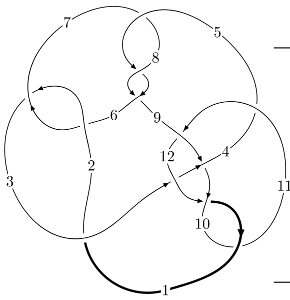
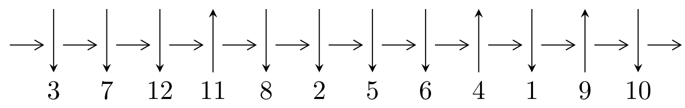
# $12a_{0688}$ $(K12a_{0688})$




A knot diagram[1]

**Linearized knot diagam**




**Solving Sequence**

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

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

$$I_1^u = \langle 1.68453 \times 10^{93} u^{111} + 1.11304 \times 10^{94} u^{110} + \cdots + 1.28372 \times 10^{91} b + 1.22997 \times 10^{93},$$
$$9.04813 \times 10^{92} u^{111} + 6.05101 \times 10^{93} u^{110} + \cdots + 6.41862 \times 10^{90} a + 6.86529 \times 10^{92},\ u^{112} + 8u^{111} + \cdots + 7u$$
$$I_2^u = \langle -3a^5 - 13a^4 - 7a^3 + 17a^2 + 13b - 21a - 7,\ a^6 + 6a^5 + 11a^4 + 4a^3 - a^2 + a + 1,\ u - 1\rangle$$
$$I_3^u = \langle b - u - 2,\ a + 2u + 3,\ u^2 + u - 1\rangle$$

* 3 irreducible components of $\dim_{\mathbb{C}} = 0$, with total 120 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.** $\boldsymbol{I_1^u = \langle 1.68 \times 10^{93} u^{111} + 1.11 \times 10^{94} u^{110} + \cdots + 1.28 \times 10^{91} b + 1.23 \times 10^{93},\ 9.05 \times 10^{92} u^{111} + 6.05 \times 10^{93} u^{110} + \cdots + 6.42 \times 10^{90} a + 6.87 \times 10^{92},\ u^{112} + 8u^{111} + \cdots + 7u + 1 \rangle}$

**(i) Arc colorings**

$$a_5 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_8 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_6 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} -u \\ -u^3 + u \end{pmatrix}$$
$$a_{11} = \begin{pmatrix} -140.967u^{111} - 942.728u^{110} + \cdots - 600.909u - 106.959 \\ -131.222u^{111} - 867.039u^{110} + \cdots - 599.242u - 95.8125 \end{pmatrix}$$
$$a_{12} = \begin{pmatrix} -213.060u^{111} - 1409.07u^{110} + \cdots - 894.420u - 152.892 \\ -224.762u^{111} - 1481.90u^{110} + \cdots - 1006.45u - 160.281 \end{pmatrix}$$
$$a_4 = \begin{pmatrix} 395.197u^{111} + 2586.54u^{110} + \cdots + 1658.16u + 259.193 \\ 480.110u^{111} + 3139.69u^{110} + \cdots + 2114.70u + 332.176 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} -222.614u^{111} - 1474.78u^{110} + \cdots - 971.574u - 159.791 \\ -210.094u^{111} - 1388.78u^{110} + \cdots - 955.661u - 152.161 \end{pmatrix}$$
$$a_1 = \begin{pmatrix} 29.6253u^{111} + 191.679u^{110} + \cdots + 147.724u + 18.3331 \\ 27.7910u^{111} + 186.215u^{110} + \cdots + 132.979u + 21.1686 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} -11.9578u^{111} - 90.3909u^{110} + \cdots - 110.147u - 13.3668 \\ -1.04928u^{111} - 18.2756u^{110} + \cdots - 40.6199u - 7.10602 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} u \\ u \end{pmatrix}$$
$$a_2 = \begin{pmatrix} 8.04702u^{111} + 45.4206u^{110} + \cdots - 14.9838u + 1.78624 \\ 18.9556u^{111} + 117.536u^{110} + \cdots + 54.5429u + 8.04702 \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= 725.208u^{111} + 4779.01u^{110} + \cdots + 3630.85u + 563.580$

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

| Crossings | u-Polynomials at each crossing |
| --- | --- |
| $c_1$ | $u^{112} + 42u^{111} + \cdots + 36864u + 4096$ |
| $c_2, c_6$ | $u^{112} - 2u^{111} + \cdots + 192u + 64$ |
| $c_3$ | $u^{112} - 9u^{111} + \cdots + 2324u - 121$ |
| $c_4$ | $u^{112} - 5u^{111} + \cdots - 32u + 161$ |
| $c_5, c_7, c_8$ | $u^{112} - 8u^{111} + \cdots - 7u + 1$ |
| $c_9$ | $u^{112} + 9u^{111} + \cdots + 2u + 1$ |
| $c_{10}, c_{12}$ | $u^{112} - 4u^{111} + \cdots - 35u + 1$ |
| $c_{11}$ | $u^{112} + 18u^{111} + \cdots - 48u + 4$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $y^{112} + 46y^{111} + \cdots + 1719664640y + 16777216$ |
| $c_2, c_6$ | $y^{112} - 42y^{111} + \cdots - 36864y + 4096$ |
| $c_3$ | $y^{112} - 109y^{111} + \cdots - 1162588y + 14641$ |
| $c_4$ | $y^{112} - 109y^{111} + \cdots - 254760y + 25921$ |
| $c_5, c_7, c_8$ | $y^{112} - 96y^{111} + \cdots + 115y + 1$ |
| $c_9$ | $y^{112} + 11y^{111} + \cdots - 8y + 1$ |
| $c_{10}, c_{12}$ | $y^{112} - 68y^{111} + \cdots - 815y + 1$ |
| $c_{11}$ | $y^{112} - 18y^{111} + \cdots - 1464y + 16$ |

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

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.972143 + 0.332867I$<br>$a = -1.362640 - 0.348523I$<br>$b = 0.160167 + 0.470619I$ | $-3.76699 + 1.68644I$ | 0 |
| $u = 0.972143 - 0.332867I$<br>$a = -1.362640 + 0.348523I$<br>$b = 0.160167 - 0.470619I$ | $-3.76699 - 1.68644I$ | 0 |
| $u = 0.647072 + 0.675313I$<br>$a = 0.310613 + 0.510412I$<br>$b = -0.698002 + 0.997090I$ | $-5.03852 - 7.34388I$ | 0 |
| $u = 0.647072 - 0.675313I$<br>$a = 0.310613 - 0.510412I$<br>$b = -0.698002 - 0.997090I$ | $-5.03852 + 7.34388I$ | 0 |
| $u = 0.548793 + 0.737316I$<br>$a = -0.661657 + 0.301680I$<br>$b = -0.474652 - 0.832338I$ | $-4.72741 + 2.38013I$ | 0 |
| $u = 0.548793 - 0.737316I$<br>$a = -0.661657 - 0.301680I$<br>$b = -0.474652 + 0.832338I$ | $-4.72741 - 2.38013I$ | 0 |
| $u = 0.227920 + 0.890098I$<br>$a = -0.597510 - 0.463491I$<br>$b = 0.986400 - 0.352157I$ | $1.39228 - 6.23151I$ | 0 |
| $u = 0.227920 - 0.890098I$<br>$a = -0.597510 + 0.463491I$<br>$b = 0.986400 + 0.352157I$ | $1.39228 + 6.23151I$ | 0 |
| $u = 0.189834 + 0.893590I$<br>$a = 1.083890 + 0.384288I$<br>$b = -1.25320 + 1.19672I$ | $0.0844 - 14.1422I$ | 0 |
| $u = 0.189834 - 0.893590I$<br>$a = 1.083890 - 0.384288I$<br>$b = -1.25320 - 1.19672I$ | $0.0844 + 14.1422I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.997496 + 0.551038I$<br>$a = 0.193992 - 0.279188I$<br>$b = 0.861494 + 0.198796I$ | $-0.97322 + 1.18405I$ | 0 |
| $u = 0.997496 - 0.551038I$<br>$a = 0.193992 + 0.279188I$<br>$b = 0.861494 - 0.198796I$ | $-0.97322 - 1.18405I$ | 0 |
| $u = 1.113020 + 0.261600I$<br>$a = -0.66056 + 3.72609I$<br>$b = -2.25960 - 0.15223I$ | $-2.52074 - 0.67374I$ | 0 |
| $u = 1.113020 - 0.261600I$<br>$a = -0.66056 - 3.72609I$<br>$b = -2.25960 + 0.15223I$ | $-2.52074 + 0.67374I$ | 0 |
| $u = 0.157978 + 0.840183I$<br>$a = -0.955571 - 0.661158I$<br>$b = 0.891203 - 0.911299I$ | $3.81295 - 7.90390I$ | 0 |
| $u = 0.157978 - 0.840183I$<br>$a = -0.955571 + 0.661158I$<br>$b = 0.891203 + 0.911299I$ | $3.81295 + 7.90390I$ | 0 |
| $u = 0.099726 + 0.831030I$<br>$a = 0.241531 + 0.125256I$<br>$b = -0.278553 + 0.649349I$ | $3.10964 - 3.02719I$ | 0 |
| $u = 0.099726 - 0.831030I$<br>$a = 0.241531 - 0.125256I$<br>$b = -0.278553 - 0.649349I$ | $3.10964 + 3.02719I$ | 0 |
| $u = 1.086720 + 0.423280I$<br>$a = 0.458631 + 0.411155I$<br>$b = 0.878136 + 0.769471I$ | $0.97833 + 3.36110I$ | 0 |
| $u = 1.086720 - 0.423280I$<br>$a = 0.458631 - 0.411155I$<br>$b = 0.878136 - 0.769471I$ | $0.97833 - 3.36110I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -1.161640 + 0.221560I$<br>$a = 0.693593 - 0.043378I$<br>$b = 1.31955 - 0.74333I$ | $-1.46335 - 4.79145I$ | 0 |
| $u = -1.161640 - 0.221560I$<br>$a = 0.693593 + 0.043378I$<br>$b = 1.31955 + 0.74333I$ | $-1.46335 + 4.79145I$ | 0 |
| $u = -0.019986 + 0.809418I$<br>$a = -0.259392 + 0.443642I$<br>$b = 0.492698 + 0.239422I$ | $3.50998 - 2.86593I$ | 0 |
| $u = -0.019986 - 0.809418I$<br>$a = -0.259392 - 0.443642I$<br>$b = 0.492698 - 0.239422I$ | $3.50998 + 2.86593I$ | 0 |
| $u = 1.075340 + 0.518822I$<br>$a = -0.726902 + 0.037922I$<br>$b = -1.14674 - 1.11271I$ | $-2.61261 + 9.14928I$ | 0 |
| $u = 1.075340 - 0.518822I$<br>$a = -0.726902 - 0.037922I$<br>$b = -1.14674 + 1.11271I$ | $-2.61261 - 9.14928I$ | 0 |
| $u = 0.186766 + 0.778487I$<br>$a = -1.61668 + 0.23169I$<br>$b = 0.429062 - 0.334358I$ | $-1.33438 - 5.79082I$ | 0 |
| $u = 0.186766 - 0.778487I$<br>$a = -1.61668 - 0.23169I$<br>$b = 0.429062 + 0.334358I$ | $-1.33438 + 5.79082I$ | 0 |
| $u = 0.719187 + 0.318145I$<br>$a = -2.22822 - 0.73581I$<br>$b = 0.088142 - 0.899059I$ | $-4.28499 - 1.36074I$ | 0 |
| $u = 0.719187 - 0.318145I$<br>$a = -2.22822 + 0.73581I$<br>$b = 0.088142 + 0.899059I$ | $-4.28499 + 1.36074I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.227110 + 0.002061I$<br>$a = -1.66017 + 1.94116I$<br>$b = -0.560265 + 0.316560I$ | $-2.72849 - 1.53038I$ | 0 |
| $u = 1.227110 - 0.002061I$<br>$a = -1.66017 - 1.94116I$<br>$b = -0.560265 - 0.316560I$ | $-2.72849 + 1.53038I$ | 0 |
| $u = -1.214510 + 0.193657I$<br>$a = -0.331320 - 0.319809I$<br>$b = -1.255610 - 0.094001I$ | $-0.04609 + 2.27832I$ | 0 |
| $u = -1.214510 - 0.193657I$<br>$a = -0.331320 + 0.319809I$<br>$b = -1.255610 + 0.094001I$ | $-0.04609 - 2.27832I$ | 0 |
| $u = 0.142386 + 0.756030I$<br>$a = 2.22149 + 0.27721I$<br>$b = -2.86360 - 0.28993I$ | $0.35372 - 3.11615I$ | 0 |
| $u = 0.142386 - 0.756030I$<br>$a = 2.22149 - 0.27721I$<br>$b = -2.86360 + 0.28993I$ | $0.35372 + 3.11615I$ | 0 |
| $u = 1.217360 + 0.250346I$<br>$a = 1.70418 - 3.04656I$<br>$b = 2.85131 + 0.00560I$ | $-2.76825 - 1.54043I$ | 0 |
| $u = 1.217360 - 0.250346I$<br>$a = 1.70418 + 3.04656I$<br>$b = 2.85131 - 0.00560I$ | $-2.76825 + 1.54043I$ | 0 |
| $u = 1.239890 + 0.163213I$<br>$a = -0.51282 - 2.72556I$<br>$b = -0.113281 - 1.084940I$ | $-5.29466 - 0.57195I$ | 0 |
| $u = 1.239890 - 0.163213I$<br>$a = -0.51282 + 2.72556I$<br>$b = -0.113281 + 1.084940I$ | $-5.29466 + 0.57195I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.143570 + 0.726883I$<br>$a = -1.27103 + 0.68455I$<br>$b = 1.22226 + 1.00947I$ | $1.47470 + 8.28591I$ | 0 |
| $u = -0.143570 - 0.726883I$<br>$a = -1.27103 - 0.68455I$<br>$b = 1.22226 - 1.00947I$ | $1.47470 - 8.28591I$ | 0 |
| $u = -1.225750 + 0.333086I$<br>$a = 0.461927 - 0.047089I$<br>$b = 0.855537 - 0.095153I$ | $-0.18525 + 6.98643I$ | 0 |
| $u = -1.225750 - 0.333086I$<br>$a = 0.461927 + 0.047089I$<br>$b = 0.855537 + 0.095153I$ | $-0.18525 - 6.98643I$ | 0 |
| $u = -1.245720 + 0.276383I$<br>$a = -0.429395 + 0.363064I$<br>$b = -1.165230 + 0.702845I$ | $0.97470 + 1.25354I$ | 0 |
| $u = -1.245720 - 0.276383I$<br>$a = -0.429395 - 0.363064I$<br>$b = -1.165230 - 0.702845I$ | $0.97470 - 1.25354I$ | 0 |
| $u = -0.039317 + 0.720481I$<br>$a = 1.30484 - 0.79273I$<br>$b = -0.993124 - 0.771280I$ | $4.67418 + 2.34341I$ | 0 |
| $u = -0.039317 - 0.720481I$<br>$a = 1.30484 + 0.79273I$<br>$b = -0.993124 + 0.771280I$ | $4.67418 - 2.34341I$ | 0 |
| $u = 0.192939 + 0.694349I$<br>$a = -0.264401 + 0.563665I$<br>$b = 0.102997 + 1.191740I$ | $-2.51350 - 2.16509I$ | 0 |
| $u = 0.192939 - 0.694349I$<br>$a = -0.264401 - 0.563665I$<br>$b = 0.102997 - 1.191740I$ | $-2.51350 + 2.16509I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.232290 + 0.347470I$<br>$a = -0.490318 - 0.822966I$<br>$b = 0.110576 - 0.543663I$ | $-0.359065 - 1.357260I$ | 0 |
| $u = 1.232290 - 0.347470I$<br>$a = -0.490318 + 0.822966I$<br>$b = 0.110576 + 0.543663I$ | $-0.359065 + 1.357260I$ | 0 |
| $u = 1.211410 + 0.426352I$<br>$a = -0.258603 - 0.333714I$<br>$b = -0.201500 - 0.178702I$ | $-0.28499 - 1.43055I$ | 0 |
| $u = 1.211410 - 0.426352I$<br>$a = -0.258603 + 0.333714I$<br>$b = -0.201500 + 0.178702I$ | $-0.28499 + 1.43055I$ | 0 |
| $u = 0.089830 + 0.703854I$<br>$a = -2.00704 - 0.17497I$<br>$b = 2.26623 - 0.37498I$ | $0.63350 - 1.90492I$ | 0 |
| $u = 0.089830 - 0.703854I$<br>$a = -2.00704 + 0.17497I$<br>$b = 2.26623 + 0.37498I$ | $0.63350 + 1.90492I$ | 0 |
| $u = 1.271470 + 0.237024I$<br>$a = 1.57652 + 0.70957I$<br>$b = -0.349469 + 0.426717I$ | $-4.39307 - 4.01879I$ | 0 |
| $u = 1.271470 - 0.237024I$<br>$a = 1.57652 - 0.70957I$<br>$b = -0.349469 - 0.426717I$ | $-4.39307 + 4.01879I$ | 0 |
| $u = 0.690432$<br>$a = -0.298400$<br>$b = 0.429439$ | $-1.01489$ | 0 |
| $u = 0.502927 + 0.470467I$<br>$a = -0.219491 - 1.265850I$<br>$b = 0.584208 - 0.484004I$ | $-0.94679 - 3.25376I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.502927 - 0.470467I$<br>$a = -0.219491 + 1.265850I$<br>$b = 0.584208 + 0.484004I$ | $-0.94679 + 3.25376I$ | 0 |
| $u = 1.293630 + 0.299459I$<br>$a = 0.48591 + 2.44283I$<br>$b = -0.853382 + 0.851081I$ | $0.51258 - 6.03565I$ | 0 |
| $u = 1.293630 - 0.299459I$<br>$a = 0.48591 - 2.44283I$<br>$b = -0.853382 - 0.851081I$ | $0.51258 + 6.03565I$ | 0 |
| $u = -0.154665 + 0.643514I$<br>$a = 0.555855 - 0.975061I$<br>$b = -1.026540 - 0.095270I$ | $3.07753 + 0.68921I$ | 0 |
| $u = -0.154665 - 0.643514I$<br>$a = 0.555855 + 0.975061I$<br>$b = -1.026540 + 0.095270I$ | $3.07753 - 0.68921I$ | 0 |
| $u = -1.330400 + 0.260515I$<br>$a = 0.95297 - 1.04827I$<br>$b = -0.196988 - 0.216176I$ | $-5.01539 + 2.29068I$ | 0 |
| $u = -1.330400 - 0.260515I$<br>$a = 0.95297 + 1.04827I$<br>$b = -0.196988 + 0.216176I$ | $-5.01539 - 2.29068I$ | 0 |
| $u = -1.328060 + 0.294821I$<br>$a = 0.36738 + 2.37866I$<br>$b = 2.08275 + 0.80093I$ | $-3.83391 + 5.53172I$ | 0 |
| $u = -1.328060 - 0.294821I$<br>$a = 0.36738 - 2.37866I$<br>$b = 2.08275 - 0.80093I$ | $-3.83391 - 5.53172I$ | 0 |
| $u = 0.055623 + 0.622634I$<br>$a = 1.57566 + 0.78961I$<br>$b = -0.137389 - 0.136164I$ | $-0.591650 + 0.928319I$ | $-6.00000 + 0.I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.055623 - 0.622634I$<br>$a = 1.57566 - 0.78961I$<br>$b = -0.137389 + 0.136164I$ | $-0.591650 - 0.928319I$ | $-6.00000 + 0.I$ |
| $u = -1.374060 + 0.048611I$<br>$a = 0.89533 - 1.47816I$<br>$b = 0.705292 - 0.964759I$ | $-6.88250 + 0.95679I$ | 0 |
| $u = -1.374060 - 0.048611I$<br>$a = 0.89533 + 1.47816I$<br>$b = 0.705292 + 0.964759I$ | $-6.88250 - 0.95679I$ | 0 |
| $u = 1.352330 + 0.307047I$<br>$a = -0.28491 - 2.46921I$<br>$b = 1.18789 - 1.17802I$ | $-3.24903 - 12.04520I$ | 0 |
| $u = 1.352330 - 0.307047I$<br>$a = -0.28491 + 2.46921I$<br>$b = 1.18789 + 1.17802I$ | $-3.24903 + 12.04520I$ | 0 |
| $u = 0.529509 + 0.306312I$<br>$a = -0.037220 + 0.172357I$<br>$b = 0.588740 + 0.308270I$ | $-1.135370 - 0.042892I$ | $-9.77824 + 0.I$ |
| $u = 0.529509 - 0.306312I$<br>$a = -0.037220 - 0.172357I$<br>$b = 0.588740 - 0.308270I$ | $-1.135370 + 0.042892I$ | $-9.77824 + 0.I$ |
| $u = -1.351740 + 0.319952I$<br>$a = -1.69444 - 1.70373I$<br>$b = -3.09935 + 0.46402I$ | $-4.35845 + 7.01409I$ | 0 |
| $u = -1.351740 - 0.319952I$<br>$a = -1.69444 + 1.70373I$<br>$b = -3.09935 - 0.46402I$ | $-4.35845 - 7.01409I$ | 0 |
| $u = -1.341910 + 0.359550I$<br>$a = 0.532957 - 1.118490I$<br>$b = -0.305901 - 0.888362I$ | $-1.43150 + 7.30797I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -1.341910 - 0.359550I$<br>$a = 0.532957 + 1.118490I$<br>$b = -0.305901 + 0.888362I$ | $-1.43150 - 7.30797I$ | 0 |
| $u = -1.39348$<br>$a = -3.37932$<br>$b = -3.54740$ | $-8.60113$ | 0 |
| $u = -1.366310 + 0.293948I$<br>$a = 0.59315 - 1.75824I$<br>$b = 0.197409 - 1.284420I$ | $-7.43290 + 5.78346I$ | 0 |
| $u = -1.366310 - 0.293948I$<br>$a = 0.59315 + 1.75824I$<br>$b = 0.197409 + 1.284420I$ | $-7.43290 - 5.78346I$ | 0 |
| $u = 1.375700 + 0.272901I$<br>$a = -0.484234 + 1.243210I$<br>$b = -0.900349 + 0.307525I$ | $-1.81857 - 4.04926I$ | 0 |
| $u = 1.375700 - 0.272901I$<br>$a = -0.484234 - 1.243210I$<br>$b = -0.900349 - 0.307525I$ | $-1.81857 + 4.04926I$ | 0 |
| $u = 1.404160 + 0.033715I$<br>$a = 1.25531 + 1.44669I$<br>$b = 0.566275 + 0.948690I$ | $-6.89574 + 4.83025I$ | 0 |
| $u = 1.404160 - 0.033715I$<br>$a = 1.25531 - 1.44669I$<br>$b = 0.566275 - 0.948690I$ | $-6.89574 - 4.83025I$ | 0 |
| $u = -1.373030 + 0.326241I$<br>$a = -1.007360 + 0.555305I$<br>$b = 0.590165 + 0.343631I$ | $-6.26355 + 9.78611I$ | 0 |
| $u = -1.373030 - 0.326241I$<br>$a = -1.007360 - 0.555305I$<br>$b = 0.590165 - 0.343631I$ | $-6.26355 - 9.78611I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -1.409010 + 0.080595I$<br>$a = \quad 0.47214 + 1.91564I$<br>$b = \quad 0.390502 + 0.770194I$ | $-7.09262 + 4.86963I$ | 0 |
| $u = -1.409010 - 0.080595I$<br>$a = \quad 0.47214 - 1.91564I$<br>$b = \quad 0.390502 - 0.770194I$ | $-7.09262 - 4.86963I$ | 0 |
| $u = -1.36882 + 0.35973I$<br>$a = -0.52300 + 2.04764I$<br>$b = \quad 0.869024 + 1.011960I$ | $-1.00529 + 12.22180I$ | 0 |
| $u = -1.36882 - 0.35973I$<br>$a = -0.52300 - 2.04764I$<br>$b = \quad 0.869024 - 1.011960I$ | $-1.00529 - 12.22180I$ | 0 |
| $u = -1.42521 + 0.02285I$<br>$a = -0.59418 + 1.59160I$<br>$b = \quad 0.468045 + 0.892905I$ | $-10.99840 + 2.00997I$ | 0 |
| $u = -1.42521 - 0.02285I$<br>$a = -0.59418 - 1.59160I$<br>$b = \quad 0.468045 - 0.892905I$ | $-10.99840 - 2.00997I$ | 0 |
| $u = -1.39493 + 0.38237I$<br>$a = \quad 0.45776 - 2.15262I$<br>$b = -1.30054 - 1.28561I$ | $-4.9272 + 18.7232I$ | 0 |
| $u = -1.39493 - 0.38237I$<br>$a = \quad 0.45776 + 2.15262I$<br>$b = -1.30054 + 1.28561I$ | $-4.9272 - 18.7232I$ | 0 |
| $u = \quad 0.541504$<br>$a = \quad 6.40334$<br>$b = -4.23756$ | $-2.58861$ | 158.370 |
| $u = -1.41117 + 0.37622I$<br>$a = \quad 0.095495 + 1.289910I$<br>$b = \quad 1.036730 + 0.484104I$ | $-3.79919 + 10.78570I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -1.41117 - 0.37622I$<br>$a = 0.095495 - 1.289910I$<br>$b = 1.036730 - 0.484104I$ | $-3.79919 - 10.78570I$ | $0$ |
| $u = -0.497821 + 0.137020I$<br>$a = 1.51035 - 0.27858I$<br>$b = 0.911716 - 0.662167I$ | $-0.90850 - 5.42294I$ | $-1.43047 + 4.96614I$ |
| $u = -0.497821 - 0.137020I$<br>$a = 1.51035 + 0.27858I$<br>$b = 0.911716 + 0.662167I$ | $-0.90850 + 5.42294I$ | $-1.43047 - 4.96614I$ |
| $u = -1.49258 + 0.12612I$<br>$a = -0.46867 - 1.85261I$<br>$b = -0.75840 - 1.30183I$ | $-12.2107 + 9.8962I$ | $0$ |
| $u = -1.49258 - 0.12612I$<br>$a = -0.46867 + 1.85261I$<br>$b = -0.75840 + 1.30183I$ | $-12.2107 - 9.8962I$ | $0$ |
| $u = -1.50703 + 0.17644I$<br>$a = -0.659597 + 0.817640I$<br>$b = -0.105634 + 0.883669I$ | $-11.58490 + 0.78846I$ | $0$ |
| $u = -1.50703 - 0.17644I$<br>$a = -0.659597 - 0.817640I$<br>$b = -0.105634 - 0.883669I$ | $-11.58490 - 0.78846I$ | $0$ |
| $u = -1.63690$<br>$a = 0.332409$<br>$b = 0.414031$ | $-10.4601$ | $0$ |
| $u = -0.244806 + 0.102225I$<br>$a = -1.67402 - 2.35307I$<br>$b = -0.866434 - 0.319209I$ | $1.46476 + 1.15131I$ | $2.56362 - 1.63144I$ |
| $u = -0.244806 - 0.102225I$<br>$a = -1.67402 + 2.35307I$<br>$b = -0.866434 + 0.319209I$ | $1.46476 - 1.15131I$ | $2.56362 + 1.63144I$ |

| Solutions to $I^u_1$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.0392826 + 0.0876665I$<br>$a = -3.58914 + 5.96550I$<br>$b = 0.439969 + 0.844782I$ | $-1.92777 - 0.81004I$ | $-4.48759 + 0.13033I$ |
| $u = -0.0392826 - 0.0876665I$<br>$a = -3.58914 - 5.96550I$<br>$b = 0.439969 - 0.844782I$ | $-1.92777 + 0.81004I$ | $-4.48759 - 0.13033I$ |

**II.** $\boldsymbol{I_2^u =}$
$\boldsymbol{\langle -3a^5-13a^4-7a^3+17a^2+13b-21a-7,\ a^6+6a^5+11a^4+4a^3-a^2+a+1,\ u-1\rangle}$

**(i) Arc colorings**

$$a_5 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_8 = \begin{pmatrix} 0 \\ 1 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} -1 \\ 0 \end{pmatrix}$$
$$a_{11} = \begin{pmatrix} a \\ \frac{3}{13}a^5 + a^4 + \cdots + \frac{21}{13}a + \frac{7}{13} \end{pmatrix}$$
$$a_{12} = \begin{pmatrix} \frac{3}{13}a^5 + a^4 + \cdots + \frac{34}{13}a + \frac{7}{13} \\ \frac{3}{13}a^5 + a^4 + \cdots + \frac{21}{13}a + \frac{7}{13} \end{pmatrix}$$
$$a_4 = \begin{pmatrix} -\frac{5}{13}a^5 - 2a^4 + \cdots + \frac{4}{13}a + \frac{10}{13} \\ -1.15385a^5 - 6a^4 + \cdots + 0.923077a - 0.692308 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} -2.30769a^5 - 12a^4 + \cdots + 1.84615a - 3.38462 \\ -2.07692a^5 - 11a^4 + \cdots + 2.46154a - 2.84615 \end{pmatrix}$$
$$a_1 = \begin{pmatrix} -2.07692a^5 - 11a^4 + \cdots + 2.46154a - 2.84615 \\ -2.07692a^5 - 11a^4 + \cdots + 2.46154a - 2.84615 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} -2.07692a^5 - 11a^4 + \cdots + 2.46154a - 2.84615 \\ -2.07692a^5 - 11a^4 + \cdots + 2.46154a - 2.84615 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$
$$a_2 = \begin{pmatrix} -2.07692a^5 - 11a^4 + \cdots + 2.46154a - 2.84615 \\ -2.07692a^5 - 11a^4 + \cdots + 2.46154a - 2.84615 \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= \frac{92}{13}a^5 + 37a^4 + \frac{622}{13}a^3 - \frac{179}{13}a^2 + \frac{20}{13}a + \frac{24}{13}$

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

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

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

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

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

| Solutions to $I_2^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.00000$<br>$a = -0.658836 + 0.177500I$<br>$b = -1.073950 + 0.558752I$ | $-1.64493 - 5.69302I$ | $-11.7058 + 8.3306I$ |
| $u = 1.00000$<br>$a = -0.658836 - 0.177500I$<br>$b = -1.073950 - 0.558752I$ | $-1.64493 + 5.69302I$ | $-11.7058 - 8.3306I$ |
| $u = 1.00000$<br>$a = 0.346225 + 0.393823I$<br>$b = 1.002190 + 0.295542I$ | $0.245672 + 0.924305I$ | $-5.68949 - 0.25702I$ |
| $u = 1.00000$<br>$a = 0.346225 - 0.393823I$<br>$b = 1.002190 - 0.295542I$ | $0.245672 - 0.924305I$ | $-5.68949 + 0.25702I$ |
| $u = 1.00000$<br>$a = -2.68739 + 0.76772I$<br>$b = -0.428243 - 0.664531I$ | $-3.53554 - 0.92430I$ | $-12.60470 - 5.55069I$ |
| $u = 1.00000$<br>$a = -2.68739 - 0.76772I$<br>$b = -0.428243 + 0.664531I$ | $-3.53554 + 0.92430I$ | $-12.60470 + 5.55069I$ |

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

**(i) Arc colorings**

$$a_5 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

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

$$a_6 = \begin{pmatrix} 1 \\ -u+1 \end{pmatrix}$$

$$a_9 = \begin{pmatrix} -u \\ -u+1 \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} -2u-3 \\ u+2 \end{pmatrix}$$

$$a_{12} = \begin{pmatrix} -2u-3 \\ u+2 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} -5u-7 \\ 3u+5 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} -4u-2 \\ 3 \end{pmatrix}$$

$$a_1 = \begin{pmatrix} 2u-1 \\ u-1 \end{pmatrix}$$

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

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

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

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

**(iii) Cusp Shapes** $= -61$

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

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

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

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

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

| Solutions to $I^u_3$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.618034$<br>$a = -4.23607$<br>$b = 2.61803$ | $-2.63189$ | $-61.0000$ |
| $u = -1.61803$<br>$a = 0.236068$<br>$b = 0.381966$ | $-10.5276$ | $-61.0000$ |

## IV. u-Polynomials

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $u^6(u^2-3u+1)(u^{112}+42u^{111}+\cdots+36864u+4096)$ |
| $c_2$ | $u^6(u^2+u-1)(u^{112}-2u^{111}+\cdots+192u+64)$ |
| $c_3$ | $(u^2-3u+1)(u^6+3u^5+5u^4+4u^3+2u^2+u+1)$ $\cdot(u^{112}-9u^{111}+\cdots+2324u-121)$ |
| $c_4$ | $(u^2-3u+1)(u^6+u^5+\cdots+u+1)(u^{112}-5u^{111}+\cdots-32u+161)$ |
| $c_5$ | $((u-1)^6)(u^2+u-1)(u^{112}-8u^{111}+\cdots-7u+1)$ |
| $c_6$ | $u^6(u^2-u-1)(u^{112}-2u^{111}+\cdots+192u+64)$ |
| $c_7, c_8$ | $((u+1)^6)(u^2-u-1)(u^{112}-8u^{111}+\cdots-7u+1)$ |
| $c_9$ | $(u^2+3u+1)(u^6+3u^5+5u^4+4u^3+2u^2+u+1)$ $\cdot(u^{112}+9u^{111}+\cdots+2u+1)$ |
| $c_{10}$ | $((u-1)^2)(u^6+u^5+\cdots+u+1)(u^{112}-4u^{111}+\cdots-35u+1)$ |
| $c_{11}$ | $u^2(u^6+u^5+\cdots+u+1)(u^{112}+18u^{111}+\cdots-48u+4)$ |
| $c_{12}$ | $((u+1)^2)(u^6-u^5+\cdots-u+1)(u^{112}-4u^{111}+\cdots-35u+1)$ |

**V. Riley Polynomials**

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $y^6(y^2-7y+1)(y^{112}+46y^{111}+\cdots+1.71966\times10^9y+1.67772\times10^7)$ |
| $c_2, c_6$ | $y^6(y^2-3y+1)(y^{112}-42y^{111}+\cdots-36864y+4096)$ |
| $c_3$ | $(y^2-7y+1)(y^6+y^5+5y^4+6y^2+3y+1)$ $\cdot(y^{112}-109y^{111}+\cdots-1162588y+14641)$ |
| $c_4$ | $(y^2-7y+1)(y^6-3y^5+5y^4-4y^3+2y^2-y+1)$ $\cdot(y^{112}-109y^{111}+\cdots-254760y+25921)$ |
| $c_5, c_7, c_8$ | $((y-1)^6)(y^2-3y+1)(y^{112}-96y^{111}+\cdots+115y+1)$ |
| $c_9$ | $(y^2-7y+1)(y^6+y^5+\cdots+3y+1)(y^{112}+11y^{111}+\cdots-8y+1)$ |
| $c_{10}, c_{12}$ | $(y-1)^2(y^6-3y^5+5y^4-4y^3+2y^2-y+1)$ $\cdot(y^{112}-68y^{111}+\cdots-815y+1)$ |
| $c_{11}$ | $y^2(y^6-3y^5+\cdots-y+1)(y^{112}-18y^{111}+\cdots-1464y+16)$ |