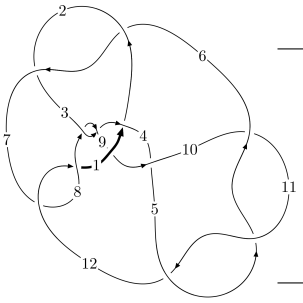
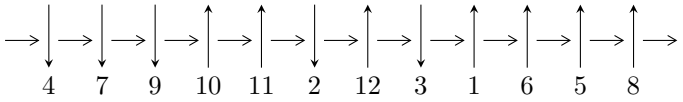
## $12a_{1048}$ $(K12a_{1048})$




A knot diagram[1]

**Linearized knot diagam**




**Solving Sequence**

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

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

$$\begin{aligned} I_1^u = \langle & 1.21895 \times 10^{483} u^{122} - 2.00271 \times 10^{482} u^{121} + \cdots + 2.90201 \times 10^{482} b + 1.95148 \times 10^{485}, \\ & 1.85948 \times 10^{485} u^{122} - 3.93751 \times 10^{484} u^{121} + \cdots + 3.97576 \times 10^{484} a + 3.12400 \times 10^{487}, \\ & u^{123} - u^{122} + \cdots + 853u - 137 \rangle \\ I_2^u = \langle & 3615086u^{24} + 4785247u^{23} + \cdots + 2401109b - 9094340, \\ & - 5355406u^{24} + 999159u^{23} + \cdots + 7203327a + 12279998,\ u^{25} - 12u^{23} + \cdots + 4u + 3 \rangle \end{aligned}$$

* 2 irreducible components of $\dim_{\mathbb{C}} = 0$, with total 148 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.** $\boldsymbol{I_1^u = \langle 1.22 \times 10^{483} u^{122} - 2.00 \times 10^{482} u^{121} + \cdots + 2.90 \times 10^{482} b + 1.95 \times 10^{485},\ 1.86 \times 10^{485} u^{122} - 3.94 \times 10^{484} u^{121} + \cdots + 3.98 \times 10^{484} a + 3.12 \times 10^{487},\ u^{123} - u^{122} + \cdots + 853u - 137 \rangle}$

**(i) Arc colorings**

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

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

$$a_9 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$

$$a_1 = \begin{pmatrix} -4.67704u^{122} + 0.990379u^{121} + \cdots + 3876.46u - 785.763 \\ -4.20035u^{122} + 0.690110u^{121} + \cdots + 3393.47u - 672.456 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} -u \\ -u^3 + u \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} -1.36566u^{122} - 0.0177930u^{121} + \cdots + 1101.44u - 210.574 \\ -3.17578u^{122} + 0.515977u^{121} + \cdots + 2687.38u - 534.214 \end{pmatrix}$$

$$a_5 = \begin{pmatrix} 1.79496u^{122} - 0.0577026u^{121} + \cdots - 1325.63u + 255.267 \\ 4.80962u^{122} - 0.664266u^{121} + \cdots - 3857.94u + 760.602 \end{pmatrix}$$

$$a_{12} = \begin{pmatrix} -0.476686u^{122} + 0.300269u^{121} + \cdots + 482.987u - 113.307 \\ -4.20035u^{122} + 0.690110u^{121} + \cdots + 3393.47u - 672.456 \end{pmatrix}$$

$$a_7 = \begin{pmatrix} -2.03889u^{122} + 0.462183u^{121} + \cdots + 1852.80u - 372.392 \\ 8.25817u^{122} - 1.01878u^{121} + \cdots - 6665.60u + 1310.00 \end{pmatrix}$$

$$a_2 = \begin{pmatrix} -0.676402u^{122} + 0.255561u^{121} + \cdots + 610.368u - 132.811 \\ -5.46240u^{122} + 0.914876u^{121} + \cdots + 4421.91u - 877.990 \end{pmatrix}$$

$$a_6 = \begin{pmatrix} -2.63084u^{122} + 0.421127u^{121} + \cdots + 2131.33u - 416.137 \\ 6.62526u^{122} - 0.866746u^{121} + \cdots - 5402.46u + 1065.21 \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} -4.44348u^{122} + 0.332202u^{121} + \cdots + 3545.17u - 687.481 \\ 7.02325u^{122} - 0.491528u^{121} + \cdots - 5313.14u + 1030.01 \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= -24.7292u^{122} + 2.72629u^{121} + \cdots + 19167.5u - 3758.32$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $u^{123} - 4u^{122} + \cdots + 608612u - 35287$ |
| $c_2, c_6$ | $u^{123} - 2u^{122} + \cdots + 7280u - 1709$ |
| $c_3, c_8$ | $u^{123} + u^{122} + \cdots + 853u + 137$ |
| $c_4$ | $u^{123} - u^{122} + \cdots + 310818u + 82413$ |
| $c_5, c_{10}, c_{11}$ | $u^{123} + u^{122} + \cdots + 48u + 9$ |
| $c_7, c_{12}$ | $u^{123} + 2u^{122} + \cdots + 4u + 1$ |
| $c_9$ | $u^{123} - 2u^{122} + \cdots + 2u - 1$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $y^{123} - 24y^{122} + \cdots + 48933975036y - 1245172369$ |
| $c_2, c_6$ | $y^{123} - 84y^{122} + \cdots + 29345840y - 2920681$ |
| $c_3, c_8$ | $y^{123} - 87y^{122} + \cdots + 642943y - 18769$ |
| $c_4$ | $y^{123} - 31y^{122} + \cdots + 104568100794y - 6791902569$ |
| $c_5, c_{10}, c_{11}$ | $y^{123} + 109y^{122} + \cdots + 3186y - 81$ |
| $c_7, c_{12}$ | $y^{123} - 72y^{122} + \cdots + 112y - 1$ |
| $c_9$ | $y^{123} - 8y^{122} + \cdots + 122y - 1$ |

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

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.943927 + 0.361878I$<br>$a = 0.908606 - 0.984560I$<br>$b = 1.316770 - 0.232966I$ | $-1.14555 + 2.82046I$ | 0 |
| $u = 0.943927 - 0.361878I$<br>$a = 0.908606 + 0.984560I$<br>$b = 1.316770 + 0.232966I$ | $-1.14555 - 2.82046I$ | 0 |
| $u = 0.875727 + 0.452631I$<br>$a = -0.01544 + 1.88890I$<br>$b = -1.13845 + 0.95496I$ | $1.15757 - 5.43534I$ | 0 |
| $u = 0.875727 - 0.452631I$<br>$a = -0.01544 - 1.88890I$<br>$b = -1.13845 - 0.95496I$ | $1.15757 + 5.43534I$ | 0 |
| $u = -0.891895 + 0.507585I$<br>$a = -0.01788 + 1.92967I$<br>$b = 1.10603 + 1.03544I$ | $-3.38927 + 8.71767I$ | 0 |
| $u = -0.891895 - 0.507585I$<br>$a = -0.01788 - 1.92967I$<br>$b = 1.10603 - 1.03544I$ | $-3.38927 - 8.71767I$ | 0 |
| $u = 1.026550 + 0.121549I$<br>$a = 0.386221 + 1.319250I$<br>$b = -1.198580 + 0.420234I$ | $-2.46420 - 1.83999I$ | 0 |
| $u = 1.026550 - 0.121549I$<br>$a = 0.386221 - 1.319250I$<br>$b = -1.198580 - 0.420234I$ | $-2.46420 + 1.83999I$ | 0 |
| $u = -0.157699 + 0.938275I$<br>$a = 0.277855 + 0.268995I$<br>$b = -1.232660 + 0.014196I$ | $3.44114 + 1.62193I$ | 0 |
| $u = -0.157699 - 0.938275I$<br>$a = 0.277855 - 0.268995I$<br>$b = -1.232660 - 0.014196I$ | $3.44114 - 1.62193I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-1.014780+0.274190I$<br>$a=-0.94328-1.10444I$<br>$b=-1.269650-0.444108I$ | $2.74556+0.92758I$ | 0 |
| $u=-1.014780-0.274190I$<br>$a=-0.94328+1.10444I$<br>$b=-1.269650+0.444108I$ | $2.74556-0.92758I$ | 0 |
| $u=-1.061450+0.078503I$<br>$a=-0.88476+1.21857I$<br>$b=1.099060+0.307206I$ | $-8.31481-0.54476I$ | 0 |
| $u=-1.061450-0.078503I$<br>$a=-0.88476-1.21857I$<br>$b=1.099060-0.307206I$ | $-8.31481+0.54476I$ | 0 |
| $u=-1.053660+0.166811I$<br>$a=-0.82483+1.39823I$<br>$b=-0.402376+0.640368I$ | $-6.90473-0.66791I$ | 0 |
| $u=-1.053660-0.166811I$<br>$a=-0.82483-1.39823I$<br>$b=-0.402376-0.640368I$ | $-6.90473+0.66791I$ | 0 |
| $u=-0.708309+0.587971I$<br>$a=-0.825937-0.455610I$<br>$b=-1.347660+0.339095I$ | $-1.94726+1.61762I$ | 0 |
| $u=-0.708309-0.587971I$<br>$a=-0.825937+0.455610I$<br>$b=-1.347660-0.339095I$ | $-1.94726-1.61762I$ | 0 |
| $u=1.074590+0.221218I$<br>$a=1.00913-1.20136I$<br>$b=1.27968-0.65261I$ | $-1.19981-4.88070I$ | 0 |
| $u=1.074590-0.221218I$<br>$a=1.00913+1.20136I$<br>$b=1.27968+0.65261I$ | $-1.19981+4.88070I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-1.084660+0.181582I$<br>$a=-0.31392+1.77188I$<br>$b=\ \ 1.091840+0.530231I$ | $-2.13487+5.15770I$ | 0 |
| $u=-1.084660-0.181582I$<br>$a=-0.31392-1.77188I$<br>$b=\ \ 1.091840-0.530231I$ | $-2.13487-5.15770I$ | 0 |
| $u=-0.900205$<br>$a=\ \ 1.02288$<br>$b=\ \ 1.98444$ | $4.01544$ | 0 |
| $u=\ \ 0.895791+0.019019I$<br>$a=-1.009130+0.439876I$<br>$b=-1.95945+0.25495I$ | $0.12052-4.25089I$ | 0 |
| $u=\ \ 0.895791-0.019019I$<br>$a=-1.009130-0.439876I$<br>$b=-1.95945-0.25495I$ | $0.12052+4.25089I$ | 0 |
| $u=-0.820333+0.360106I$<br>$a=\ \ 0.10899+1.87087I$<br>$b=\ \ 1.23039+0.88663I$ | $-2.13523+2.35342I$ | 0 |
| $u=-0.820333-0.360106I$<br>$a=\ \ 0.10899-1.87087I$<br>$b=\ \ 1.23039-0.88663I$ | $-2.13523-2.35342I$ | 0 |
| $u=-0.595834+0.666999I$<br>$a=-0.752220-0.136772I$<br>$b=-1.254400+0.593067I$ | $-2.54598-4.14695I$ | 0 |
| $u=-0.595834-0.666999I$<br>$a=-0.752220+0.136772I$<br>$b=-1.254400-0.593067I$ | $-2.54598+4.14695I$ | 0 |
| $u=\ \ 0.628567+0.612338I$<br>$a=\ \ 0.721244-0.291562I$<br>$b=\ \ 1.253860+0.465398I$ | $1.83812+1.17430I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.628567 - 0.612338I$<br>$a = 0.721244 + 0.291562I$<br>$b = 1.253860 - 0.465398I$ | $1.83812 - 1.17430I$ | 0 |
| $u = 1.011850 + 0.506765I$<br>$a = 0.20701 + 1.86271I$<br>$b = -0.803841 + 1.002100I$ | $-4.71491 - 2.53383I$ | 0 |
| $u = 1.011850 - 0.506765I$<br>$a = 0.20701 - 1.86271I$<br>$b = -0.803841 - 1.002100I$ | $-4.71491 + 2.53383I$ | 0 |
| $u = 1.124820 + 0.150846I$<br>$a = 0.49409 + 1.97860I$<br>$b = -1.023840 + 0.511274I$ | $-7.57023 - 8.08021I$ | 0 |
| $u = 1.124820 - 0.150846I$<br>$a = 0.49409 - 1.97860I$<br>$b = -1.023840 - 0.511274I$ | $-7.57023 + 8.08021I$ | 0 |
| $u = 1.044170 + 0.452068I$<br>$a = 0.54048 + 1.61241I$<br>$b = -0.302505 + 0.764357I$ | $-5.75484 - 7.01132I$ | 0 |
| $u = 1.044170 - 0.452068I$<br>$a = 0.54048 - 1.61241I$<br>$b = -0.302505 - 0.764357I$ | $-5.75484 + 7.01132I$ | 0 |
| $u = 0.071464 + 0.850950I$<br>$a = -0.310659 + 0.421459I$<br>$b = 1.285850 + 0.133404I$ | $6.41680 + 2.49001I$ | 0 |
| $u = 0.071464 - 0.850950I$<br>$a = -0.310659 - 0.421459I$<br>$b = 1.285850 - 0.133404I$ | $6.41680 - 2.49001I$ | 0 |
| $u = -1.053840 + 0.459422I$<br>$a = -0.11215 + 1.65604I$<br>$b = 0.832009 + 0.698244I$ | $-0.59052 + 4.46516I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-1.053840-0.459422I$<br>$a=-0.11215-1.65604I$<br>$b=\ \ 0.832009-0.698244I$ | $-0.59052-4.46516I$ | 0 |
| $u=\ \ 0.819330+0.119219I$<br>$a=\ \ 0.65038+1.37615I$<br>$b=\ \ 0.480344+0.257697I$ | $-1.34243-0.86064I$ | 0 |
| $u=\ \ 0.819330-0.119219I$<br>$a=\ \ 0.65038-1.37615I$<br>$b=\ \ 0.480344-0.257697I$ | $-1.34243+0.86064I$ | 0 |
| $u=-1.062360+0.529457I$<br>$a=-0.183964+1.379970I$<br>$b=\ \ 0.681724+0.458602I$ | $-0.57261+4.38148I$ | 0 |
| $u=-1.062360-0.529457I$<br>$a=-0.183964-1.379970I$<br>$b=\ \ 0.681724-0.458602I$ | $-0.57261-4.38148I$ | 0 |
| $u=-0.006342+0.798607I$<br>$a=\ \ 0.343553+0.560626I$<br>$b=-1.319680+0.224194I$ | $1.80789-6.44660I$ | 0 |
| $u=-0.006342-0.798607I$<br>$a=\ \ 0.343553-0.560626I$<br>$b=-1.319680-0.224194I$ | $1.80789+6.44660I$ | 0 |
| $u=-0.749921+0.232002I$<br>$a=-0.64198+1.93072I$<br>$b=-0.309033+0.036205I$ | $-0.14848+4.10853I$ | 0 |
| $u=-0.749921-0.232002I$<br>$a=-0.64198-1.93072I$<br>$b=-0.309033-0.036205I$ | $-0.14848-4.10853I$ | 0 |
| $u=-0.400493+1.152770I$<br>$a=-0.490794+0.066694I$<br>$b=\ \ 0.769012-0.438048I$ | $-7.86387-1.90779I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-0.400493-1.152770I$<br>$a=-0.490794-0.066694I$<br>$b=\ 0.769012+0.438048I$ | $-7.86387+1.90779I$ | 0 |
| $u=\ 0.427072+0.648572I$<br>$a=\ 0.430200+0.142061I$<br>$b=\ 0.904487+0.701968I$ | $-3.06610-1.93239I$ | 0 |
| $u=\ 0.427072-0.648572I$<br>$a=\ 0.430200-0.142061I$<br>$b=\ 0.904487-0.701968I$ | $-3.06610+1.93239I$ | 0 |
| $u=\ 0.746508+0.212985I$<br>$a=\ 0.91479+2.38092I$<br>$b=\ 0.288886-0.019338I$ | $-5.48833-7.43918I$ | 0 |
| $u=\ 0.746508-0.212985I$<br>$a=\ 0.91479-2.38092I$<br>$b=\ 0.288886+0.019338I$ | $-5.48833+7.43918I$ | 0 |
| $u=\ 0.057801+1.225450I$<br>$a=\ 0.164375-0.126913I$<br>$b=-1.177070-0.500730I$ | $-2.18555+12.06840I$ | 0 |
| $u=\ 0.057801-1.225450I$<br>$a=\ 0.164375+0.126913I$<br>$b=-1.177070+0.500730I$ | $-2.18555-12.06840I$ | 0 |
| $u=\ 1.192370+0.322491I$<br>$a=-0.17612+1.88313I$<br>$b=-1.066390+0.590194I$ | $-5.10407-4.21172I$ | 0 |
| $u=\ 1.192370-0.322491I$<br>$a=-0.17612-1.88313I$<br>$b=-1.066390-0.590194I$ | $-5.10407+4.21172I$ | 0 |
| $u=-0.037822+1.256410I$<br>$a=-0.174233-0.073283I$<br>$b=\ 1.161490-0.431431I$ | $3.24434-7.77719I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-0.037822-1.256410I$<br>$a=-0.174233+0.073283I$<br>$b=\ \ 1.161490+0.431431I$ | $3.24434+7.77719I$ | 0 |
| $u=\ \ 0.657170+0.299786I$<br>$a=-0.134959+1.125220I$<br>$b=\ \ 0.492215+0.022504I$ | $-1.72975-1.55845I$ | 0 |
| $u=\ \ 0.657170-0.299786I$<br>$a=-0.134959-1.125220I$<br>$b=\ \ 0.492215-0.022504I$ | $-1.72975+1.55845I$ | 0 |
| $u=\ \ 1.243470+0.334315I$<br>$a=-0.31841-1.38144I$<br>$b=-0.295676-1.355500I$ | $-4.25389-7.11888I$ | 0 |
| $u=\ \ 1.243470-0.334315I$<br>$a=-0.31841+1.38144I$<br>$b=-0.295676+1.355500I$ | $-4.25389+7.11888I$ | 0 |
| $u=-1.240730+0.365552I$<br>$a=\ \ 0.44278-1.38631I$<br>$b=\ \ 0.39494-1.38877I$ | $-9.3621+11.0853I$ | 0 |
| $u=-1.240730-0.365552I$<br>$a=\ \ 0.44278+1.38631I$<br>$b=\ \ 0.39494+1.38877I$ | $-9.3621-11.0853I$ | 0 |
| $u=-1.271220+0.279397I$<br>$a=\ \ 0.099812-1.265720I$<br>$b=\ \ 0.143232-1.205370I$ | $-6.44094+3.01844I$ | 0 |
| $u=-1.271220-0.279397I$<br>$a=\ \ 0.099812+1.265720I$<br>$b=\ \ 0.143232+1.205370I$ | $-6.44094-3.01844I$ | 0 |
| $u=-0.425582+0.516359I$<br>$a=-0.0262110-0.0534149I$<br>$b=-0.843186+0.383466I$ | $1.176920-0.453188I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-0.425582-0.516359I$<br>$a=-0.0262110+0.0534149I$<br>$b=-0.843186-0.383466I$ | $1.176920+0.453188I$ | 0 |
| $u=\ \ 0.962930+0.919473I$<br>$a=\ \ 0.274389+0.616670I$<br>$b=-0.691374-0.071551I$ | $-0.566634-0.566059I$ | 0 |
| $u=\ \ 0.962930-0.919473I$<br>$a=\ \ 0.274389-0.616670I$<br>$b=-0.691374+0.071551I$ | $-0.566634+0.566059I$ | 0 |
| $u=-1.316600+0.200552I$<br>$a=-0.172358-1.051680I$<br>$b=-0.024738-0.950032I$ | $-6.48344+2.73920I$ | 0 |
| $u=-1.316600-0.200552I$<br>$a=-0.172358+1.051680I$<br>$b=-0.024738+0.950032I$ | $-6.48344-2.73920I$ | 0 |
| $u=-0.647947+0.104349I$<br>$a=-2.22160+1.30527I$<br>$b=-0.288992-0.048584I$ | $-7.02860-1.00487I$ | $-8.65082+0.I$ |
| $u=-0.647947-0.104349I$<br>$a=-2.22160-1.30527I$<br>$b=-0.288992+0.048584I$ | $-7.02860+1.00487I$ | $-8.65082+0.I$ |
| $u=\ \ 1.362340+0.039972I$<br>$a=\ \ 0.710428-0.788816I$<br>$b=\ \ 0.360946-0.608288I$ | $-4.23964+0.60625I$ | 0 |
| $u=\ \ 1.362340-0.039972I$<br>$a=\ \ 0.710428+0.788816I$<br>$b=\ \ 0.360946+0.608288I$ | $-4.23964-0.60625I$ | 0 |
| $u=\ \ 1.286580+0.456843I$<br>$a=-0.51359+1.51646I$<br>$b=-1.136810+0.417099I$ | $2.62817-7.27240I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.286580 - 0.456843I$<br>$a = -0.51359 - 1.51646I$<br>$b = -1.136810 - 0.417099I$ | $2.62817 + 7.27240I$ | 0 |
| $u = 0.006326 + 1.367020I$<br>$a = 0.213986 - 0.016195I$<br>$b = -1.090280 - 0.341522I$ | $1.37277 + 2.83274I$ | 0 |
| $u = 0.006326 - 1.367020I$<br>$a = 0.213986 + 0.016195I$<br>$b = -1.090280 + 0.341522I$ | $1.37277 - 2.83274I$ | 0 |
| $u = -1.264610 + 0.519690I$<br>$a = 0.412066 + 1.321800I$<br>$b = 1.064680 + 0.329761I$ | $-0.02567 + 3.62374I$ | 0 |
| $u = -1.264610 - 0.519690I$<br>$a = 0.412066 - 1.321800I$<br>$b = 1.064680 - 0.329761I$ | $-0.02567 - 3.62374I$ | 0 |
| $u = -1.301940 + 0.425848I$<br>$a = 0.57140 + 1.62346I$<br>$b = 1.172350 + 0.462199I$ | $-2.21004 + 10.96610I$ | 0 |
| $u = -1.301940 - 0.425848I$<br>$a = 0.57140 - 1.62346I$<br>$b = 1.172350 - 0.462199I$ | $-2.21004 - 10.96610I$ | 0 |
| $u = -1.390730 + 0.028900I$<br>$a = -1.034760 + 0.728548I$<br>$b = -0.567991 + 0.534796I$ | $-8.98552 + 3.80517I$ | 0 |
| $u = -1.390730 - 0.028900I$<br>$a = -1.034760 - 0.728548I$<br>$b = -0.567991 - 0.534796I$ | $-8.98552 - 3.80517I$ | 0 |
| $u = 0.169614 + 0.580134I$<br>$a = 0.135000 + 0.405730I$<br>$b = 0.323684 + 0.730764I$ | $-3.37544 + 3.14455I$ | $0. - 2.75952I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.169614 - 0.580134I$<br>$a = 0.135000 - 0.405730I$<br>$b = 0.323684 - 0.730764I$ | $-3.37544 - 3.14455I$ | $0. + 2.75952I$ |
| $u = 1.147670 + 0.826267I$<br>$a = -0.544271 - 0.518128I$<br>$b = 0.971943 - 0.370304I$ | $-6.71876 + 2.33578I$ | 0 |
| $u = 1.147670 - 0.826267I$<br>$a = -0.544271 + 0.518128I$<br>$b = 0.971943 + 0.370304I$ | $-6.71876 - 2.33578I$ | 0 |
| $u = 1.37236 + 0.35150I$<br>$a = -0.372128 - 0.899872I$<br>$b = -0.466061 - 0.979607I$ | $-13.52870 - 2.64043I$ | 0 |
| $u = 1.37236 - 0.35150I$<br>$a = -0.372128 + 0.899872I$<br>$b = -0.466061 + 0.979607I$ | $-13.52870 + 2.64043I$ | 0 |
| $u = -0.327669 + 0.465605I$<br>$a = -0.090913 + 0.299045I$<br>$b = -0.520573 + 0.416459I$ | $1.097740 - 0.448289I$ | $7.56061 + 0.86211I$ |
| $u = -0.327669 - 0.465605I$<br>$a = -0.090913 - 0.299045I$<br>$b = -0.520573 - 0.416459I$ | $1.097740 + 0.448289I$ | $7.56061 - 0.86211I$ |
| $u = 0.217811 + 0.503351I$<br>$a = 1.98937 + 0.22225I$<br>$b = 0.007655 - 0.666268I$ | $-5.32113 - 7.59142I$ | $-2.27030 + 5.45199I$ |
| $u = 0.217811 - 0.503351I$<br>$a = 1.98937 - 0.22225I$<br>$b = 0.007655 + 0.666268I$ | $-5.32113 + 7.59142I$ | $-2.27030 - 5.45199I$ |
| $u = 0.534917 + 0.111659I$<br>$a = 1.37024 + 1.17436I$<br>$b = 0.371956 - 0.109893I$ | $-1.30319 - 0.81755I$ | $-3.93740 + 0.I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.534917 - 0.111659I$<br>$a = 1.37024 - 1.17436I$<br>$b = 0.371956 + 0.109893I$ | $-1.30319 + 0.81755I$ | $-3.93740 + 0.I$ |
| $u = -1.46605$<br>$a = -1.25189$<br>$b = -0.714917$ | $-5.50080$ | 0 |
| $u = 1.46924 + 0.01647I$<br>$a = 1.344540 + 0.200509I$<br>$b = 0.784949 + 0.151616I$ | $-9.75565 + 2.51107I$ | 0 |
| $u = 1.46924 - 0.01647I$<br>$a = 1.344540 - 0.200509I$<br>$b = 0.784949 - 0.151616I$ | $-9.75565 - 2.51107I$ | 0 |
| $u = -1.35154 + 0.63268I$<br>$a = 0.140220 - 1.220620I$<br>$b = -1.172100 - 0.645508I$ | $-11.24380 + 8.54429I$ | 0 |
| $u = -1.35154 - 0.63268I$<br>$a = 0.140220 + 1.220620I$<br>$b = -1.172100 + 0.645508I$ | $-11.24380 - 8.54429I$ | 0 |
| $u = 1.37146 + 0.59912I$<br>$a = 0.15528 - 1.44573I$<br>$b = 1.31967 - 0.74951I$ | $-6.3088 - 18.4151I$ | 0 |
| $u = 1.37146 - 0.59912I$<br>$a = 0.15528 + 1.44573I$<br>$b = 1.31967 + 0.74951I$ | $-6.3088 + 18.4151I$ | 0 |
| $u = -1.37506 + 0.60150I$<br>$a = -0.170295 - 1.370450I$<br>$b = -1.32522 - 0.71079I$ | $-0.9370 + 14.1905I$ | 0 |
| $u = -1.37506 - 0.60150I$<br>$a = -0.170295 + 1.370450I$<br>$b = -1.32522 + 0.71079I$ | $-0.9370 - 14.1905I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.38221 + 0.60964I$<br>$a = 0.141536 - 1.252000I$<br>$b = 1.30677 - 0.65301I$ | $-2.90339 - 9.46527I$ | 0 |
| $u = 1.38221 - 0.60964I$<br>$a = 0.141536 + 1.252000I$<br>$b = 1.30677 + 0.65301I$ | $-2.90339 + 9.46527I$ | 0 |
| $u = -0.303833 + 0.326566I$<br>$a = -2.16385 + 1.08914I$<br>$b = -0.205595 - 0.493375I$ | $-0.05295 + 4.08714I$ | $2.05773 - 5.91274I$ |
| $u = -0.303833 - 0.326566I$<br>$a = -2.16385 - 1.08914I$<br>$b = -0.205595 + 0.493375I$ | $-0.05295 - 4.08714I$ | $2.05773 + 5.91274I$ |
| $u = 1.43858 + 0.69359I$<br>$a = 0.025408 - 0.838958I$<br>$b = 1.232540 - 0.464753I$ | $-2.63676 - 7.48274I$ | 0 |
| $u = 1.43858 - 0.69359I$<br>$a = 0.025408 + 0.838958I$<br>$b = 1.232540 + 0.464753I$ | $-2.63676 + 7.48274I$ | 0 |
| $u = -1.40195 + 0.91224I$<br>$a = 0.174309 - 0.536129I$<br>$b = -1.120930 - 0.346375I$ | $-0.67002 + 2.09777I$ | 0 |
| $u = -1.40195 - 0.91224I$<br>$a = 0.174309 + 0.536129I$<br>$b = -1.120930 + 0.346375I$ | $-0.67002 - 2.09777I$ | 0 |
| $u = 0.167195 + 0.173273I$<br>$a = -2.19168 - 2.23669I$<br>$b = 0.800075 + 0.480421I$ | $-2.05496 + 1.47834I$ | $1.30510 - 4.10929I$ |
| $u = 0.167195 - 0.173273I$<br>$a = -2.19168 + 2.23669I$<br>$b = 0.800075 - 0.480421I$ | $-2.05496 - 1.47834I$ | $1.30510 + 4.10929I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-1.80906+0.47005I$<br>$a=\ \ 0.269387-0.034383I$<br>$b=\ \ 0.736611-0.244833I$ | $-7.70759-5.17392I$ | 0 |
| $u=-1.80906-0.47005I$<br>$a=\ \ 0.269387+0.034383I$<br>$b=\ \ 0.736611+0.244833I$ | $-7.70759+5.17392I$ | 0 |
| $u=\ \ 2.16118$<br>$a=-0.132754$<br>$b=-0.690596$ | $-3.05947$ | 0 |

**II.**

$\boldsymbol{I_2^u = \langle 3.62\times 10^6 u^{24} + 4.79\times 10^6 u^{23} + \cdots + 2.40\times 10^6 b - 9.09\times 10^6,\ -5.36\times 10^6 u^{24} + 9.99\times 10^5 u^{23} + \cdots + 7.20\times 10^6 a + 1.23\times 10^7,\ u^{25} - 12u^{23} + \cdots + 4u + 3\rangle}$

**(i) Arc colorings**

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

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

$$a_9 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$

$$a_1 = \begin{pmatrix} 0.743463u^{24} - 0.138708u^{23} + \cdots - 3.95111u - 1.70477 \\ -1.50559u^{24} - 1.99293u^{23} + \cdots + 13.9422u + 3.78756 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} -u \\ -u^3 + u \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} -1.97850u^{24} - 3.55447u^{23} + \cdots + 8.37535u + 4.06551 \\ u^{24} - 11u^{22} + \cdots - 3u - 1 \end{pmatrix}$$

$$a_5 = \begin{pmatrix} 2.39499u^{24} + 2.80642u^{23} + \cdots + 0.441927u + 3.23002 \\ 1.63613u^{24} - 1.67073u^{23} + \cdots + 8.36861u + 5.93212 \end{pmatrix}$$

$$a_{12} = \begin{pmatrix} 2.24905u^{24} + 1.85422u^{23} + \cdots - 17.8933u - 5.49233 \\ -1.50559u^{24} - 1.99293u^{23} + \cdots + 13.9422u + 3.78756 \end{pmatrix}$$

$$a_7 = \begin{pmatrix} -0.262519u^{24} - 1.50559u^{23} + \cdots + 6.96176u + 7.89214 \\ -4.86129u^{24} + 0.428794u^{23} + \cdots + 22.6786u + 4.23039 \end{pmatrix}$$

$$a_2 = \begin{pmatrix} 0.743463u^{24} + 0.861292u^{23} + \cdots - 8.95111u - 4.70477 \\ -1.50559u^{24} - 1.99293u^{23} + \cdots + 14.9422u + 3.78756 \end{pmatrix}$$

$$a_6 = \begin{pmatrix} -0.955872u^{24} - 1.91834u^{23} + \cdots + 2.86235u + 3.52462 \\ -3.86836u^{24} + 1.01370u^{23} + \cdots + 15.8687u - 1.28638 \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} -4.82557u^{24} - 2.20743u^{23} + \cdots + 19.8011u + 0.576323 \\ -7.47777u^{24} + 3.76531u^{23} + \cdots + 14.6517u - 24.6960 \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= -\frac{3951247}{2401109}u^{24} - \frac{24006734}{2401109}u^{23} + \cdots + \frac{84724767}{2401109}u + \frac{100949946}{2401109}$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $u^{25} - 9u^{24} + \cdots + u - 1$ |
| $c_2$ | $u^{25} - u^{24} + \cdots + u - 1$ |
| $c_3$ | $u^{25} - 12u^{23} + \cdots + 4u - 3$ |
| $c_4$ | $u^{25} - 4u^{23} + \cdots + 3u - 1$ |
| $c_5$ | $u^{25} + 12u^{23} + \cdots + u - 1$ |
| $c_6$ | $u^{25} + u^{24} + \cdots + u + 1$ |
| $c_7$ | $u^{25} + u^{24} + \cdots + u + 1$ |
| $c_8$ | $u^{25} - 12u^{23} + \cdots + 4u + 3$ |
| $c_9$ | $u^{25} - 3u^{24} + \cdots + u + 1$ |
| $c_{10}, c_{11}$ | $u^{25} + 12u^{23} + \cdots + u + 1$ |
| $c_{12}$ | $u^{25} - u^{24} + \cdots + u - 1$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $y^{25} - 5y^{24} + \cdots + 9y - 1$ |
| $c_2, c_6$ | $y^{25} - 25y^{24} + \cdots + 21y - 1$ |
| $c_3, c_8$ | $y^{25} - 24y^{24} + \cdots + 136y - 9$ |
| $c_4$ | $y^{25} - 8y^{24} + \cdots - 9y - 1$ |
| $c_5, c_{10}, c_{11}$ | $y^{25} + 24y^{24} + \cdots - 5y - 1$ |
| $c_7, c_{12}$ | $y^{25} - 21y^{24} + \cdots + 25y - 1$ |
| $c_9$ | $y^{25} - 9y^{24} + \cdots + 3y - 1$ |

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

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-0.937496+0.392858I$<br>$a=-0.44230+2.06970I$<br>$b=\ \ 0.789425+0.667067I$ | $-0.41678+5.39715I$ | $2.15814-11.29693I$ |
| $u=-0.937496-0.392858I$<br>$a=-0.44230-2.06970I$<br>$b=\ \ 0.789425-0.667067I$ | $-0.41678-5.39715I$ | $2.15814+11.29693I$ |
| $u=\ \ 0.874412+0.359143I$<br>$a=\ \ 0.89421+2.41022I$<br>$b=-0.684612+0.571270I$ | $-5.64050-8.33855I$ | $-2.98547+11.53909I$ |
| $u=\ \ 0.874412-0.359143I$<br>$a=\ \ 0.89421-2.41022I$<br>$b=-0.684612-0.571270I$ | $-5.64050+8.33855I$ | $-2.98547-11.53909I$ |
| $u=\ \ 1.006320+0.338974I$<br>$a=-0.13134+2.13115I$<br>$b=-0.817866+0.907400I$ | $-3.39306-3.15961I$ | $-0.66878+5.10373I$ |
| $u=\ \ 1.006320-0.338974I$<br>$a=-0.13134-2.13115I$<br>$b=-0.817866-0.907400I$ | $-3.39306+3.15961I$ | $-0.66878-5.10373I$ |
| $u=\ \ 0.764058+0.400069I$<br>$a=\ \ 0.335256+0.145395I$<br>$b=\ \ 1.022390+0.571736I$ | $-2.63271+0.14719I$ | $-1.63837-0.10427I$ |
| $u=\ \ 0.764058-0.400069I$<br>$a=\ \ 0.335256-0.145395I$<br>$b=\ \ 1.022390-0.571736I$ | $-2.63271-0.14719I$ | $-1.63837+0.10427I$ |
| $u=-0.474882+0.655103I$<br>$a=-0.121451-0.534755I$<br>$b=-1.001230+0.309003I$ | $0.385377-0.899732I$ | $0.60645+1.79260I$ |
| $u=-0.474882-0.655103I$<br>$a=-0.121451+0.534755I$<br>$b=-1.001230-0.309003I$ | $0.385377+0.899732I$ | $0.60645-1.79260I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.937406 + 0.821422I$<br>$a = 0.494912 + 0.691426I$<br>$b = -1.027960 + 0.380956I$ | $-0.03757 - 2.33026I$ | $3.55075 + 4.68808I$ |
| $u = 0.937406 - 0.821422I$<br>$a = 0.494912 - 0.691426I$<br>$b = -1.027960 - 0.380956I$ | $-0.03757 + 2.33026I$ | $3.55075 - 4.68808I$ |
| $u = -1.183110 + 0.443468I$<br>$a = 0.297012 + 1.242960I$<br>$b = 1.241190 + 0.670906I$ | $-2.11236 + 6.08208I$ | $-1.53691 - 6.02430I$ |
| $u = -1.183110 - 0.443468I$<br>$a = 0.297012 - 1.242960I$<br>$b = 1.241190 - 0.670906I$ | $-2.11236 - 6.08208I$ | $-1.53691 + 6.02430I$ |
| $u = -0.703027 + 0.066917I$<br>$a = -1.68417 + 0.21103I$<br>$b = -1.83964 + 0.28918I$ | $0.65427 - 4.02685I$ | $8.54389 + 0.68029I$ |
| $u = -0.703027 - 0.066917I$<br>$a = -1.68417 - 0.21103I$<br>$b = -1.83964 - 0.28918I$ | $0.65427 + 4.02685I$ | $8.54389 - 0.68029I$ |
| $u = -0.517374 + 0.452898I$<br>$a = -2.12303 + 0.40519I$<br>$b = 0.837483 + 0.264427I$ | $-6.34506 - 0.42346I$ | $-0.78604 - 3.15064I$ |
| $u = -0.517374 - 0.452898I$<br>$a = -2.12303 - 0.40519I$<br>$b = 0.837483 - 0.264427I$ | $-6.34506 + 0.42346I$ | $-0.78604 + 3.15064I$ |
| $u = 0.687031$<br>$a = 1.72945$<br>$b = 1.84363$ | $4.59263$ | $13.5210$ |
| $u = -1.387810 + 0.058687I$<br>$a = -1.294900 - 0.364823I$<br>$b = -0.503610 + 0.039828I$ | $-10.25260 + 1.98219I$ | $-9.52624 + 2.06921I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-1.387810-0.058687I$<br>$a=-1.294900+0.364823I$<br>$b=-0.503610-0.039828I$ | $-10.25260-1.98219I$ | $-9.52624-2.06921I$ |
| $u=\ 1.41847$<br>$a=\ 1.20240$<br>$b=\ 0.520322$ | $-5.83821$ | $-14.3320$ |
| $u=\ 1.58160+0.39404I$<br>$a=\ 0.285735-0.372076I$<br>$b=\ 0.665236+0.135034I$ | $-7.61189+4.71214I$ | $-1.46737+1.25346I$ |
| $u=\ 1.58160-0.39404I$<br>$a=\ 0.285735+0.372076I$<br>$b=\ 0.665236-0.135034I$ | $-7.61189-4.71214I$ | $-1.46737-1.25346I$ |
| $u=-2.02571$<br>$a=-0.285037$<br>$b=-0.725549$ | $-2.90551$ | $22.3110$ |

**III. u-Polynomials**

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $(u^{25}-9u^{24}+\cdots+u-1)(u^{123}-4u^{122}+\cdots+608612u-35287)$ |
| $c_2$ | $(u^{25}-u^{24}+\cdots+u-1)(u^{123}-2u^{122}+\cdots+7280u-1709)$ |
| $c_3$ | $(u^{25}-12u^{23}+\cdots+4u-3)(u^{123}+u^{122}+\cdots+853u+137)$ |
| $c_4$ | $(u^{25}-4u^{23}+\cdots+3u-1)(u^{123}-u^{122}+\cdots+310818u+82413)$ |
| $c_5$ | $(u^{25}+12u^{23}+\cdots+u-1)(u^{123}+u^{122}+\cdots+48u+9)$ |
| $c_6$ | $(u^{25}+u^{24}+\cdots+u+1)(u^{123}-2u^{122}+\cdots+7280u-1709)$ |
| $c_7$ | $(u^{25}+u^{24}+\cdots+u+1)(u^{123}+2u^{122}+\cdots+4u+1)$ |
| $c_8$ | $(u^{25}-12u^{23}+\cdots+4u+3)(u^{123}+u^{122}+\cdots+853u+137)$ |
| $c_9$ | $(u^{25}-3u^{24}+\cdots+u+1)(u^{123}-2u^{122}+\cdots+2u-1)$ |
| $c_{10}, c_{11}$ | $(u^{25}+12u^{23}+\cdots+u+1)(u^{123}+u^{122}+\cdots+48u+9)$ |
| $c_{12}$ | $(u^{25}-u^{24}+\cdots+u-1)(u^{123}+2u^{122}+\cdots+4u+1)$ |

**IV. Riley Polynomials**

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $(y^{25}-5y^{24}+\cdots+9y-1)$ $\cdot(y^{123}-24y^{122}+\cdots+48933975036y-1245172369)$ |
| $c_2, c_6$ | $(y^{25}-25y^{24}+\cdots+21y-1)$ $\cdot(y^{123}-84y^{122}+\cdots+29345840y-2920681)$ |
| $c_3, c_8$ | $(y^{25}-24y^{24}+\cdots+136y-9)$ $\cdot(y^{123}-87y^{122}+\cdots+642943y-18769)$ |
| $c_4$ | $(y^{25}-8y^{24}+\cdots-9y-1)$ $\cdot(y^{123}-31y^{122}+\cdots+104568100794y-6791902569)$ |
| $c_5, c_{10}, c_{11}$ | $(y^{25}+24y^{24}+\cdots-5y-1)(y^{123}+109y^{122}+\cdots+3186y-81)$ |
| $c_7, c_{12}$ | $(y^{25}-21y^{24}+\cdots+25y-1)(y^{123}-72y^{122}+\cdots+112y-1)$ |
| $c_9$ | $(y^{25}-9y^{24}+\cdots+3y-1)(y^{123}-8y^{122}+\cdots+122y-1)$ |