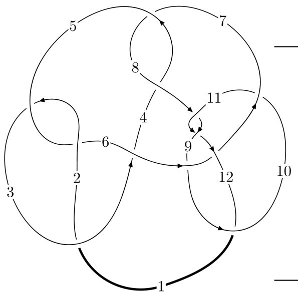
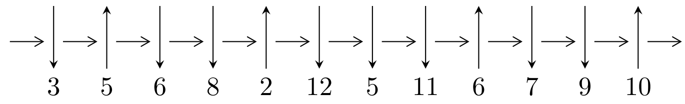
# $12n_{0021}$ $(K12n_{0021})$




A knot diagram[1]

**Linearized knot diagam**




**Solving Sequence**

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

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

$$\begin{aligned} I_1^u = \langle & -1.31031 \times 10^{60} u^{73} + 8.78516 \times 10^{60} u^{72} + \cdots + 8.05327 \times 10^{59} b + 2.46563 \times 10^{59}, \\ & -1.87533 \times 10^{60} u^{73} + 1.24710 \times 10^{61} u^{72} + \cdots + 8.05327 \times 10^{59} a - 7.86574 \times 10^{60}, \\ & u^{74} - 7u^{73} + \cdots - 10u + 1 \rangle \\ I_2^u = \langle & -2a^4 u + 9a^3 u + 9a^3 - 10a^2 - 6au + 5b + 4u + 4,\ a^5 + 5a^4 u - 6a^3 u - 6a^3 + 3a^2 + au - u - 1,\ u^2 + u + 1 \rangle \\ I_3^u = \langle & -2u^4 + 2u^3 - 2u^2 + b - u + 2,\ -u^4 + 3u^3 - 4u^2 + a + 4u - 1,\ u^5 - u^4 + 2u^3 - u^2 + u - 1 \rangle \end{aligned}$$

* 3 irreducible components of $\dim_{\mathbb{C}} = 0$, with total 89 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.** $\boldsymbol{I_1^u = \langle -1.31 \times 10^{60} u^{73} + 8.79 \times 10^{60} u^{72} + \cdots + 8.05 \times 10^{59} b + 2.47 \times 10^{59},\ -1.88 \times 10^{60} u^{73} + 1.25 \times 10^{61} u^{72} + \cdots + 8.05 \times 10^{59} a - 7.87 \times 10^{60},\ u^{74} - 7u^{73} + \cdots - 10u + 1 \rangle}$

**(i) Arc colorings**

$$a_3 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_5 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_2 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} u \\ u^3 + u \end{pmatrix}$$
$$a_1 = \begin{pmatrix} u^2 + 1 \\ u^2 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} 2.32865u^{73} - 15.4857u^{72} + \cdots + 29.2596u + 9.76713 \\ 1.62705u^{73} - 10.9088u^{72} + \cdots - 4.88417u - 0.306165 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} 1.30294u^{73} - 8.68046u^{72} + \cdots + 15.6245u + 11.1275 \\ 0.928079u^{73} - 4.66399u^{72} + \cdots - 21.2414u + 1.42898 \end{pmatrix}$$
$$a_{12} = \begin{pmatrix} 0.0128426u^{73} - 0.606575u^{72} + \cdots - 24.6025u - 4.47929 \\ -1.07283u^{73} + 7.86599u^{72} + \cdots - 13.6469u + 1.79816 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} -1.84067u^{73} + 11.0360u^{72} + \cdots - 8.87375u - 2.84119 \\ -1.31744u^{73} + 10.0636u^{72} + \cdots - 16.1390u + 2.16705 \end{pmatrix}$$
$$a_8 = \begin{pmatrix} -1.84067u^{73} + 11.0360u^{72} + \cdots - 8.87375u - 2.84119 \\ -1.23075u^{73} + 11.7949u^{72} + \cdots - 32.7857u + 4.01579 \end{pmatrix}$$
$$a_4 = \begin{pmatrix} u^4 + u^2 + 1 \\ u^6 + 2u^4 + u^2 \end{pmatrix}$$
$$a_{11} = \begin{pmatrix} 0.612092u^{73} - 4.77433u^{72} + \cdots + 2.25396u + 7.51995 \\ -0.187474u^{73} + 4.35220u^{72} + \cdots - 38.3916u + 3.65569 \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= -12.9104u^{73} + 92.7725u^{72} + \cdots - 82.6450u + 3.33954$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $u^{74}+23u^{73}+\cdots-168u+1$ |
| $c_2, c_5$ | $u^{74}+7u^{73}+\cdots+10u+1$ |
| $c_3$ | $u^{74}-7u^{73}+\cdots+23935148u+1174793$ |
| $c_4, c_7$ | $u^{74}-2u^{73}+\cdots+3072u+1024$ |
| $c_6$ | $u^{74}-4u^{73}+\cdots+3u-1$ |
| $c_8, c_{11}$ | $u^{74}-8u^{73}+\cdots-83u-1$ |
| $c_9$ | $u^{74}-4u^{73}+\cdots+18563u+7979$ |
| $c_{10}$ | $u^{74}+2u^{73}+\cdots+140788u-6632$ |
| $c_{12}$ | $u^{74}+11u^{73}+\cdots+600u^2+32$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $y^{74} + 63y^{73} + \cdots - 33884y + 1$ |
| $c_2, c_5$ | $y^{74} + 23y^{73} + \cdots - 168y + 1$ |
| $c_3$ | $y^{74} + 103y^{73} + \cdots - 195612233228368y + 1380138592849$ |
| $c_4, c_7$ | $y^{74} + 50y^{73} + \cdots + 5242880y + 1048576$ |
| $c_6$ | $y^{74} - 20y^{73} + \cdots + y + 1$ |
| $c_8, c_{11}$ | $y^{74} - 40y^{73} + \cdots - 2497y + 1$ |
| $c_9$ | $y^{74} + 46y^{73} + \cdots - 1411728345y + 63664441$ |
| $c_{10}$ | $y^{74} + 78y^{73} + \cdots - 8817552656y + 43983424$ |
| $c_{12}$ | $y^{74} - 27y^{73} + \cdots + 38400y + 1024$ |

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

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.588568 + 0.781606I$<br>$a = \quad 2.11655 - 1.27106I$<br>$b = -0.34086 - 1.74865I$ | $-0.94329 - 1.13464I$ | 0 |
| $u = -0.588568 - 0.781606I$<br>$a = \quad 2.11655 + 1.27106I$<br>$b = -0.34086 + 1.74865I$ | $-0.94329 + 1.13464I$ | 0 |
| $u = -0.224608 + 0.939787I$<br>$a = -1.43760 - 1.52815I$<br>$b = -1.80851 + 0.25423I$ | $-3.42601 - 3.36523I$ | 0 |
| $u = -0.224608 - 0.939787I$<br>$a = -1.43760 + 1.52815I$<br>$b = -1.80851 - 0.25423I$ | $-3.42601 + 3.36523I$ | 0 |
| $u = -0.480747 + 0.917533I$<br>$a = \quad 3.51191 - 3.12500I$<br>$b = -1.37679 - 5.49401I$ | $-2.18804 - 1.82733I$ | 0 |
| $u = -0.480747 - 0.917533I$<br>$a = \quad 3.51191 + 3.12500I$<br>$b = -1.37679 + 5.49401I$ | $-2.18804 + 1.82733I$ | 0 |
| $u = -0.948295 + 0.114817I$<br>$a = \quad 0.642760 - 0.299680I$<br>$b = -0.384036 - 0.001201I$ | $2.84481 - 6.06997I$ | $0. + 5.46750I$ |
| $u = -0.948295 - 0.114817I$<br>$a = \quad 0.642760 + 0.299680I$<br>$b = -0.384036 + 0.001201I$ | $2.84481 + 6.06997I$ | $0. - 5.46750I$ |
| $u = -0.605694 + 0.882842I$<br>$a = \quad 1.04425 - 1.21226I$<br>$b = \quad 0.30514 - 2.02629I$ | $-1.25518 - 3.58366I$ | 0 |
| $u = -0.605694 - 0.882842I$<br>$a = \quad 1.04425 + 1.21226I$<br>$b = \quad 0.30514 + 2.02629I$ | $-1.25518 + 3.58366I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.363037 + 0.817565I$<br>$a = 0.599509 - 0.288116I$<br>$b = -0.309360 - 0.528307I$ | $-0.31180 - 1.54577I$ | $-2.35841 + 4.98495I$ |
| $u = -0.363037 - 0.817565I$<br>$a = 0.599509 + 0.288116I$<br>$b = -0.309360 + 0.528307I$ | $-0.31180 + 1.54577I$ | $-2.35841 - 4.98495I$ |
| $u = 0.377437 + 0.795068I$<br>$a = 0.458626 - 0.671697I$<br>$b = -0.886331 - 0.076122I$ | $-6.11124 + 6.05756I$ | $-13.16929 + 2.49659I$ |
| $u = 0.377437 - 0.795068I$<br>$a = 0.458626 + 0.671697I$<br>$b = -0.886331 + 0.076122I$ | $-6.11124 - 6.05756I$ | $-13.16929 - 2.49659I$ |
| $u = 0.879036$<br>$a = 0.464133$<br>$b = -0.0979340$ | $-3.60099$ | $6.20630$ |
| $u = 0.424038 + 0.768258I$<br>$a = -0.668714 + 0.128685I$<br>$b = 0.451674 + 0.637183I$ | $-5.95413 - 2.77149I$ | $-11.1970 + 11.7984I$ |
| $u = 0.424038 - 0.768258I$<br>$a = -0.668714 - 0.128685I$<br>$b = 0.451674 - 0.637183I$ | $-5.95413 + 2.77149I$ | $-11.1970 - 11.7984I$ |
| $u = -0.789645 + 0.824107I$<br>$a = -0.35319 + 1.72243I$<br>$b = 1.27854 + 1.76922I$ | $3.57080 - 3.55900I$ | $0$ |
| $u = -0.789645 - 0.824107I$<br>$a = -0.35319 - 1.72243I$<br>$b = 1.27854 - 1.76922I$ | $3.57080 + 3.55900I$ | $0$ |
| $u = 0.926734 + 0.675434I$<br>$a = -0.503809 - 1.111700I$<br>$b = 0.37933 - 1.50865I$ | $7.41718 - 3.39847I$ | $0$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.926734 - 0.675434I$<br>$a = -0.503809 + 1.111700I$<br>$b = 0.37933 + 1.50865I$ | $7.41718 + 3.39847I$ | $0$ |
| $u = -0.357389 + 1.093680I$<br>$a = 0.227043 - 0.773438I$<br>$b = -0.030211 + 0.326577I$ | $0.97521 - 4.62256I$ | $0$ |
| $u = -0.357389 - 1.093680I$<br>$a = 0.227043 + 0.773438I$<br>$b = -0.030211 - 0.326577I$ | $0.97521 + 4.62256I$ | $0$ |
| $u = 0.820006 + 0.826808I$<br>$a = 0.158463 + 0.704129I$<br>$b = -1.384830 + 0.014374I$ | $3.14985 - 1.37670I$ | $0$ |
| $u = 0.820006 - 0.826808I$<br>$a = 0.158463 - 0.704129I$<br>$b = -1.384830 - 0.014374I$ | $3.14985 + 1.37670I$ | $0$ |
| $u = -0.168266 + 1.155270I$<br>$a = 0.511207 - 0.231030I$<br>$b = -0.109347 + 0.212969I$ | $-0.18048 - 2.67430I$ | $0$ |
| $u = -0.168266 - 1.155270I$<br>$a = 0.511207 + 0.231030I$<br>$b = -0.109347 - 0.212969I$ | $-0.18048 + 2.67430I$ | $0$ |
| $u = -0.315143 + 0.768424I$<br>$a = -1.52568 + 6.21959I$<br>$b = 6.24699 + 1.55706I$ | $-1.96434 - 1.46942I$ | $69.4609 - 82.1819I$ |
| $u = -0.315143 - 0.768424I$<br>$a = -1.52568 - 6.21959I$<br>$b = 6.24699 - 1.55706I$ | $-1.96434 + 1.46942I$ | $69.4609 + 82.1819I$ |
| $u = -0.817564 + 0.115016I$<br>$a = -0.102494 - 0.097733I$<br>$b = 0.693608 + 0.178324I$ | $4.23425 + 0.54410I$ | $1.60258 - 0.06952I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-0.817564-0.115016I$<br>$a=-0.102494+0.097733I$<br>$b=\ \ 0.693608-0.178324I$ | $4.23425-0.54410I$ | $1.60258+0.06952I$ |
| $u=\ \ 0.782206+0.888648I$<br>$a=\ \ 1.29280+1.39998I$<br>$b=-0.63121+2.77026I$ | $1.01094+2.94591I$ | $0$ |
| $u=\ \ 0.782206-0.888648I$<br>$a=\ \ 1.29280-1.39998I$<br>$b=-0.63121-2.77026I$ | $1.01094-2.94591I$ | $0$ |
| $u=\ \ 0.960126+0.695377I$<br>$a=\ \ 1.22788+1.52034I$<br>$b=\ \ 0.01982+2.23698I$ | $6.50731-10.89880I$ | $0$ |
| $u=\ \ 0.960126-0.695377I$<br>$a=\ \ 1.22788-1.52034I$<br>$b=\ \ 0.01982-2.23698I$ | $6.50731+10.89880I$ | $0$ |
| $u=-0.099605+0.797661I$<br>$a=-1.28212+0.66262I$<br>$b=-0.983447+0.821591I$ | $-3.94950-0.19450I$ | $-14.2244+0.5338I$ |
| $u=-0.099605-0.797661I$<br>$a=-1.28212-0.66262I$<br>$b=-0.983447-0.821591I$ | $-3.94950+0.19450I$ | $-14.2244-0.5338I$ |
| $u=\ \ 0.913271+0.785754I$<br>$a=-1.24292-1.30749I$<br>$b=-0.04215-2.39793I$ | $9.56303-3.64207I$ | $0$ |
| $u=\ \ 0.913271-0.785754I$<br>$a=-1.24292+1.30749I$<br>$b=-0.04215+2.39793I$ | $9.56303+3.64207I$ | $0$ |
| $u=\ \ 0.837187+0.871109I$<br>$a=-2.00342+0.20473I$<br>$b=-0.960890-0.793882I$ | $4.88888+2.03616I$ | $0$ |

| Solutions to $I^u_1$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = \ \ 0.837187 - 0.871109I$<br>$a = -2.00342 - 0.20473I$<br>$b = -0.960890 + 0.793882I$ | $4.88888 - 2.03616I$ | 0 |
| $u = -0.753364 + 0.950514I$<br>$a = -1.37943 + 0.51575I$<br>$b = -0.46215 + 1.85324I$ | $3.17540 - 2.27063I$ | 0 |
| $u = -0.753364 - 0.950514I$<br>$a = -1.37943 - 0.51575I$<br>$b = -0.46215 - 1.85324I$ | $3.17540 + 2.27063I$ | 0 |
| $u = -0.883272 + 0.834733I$<br>$a = \ \ 1.35545 - 1.08459I$<br>$b = \ \ 0.24804 - 1.97325I$ | $2.10183 + 2.80934I$ | 0 |
| $u = -0.883272 - 0.834733I$<br>$a = \ \ 1.35545 + 1.08459I$<br>$b = \ \ 0.24804 + 1.97325I$ | $2.10183 - 2.80934I$ | 0 |
| $u = \ \ 0.784779 + 0.950831I$<br>$a = \ \ 0.418763 - 0.127905I$<br>$b = \ \ 1.32211 + 1.05195I$ | $2.76643 + 7.39057I$ | 0 |
| $u = \ \ 0.784779 - 0.950831I$<br>$a = \ \ 0.418763 + 0.127905I$<br>$b = \ \ 1.32211 - 1.05195I$ | $2.76643 - 7.39057I$ | 0 |
| $u = \ \ 0.817309 + 0.927924I$<br>$a = \ \ 0.88430 - 1.76207I$<br>$b = \ \ 1.34165 - 1.29399I$ | $4.71109 + 4.13291I$ | 0 |
| $u = \ \ 0.817309 - 0.927924I$<br>$a = \ \ 0.88430 + 1.76207I$<br>$b = \ \ 1.34165 + 1.29399I$ | $4.71109 - 4.13291I$ | 0 |
| $u = -0.251345 + 1.227450I$<br>$a = -0.570312 + 0.368260I$<br>$b = -0.543530 - 0.574793I$ | $-1.87183 - 10.09290I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.251345 - 1.227450I$<br>$a = -0.570312 - 0.368260I$<br>$b = -0.543530 + 0.574793I$ | $-1.87183 + 10.09290I$ | 0 |
| $u = 0.943453 + 0.828089I$<br>$a = 0.60572 + 1.39990I$<br>$b = -0.38320 + 1.76670I$ | $9.18515 + 2.01287I$ | 0 |
| $u = 0.943453 - 0.828089I$<br>$a = 0.60572 - 1.39990I$<br>$b = -0.38320 - 1.76670I$ | $9.18515 - 2.01287I$ | 0 |
| $u = -0.826585 + 0.970325I$<br>$a = 0.76341 - 1.66069I$<br>$b = -0.86711 - 2.14556I$ | $1.67555 - 9.13934I$ | 0 |
| $u = -0.826585 - 0.970325I$<br>$a = 0.76341 + 1.66069I$<br>$b = -0.86711 + 2.14556I$ | $1.67555 + 9.13934I$ | 0 |
| $u = -0.419590 + 1.216660I$<br>$a = -0.286830 - 0.137018I$<br>$b = 0.092382 - 0.684597I$ | $-0.83764 + 1.21344I$ | 0 |
| $u = -0.419590 - 1.216660I$<br>$a = -0.286830 + 0.137018I$<br>$b = 0.092382 + 0.684597I$ | $-0.83764 - 1.21344I$ | 0 |
| $u = 0.432353 + 1.221260I$<br>$a = -0.162125 - 0.020944I$<br>$b = -0.245061 + 0.213540I$ | $-7.41606 + 4.57419I$ | 0 |
| $u = 0.432353 - 1.221260I$<br>$a = -0.162125 + 0.020944I$<br>$b = -0.245061 - 0.213540I$ | $-7.41606 - 4.57419I$ | 0 |
| $u = 0.814545 + 1.015150I$<br>$a = -1.14539 - 1.49821I$<br>$b = 0.80502 - 2.49598I$ | $8.83947 + 10.02070I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.814545 - 1.015150I$<br>$a = -1.14539 + 1.49821I$<br>$b = 0.80502 + 2.49598I$ | $8.83947 - 10.02070I$ | 0 |
| $u = 0.764489 + 1.073570I$<br>$a = -0.940897 - 0.743631I$<br>$b = 0.18830 - 1.69305I$ | $6.17331 + 9.63827I$ | 0 |
| $u = 0.764489 - 1.073570I$<br>$a = -0.940897 + 0.743631I$<br>$b = 0.18830 + 1.69305I$ | $6.17331 - 9.63827I$ | 0 |
| $u = 0.853280 + 1.005800I$<br>$a = 1.16762 + 1.03945I$<br>$b = -0.02363 + 1.82898I$ | $8.61435 + 4.58115I$ | 0 |
| $u = 0.853280 - 1.005800I$<br>$a = 1.16762 - 1.03945I$<br>$b = -0.02363 - 1.82898I$ | $8.61435 - 4.58115I$ | 0 |
| $u = 0.787160 + 1.077840I$<br>$a = 1.21504 + 1.50799I$<br>$b = -0.57962 + 2.58206I$ | $5.3004 + 17.3091I$ | 0 |
| $u = 0.787160 - 1.077840I$<br>$a = 1.21504 - 1.50799I$<br>$b = -0.57962 - 2.58206I$ | $5.3004 - 17.3091I$ | 0 |
| $u = 0.093711 + 0.582935I$<br>$a = -0.60542 + 1.79370I$<br>$b = 0.945378 + 0.484928I$ | $-0.76340 + 2.05732I$ | $-6.61172 - 3.28073I$ |
| $u = 0.093711 - 0.582935I$<br>$a = -0.60542 - 1.79370I$<br>$b = 0.945378 - 0.484928I$ | $-0.76340 - 2.05732I$ | $-6.61172 + 3.28073I$ |
| $u = -0.116761 + 0.531053I$<br>$a = 1.61823 - 1.25855I$<br>$b = -0.582250 - 0.676718I$ | $-0.75534 - 1.25758I$ | $-6.16688 + 4.20297I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.116761 - 0.531053I$<br>$a = \ \ 1.61823 + 1.25855I$<br>$b = -0.582250 + 0.676718I$ | $-0.75534 + 1.25758I$ | $-6.16688 - 4.20297I$ |
| $u = -0.298970 + 0.158249I$<br>$a = \ \ 2.38582 - 3.03610I$<br>$b = -0.052906 - 1.134690I$ | $-0.71671 - 1.37236I$ | $-4.04860 + 4.25236I$ |
| $u = -0.298970 - 0.158249I$<br>$a = \ \ 2.38582 + 3.03610I$<br>$b = -0.052906 + 1.134690I$ | $-0.71671 + 1.37236I$ | $-4.04860 - 4.25236I$ |
| $u = \ \ 0.0736878$<br>$a = \ \ 12.5458$<br>$b = -0.563170$ | $-2.30896$ | $-2.48640$ |

**II.** $\boldsymbol{I_2^u = \langle -2a^4u + 9a^3u + \cdots - 10a^2 + 4,\ a^5 + 5a^4u - 6a^3u - 6a^3 + 3a^2 + au - u - 1,\ u^2 + u + 1\rangle}$

**(i) Arc colorings**

$$a_3 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_5 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_2 = \begin{pmatrix} 1 \\ -u-1 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} u \\ u+1 \end{pmatrix}$$
$$a_1 = \begin{pmatrix} -u \\ -u-1 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} a \\ \frac{2}{5}a^4u - \frac{9}{5}a^3u + \cdots + 2a^2 - \frac{4}{5} \end{pmatrix}$$
$$a_9 = \begin{pmatrix} -\frac{9}{5}a^3u + 2a^2u + \cdots + 2a^2 - \frac{6}{5}a \\ \frac{4}{5}a^4u - \frac{18}{5}a^3u + \cdots + 4a^2 - \frac{8}{5} \end{pmatrix}$$
$$a_{12} = \begin{pmatrix} \frac{2}{5}a^3u + a^2u + \cdots + a^2 - \frac{2}{5}a \\ -\frac{2}{5}a^4u + \frac{9}{5}a^3u + \cdots - 2a^2 - \frac{6}{5} \end{pmatrix}$$
$$a_7 = \begin{pmatrix} 0 \\ -\frac{2}{5}a^4u + \frac{14}{5}a^3u + \cdots - 6a^2 + \frac{4}{5} \end{pmatrix}$$
$$a_8 = \begin{pmatrix} 0 \\ -\frac{2}{5}a^4u + \frac{14}{5}a^3u + \cdots - 6a^2 + \frac{4}{5} \end{pmatrix}$$
$$a_4 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_{11} = \begin{pmatrix} a \\ -\frac{2}{5}a^4u + \frac{14}{5}a^3u + \cdots - 6a^2 + \frac{4}{5} \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= -\frac{4}{5}a^4u - 3a^4 - \frac{52}{5}a^3u + \frac{8}{5}a^3 + 3a^2u + 8a^2 + \frac{8}{5}au + 5a + \frac{38}{5}u - \frac{2}{5}$

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

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

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

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

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

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.500000 + 0.866025I$<br>$a = 0.864485 - 0.518603I$<br>$b = -0.559524 - 0.303102I$ | $-0.329100 - 0.499304I$ | $-3.07628 - 2.84945I$ |
| $u = -0.500000 + 0.866025I$<br>$a = 0.016881 - 1.007970I$<br>$b = 0.017268 - 0.636113I$ | $-0.32910 - 3.56046I$ | $-3.01153 + 6.03927I$ |
| $u = -0.500000 + 0.866025I$<br>$a = 0.369732 + 0.377747I$<br>$b = -0.755206 + 0.074107I$ | $-5.87256 - 6.43072I$ | $-3.55752 + 12.20067I$ |
| $u = -0.500000 + 0.866025I$<br>$a = -0.512005 - 0.131324I$<br>$b = 0.441781 - 0.616974I$ | $-5.87256 + 2.37095I$ | $-6.63163 + 6.91428I$ |
| $u = -0.500000 + 0.866025I$<br>$a = 1.76091 - 3.04998I$<br>$b = -2.14432 - 3.71407I$ | $-2.40108 - 2.02988I$ | $-9.7230 + 10.6042I$ |
| $u = -0.500000 - 0.866025I$<br>$a = 0.864485 + 0.518603I$<br>$b = -0.559524 + 0.303102I$ | $-0.329100 + 0.499304I$ | $-3.07628 + 2.84945I$ |
| $u = -0.500000 - 0.866025I$<br>$a = 0.016881 + 1.007970I$<br>$b = 0.017268 + 0.636113I$ | $-0.32910 + 3.56046I$ | $-3.01153 - 6.03927I$ |
| $u = -0.500000 - 0.866025I$<br>$a = 0.369732 - 0.377747I$<br>$b = -0.755206 - 0.074107I$ | $-5.87256 + 6.43072I$ | $-3.55752 - 12.20067I$ |
| $u = -0.500000 - 0.866025I$<br>$a = -0.512005 + 0.131324I$<br>$b = 0.441781 + 0.616974I$ | $-5.87256 - 2.37095I$ | $-6.63163 - 6.91428I$ |
| $u = -0.500000 - 0.866025I$<br>$a = 1.76091 + 3.04998I$<br>$b = -2.14432 + 3.71407I$ | $-2.40108 + 2.02988I$ | $-9.7230 - 10.6042I$ |

**III.** $\boldsymbol{I^u_3 = \langle -2u^4+2u^3-2u^2+b-u+2,\ -u^4+3u^3-4u^2+a+4u-1,\ u^5-u^4+2u^3-u^2+u-1\rangle}$

**(i) Arc colorings**

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

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

**(iii) Cusp Shapes** $= -21u^4+36u^3-50u^2+39u-22$

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

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

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $y^5 - y^4 + 8y^3 - 3y^2 + 3y - 1$ |
| $c_2, c_5$ | $y^5 + 3y^4 + 4y^3 + y^2 - y - 1$ |
| $c_3, c_4, c_7$ | $y^5 - 5y^4 + 8y^3 - 3y^2 - y - 1$ |
| $c_6$ | $y^5 - 9y^4 + 32y^3 - 35y^2 - 5y - 1$ |
| $c_8, c_{11}$ | $(y-1)^5$ |
| $c_9, c_{10}$ | $y^5 + 5y^4 + 35y^3 - 32y^2 + 9y - 1$ |
| $c_{12}$ | $y^5$ |

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

| Solutions to $I_3^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-0.339110+0.822375I$<br>$a=-1.83188-4.07697I$<br>$b=-4.75182+1.50408I$ | $-1.97403-1.53058I$ | $16.1214+37.0026I$ |
| $u=-0.339110-0.822375I$<br>$a=-1.83188+4.07697I$<br>$b=-4.75182-1.50408I$ | $-1.97403+1.53058I$ | $16.1214-37.0026I$ |
| $u=\ 0.766826$<br>$a=-0.722177$<br>$b=-0.267412$ | $-4.04602$ | $-12.5230$ |
| $u=\ 0.455697+1.200150I$<br>$a=\ 0.192971-0.179096I$<br>$b=\ 0.385524-0.043640I$ | $-7.51750+4.40083I$ | $-16.8598+13.4304I$ |
| $u=\ 0.455697-1.200150I$<br>$a=\ 0.192971+0.179096I$<br>$b=\ 0.385524+0.043640I$ | $-7.51750-4.40083I$ | $-16.8598-13.4304I$ |

## IV. u-Polynomials

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $(u^2-u+1)^5(u^5-3u^4+4u^3-u^2-u+1)$ $\cdot(u^{74}+23u^{73}+\cdots-168u+1)$ |
| $c_2$ | $((u^2+u+1)^5)(u^5-u^4+\cdots+u-1)(u^{74}+7u^{73}+\cdots+10u+1)$ |
| $c_3$ | $(u^2-u+1)^5(u^5+u^4-2u^3-u^2+u-1)$ $\cdot(u^{74}-7u^{73}+\cdots+23935148u+1174793)$ |
| $c_4$ | $u^{10}(u^5+u^4+\cdots+u-1)(u^{74}-2u^{73}+\cdots+3072u+1024)$ |
| $c_5$ | $((u^2-u+1)^5)(u^5+u^4+\cdots+u+1)(u^{74}+7u^{73}+\cdots+10u+1)$ |
| $c_6$ | $(u^5-3u^4+4u^3-u^2-u+1)^2(u^5+5u^4+8u^3+3u^2-u+1)$ $\cdot(u^{74}-4u^{73}+\cdots+3u-1)$ |
| $c_7$ | $u^{10}(u^5-u^4+\cdots+u+1)(u^{74}-2u^{73}+\cdots+3072u+1024)$ |
| $c_8$ | $((u-1)^5)(u^5+u^4+\cdots+u-1)^2(u^{74}-8u^{73}+\cdots-83u-1)$ |
| $c_9$ | $(u^5-u^4+3u^3+8u^2+5u+1)(u^5+u^4+2u^3+u^2+u+1)^2$ $\cdot(u^{74}-4u^{73}+\cdots+18563u+7979)$ |
| $c_{10}$ | $(u^5-u^4-2u^3+u^2+u+1)^2(u^5-u^4+3u^3+8u^2+5u+1)$ $\cdot(u^{74}+2u^{73}+\cdots+140788u-6632)$ |
| $c_{11}$ | $((u+1)^5)(u^5-u^4+\cdots+u+1)^2(u^{74}-8u^{73}+\cdots-83u-1)$ |
| $c_{12}$ | $u^5(u^5+u^4+\cdots+u+1)^2(u^{74}+11u^{73}+\cdots+600u^2+32)$ |

## V. Riley Polynomials

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $(y^2+y+1)^5(y^5-y^4+8y^3-3y^2+3y-1)$ $\cdot(y^{74}+63y^{73}+\cdots-33884y+1)$ |
| $c_2, c_5$ | $(y^2+y+1)^5(y^5+3y^4+4y^3+y^2-y-1)$ $\cdot(y^{74}+23y^{73}+\cdots-168y+1)$ |
| $c_3$ | $(y^2+y+1)^5(y^5-5y^4+8y^3-3y^2-y-1)$ $\cdot(y^{74}+103y^{73}+\cdots-195612233228368y+1380138592849)$ |
| $c_4, c_7$ | $y^{10}(y^5-5y^4+8y^3-3y^2-y-1)$ $\cdot(y^{74}+50y^{73}+\cdots+5242880y+1048576)$ |
| $c_6$ | $(y^5-9y^4+32y^3-35y^2-5y-1)(y^5-y^4+8y^3-3y^2+3y-1)^2$ $\cdot(y^{74}-20y^{73}+\cdots+y+1)$ |
| $c_8, c_{11}$ | $(y-1)^5(y^5-5y^4+8y^3-3y^2-y-1)^2$ $\cdot(y^{74}-40y^{73}+\cdots-2497y+1)$ |
| $c_9$ | $(y^5+3y^4+4y^3+y^2-y-1)^2(y^5+5y^4+35y^3-32y^2+9y-1)$ $\cdot(y^{74}+46y^{73}+\cdots-1411728345y+63664441)$ |
| $c_{10}$ | $(y^5-5y^4+8y^3-3y^2-y-1)^2(y^5+5y^4+35y^3-32y^2+9y-1)$ $\cdot(y^{74}+78y^{73}+\cdots-8817552656y+43983424)$ |
| $c_{12}$ | $y^5(y^5+3y^4+\cdots-y-1)^2(y^{74}-27y^{73}+\cdots+38400y+1024)$ |