 - 0.468417I$<br>$a = -1.72729 - 0.71115I$<br>$b = 0.233677 - 0.885557I$ | $-1.81981 - 2.21397I$ | $3.11432 + 4.22289I$ |
| $u = 0.989359 + 0.555107I$<br>$a = -2.36917 - 1.31631I$<br>$b = 0.05818 - 1.69128I$ | $-10.95830 - 3.33174I$ | $2.08126 + 2.36228I$ |
| $u = 0.989359 - 0.555107I$<br>$a = -2.36917 + 1.31631I$<br>$b = 0.05818 + 1.69128I$ | $-10.95830 + 3.33174I$ | $2.08126 - 2.36228I$ |
| $u = 0.359454 + 0.759797I$<br>$a = -0.591315 + 0.655548I$<br>$b = 0.05818 + 1.69128I$ | $-10.95830 + 3.33174I$ | $2.08126 - 2.36228I$ |
| $u = 0.359454 - 0.759797I$<br>$a = -0.591315 - 0.655548I$<br>$b = 0.05818 - 1.69128I$ | $-10.95830 - 3.33174I$ | $2.08126 + 2.36228I$ |
| $u = -1.23403$<br>$a = 0.212482$<br>$b = 0.416284$ | $0.882183$ | $11.6090$ |
| $u = -0.379822 + 0.616522I$<br>$a = -0.694211 - 0.196319I$<br>$b = 0.233677 - 0.885557I$ | $-1.81981 - 2.21397I$ | $3.11432 + 4.22289I$ |
| $u = -0.379822 - 0.616522I$<br>$a = -0.694211 + 0.196319I$<br>$b = 0.233677 + 0.885557I$ | $-1.81981 + 2.21397I$ | $3.11432 - 4.22289I$ |
| $u = 0.617017 + 0.377000I$<br>$a = -0.981816 - 0.243241I$<br>$b = 0.416284$ | $0.882183$ | $11.60884 + 0.I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.617017 - 0.377000I$<br>$a = -0.981816 + 0.243241I$<br>$b = 0.416284$ | $0.882183$ | $11.60884 + 0.I$ |
| $u = 1.286510 + 0.148105I$<br>$a = 0.12253 + 1.74921I$<br>$b = 0.233677 + 0.885557I$ | $-1.81981 + 2.21397I$ | $3.11432 - 4.22289I$ |
| $u = 1.286510 - 0.148105I$<br>$a = 0.12253 - 1.74921I$<br>$b = 0.233677 - 0.885557I$ | $-1.81981 - 2.21397I$ | $3.11432 + 4.22289I$ |
| $u = -1.348810 + 0.204690I$<br>$a = 0.13503 - 3.10198I$<br>$b = 0.05818 - 1.69128I$ | $-10.95830 - 3.33174I$ | $2.08126 + 2.36228I$ |
| $u = -1.348810 - 0.204690I$<br>$a = 0.13503 + 3.10198I$<br>$b = 0.05818 + 1.69128I$ | $-10.95830 + 3.33174I$ | $2.08126 - 2.36228I$ |

## III. $I_3^u = \langle 2b - a + 1,\ a^2 - 2a + 13,\ u + 1\rangle$

**(i) Arc colorings**

$$a_2 = \begin{pmatrix} 0 \\ -1 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_1 = \begin{pmatrix} -1 \\ -1 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} a \\ \frac{1}{2}a - \frac{1}{2} \end{pmatrix}$$
$$a_5 = \begin{pmatrix} \frac{1}{2}a - \frac{11}{2} \\ -3 \end{pmatrix}$$
$$a_{11} = \begin{pmatrix} -\frac{3}{2}a - \frac{1}{2} \\ -a + 1 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} \frac{1}{2}a + \frac{1}{2} \\ \frac{1}{2}a - \frac{1}{2} \end{pmatrix}$$
$$a_4 = \begin{pmatrix} -\frac{1}{2}a + \frac{9}{2} \\ 3 \end{pmatrix}$$
$$a_8 = \begin{pmatrix} \frac{1}{2}a + \frac{3}{2} \\ \frac{1}{2}a + \frac{1}{2} \end{pmatrix}$$
$$a_{12} = \begin{pmatrix} \frac{1}{2}a + \frac{1}{2} \\ \frac{1}{2}a - \frac{1}{2} \end{pmatrix}$$

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

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

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

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

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

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

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

| Solutions to $I_3^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -1.00000$<br>$a = \quad 1.00000 + 3.46410I$<br>$b = \quad 1.73205I$ | $-13.1595$ | 0 |
| $u = -1.00000$<br>$a = \quad 1.00000 - 3.46410I$<br>$b = \quad -1.73205I$ | $-13.1595$ | 0 |

## IV. $\boldsymbol{I_4^u = \langle 2b - a + 1,\ a^2 - 2a + 5,\ u - 1\rangle}$

**(i) Arc colorings**

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

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

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

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

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

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

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

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

| Solutions to $I^u_4$ | | $\sqrt{-1}(\text{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|---|
| $u =$ | $1.00000$ | | |
| $a =$ | $1.00000 + 2.00000I$ | $-3.28987$ | 0 |
| $b =$ | $1.000000I$ | | |
| $u =$ | $1.00000$ | | |
| $a =$ | $1.00000 - 2.00000I$ | $-3.28987$ | 0 |
| $b =$ | $-1.000000I$ | | |

## V. $I_5^u = \langle b,\ a-1,\ u+1 \rangle$

**(i) Arc colorings**

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

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

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

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

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

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

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

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

| Solutions to $I^u_5$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -1.00000$<br>$a = 1.00000$<br>$b = 0$ | 0 | 0 |

## VI. u-Polynomials

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $((u-1)^5)(u^{15}+10u^{14}+\cdots+3u+1)(u^{39}+16u^{38}+\cdots+841u+64)$ |
| $c_2$ | $((u-1)^3)(u+1)^2(u^{15}-5u^{13}+\cdots-u+1)(u^{39}-2u^{38}+\cdots+13u-8)$ |
| $c_3$ | $u(u^2+1)(u^2+3)(u^5-u^4+\cdots+u-1)^3(u^{39}+2u^{38}+\cdots-434u-82)$ |
| $c_4, c_5, c_9$<br>$c_{10}, c_{11}$ | $u(u^2+1)(u^2+3)(u^5-u^4+4u^3-3u^2+3u-1)^3$<br>$\cdot\,(u^{39}+2u^{38}+\cdots-6u-2)$ |
| $c_6$ | $((u-1)^2)(u+1)^3(u^{15}-5u^{13}+\cdots-u+1)(u^{39}-2u^{38}+\cdots+13u-8)$ |
| $c_7, c_8$ | $((u-1)^2)(u+1)^3(u^{15}-5u^{13}+\cdots-u+1)(u^{39}+2u^{38}+\cdots-3u-8)$ |
| $c_{12}$ | $((u-1)^3)(u+1)^2(u^{15}-5u^{13}+\cdots-u+1)(u^{39}+2u^{38}+\cdots-3u-8)$ |

**VII. Riley Polynomials**

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $((y-1)^5)(y^{15}-10y^{14}+\cdots-9y-1)$ $\cdot(y^{39}+20y^{38}+\cdots+20945y-4096)$ |
| $c_2, c_6$ | $((y-1)^5)(y^{15}-10y^{14}+\cdots+3y-1)(y^{39}-16y^{38}+\cdots+841y-64)$ |
| $c_3$ | $y(y+1)^2(y+3)^2(y^5-y^4+4y^3-3y^2+3y-1)^3$ $\cdot(y^{39}+2y^{38}+\cdots-278552y-6724)$ |
| $c_4, c_5, c_9$ $c_{10}, c_{11}$ | $y(y+1)^2(y+3)^2(y^5+7y^4+16y^3+13y^2+3y-1)^3$ $\cdot(y^{39}+50y^{38}+\cdots+8y-4)$ |
| $c_7, c_8, c_{12}$ | $((y-1)^5)(y^{15}-10y^{14}+\cdots+3y-1)(y^{39}-40y^{38}+\cdots-535y-64)$ |