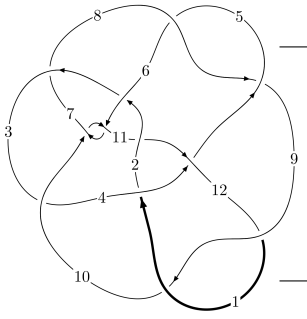
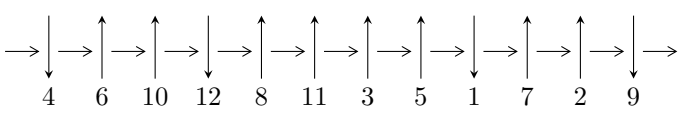
## $12a_{0963}$ $(K12a_{0963})$




A knot diagram[1]

**Linearized knot diagam**




**Solving Sequence**

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

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

$$I_1^u = \langle 3.25168 \times 10^{823} u^{156} - 2.59445 \times 10^{823} u^{155} + \cdots + 7.76883 \times 10^{823} b - 4.79193 \times 10^{825},$$
$$- 3.11599 \times 10^{825} u^{156} + 2.47642 \times 10^{825} u^{155} + \cdots + 1.40616 \times 10^{826} a + 5.05878 \times 10^{827},$$
$$u^{157} - 2u^{156} + \cdots - 1089u + 181 \rangle$$
$$I_2^u = \langle 1.92631 \times 10^{42} u^{46} - 3.43494 \times 10^{42} u^{45} + \cdots + 7.75734 \times 10^{42} b + 1.10349 \times 10^{43},$$
$$- 2.95227 \times 10^{43} u^{46} + 3.11133 \times 10^{43} u^{45} + \cdots + 5.43014 \times 10^{43} a - 9.32130 \times 10^{43},\ u^{47} - u^{46} + \cdots + 8u +$$

* 2 irreducible components of $\dim_{\mathbb{C}} = 0$, with total 204 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.** $\boldsymbol{I_1^u = \langle 3.25 \times 10^{823} u^{156} - 2.59 \times 10^{823} u^{155} + \cdots + 7.77 \times 10^{823} b - 4.79 \times 10^{825},\ -3.12 \times 10^{825} u^{156} + 2.48 \times 10^{825} u^{155} + \cdots + 1.41 \times 10^{826} a + 5.06 \times 10^{827},\ u^{157} - 2u^{156} + \cdots - 1089u + 181 \rangle}$

**(i) Arc colorings**

$$a_9 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$

$$a_{12} = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

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

$$a_5 = \begin{pmatrix} 0.221596u^{156} - 0.176112u^{155} + \cdots + 213.321u - 35.9759 \\ -0.418554u^{156} + 0.333957u^{155} + \cdots - 317.116u + 61.6815 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} -u \\ -u^3 + u \end{pmatrix}$$

$$a_4 = \begin{pmatrix} -0.196958u^{156} + 0.157845u^{155} + \cdots - 103.794u + 25.7056 \\ -0.418554u^{156} + 0.333957u^{155} + \cdots - 317.116u + 61.6815 \end{pmatrix}$$

$$a_2 = \begin{pmatrix} 0.178853u^{156} - 0.188599u^{155} + \cdots + 119.981u - 39.6455 \\ -0.0623607u^{156} + 0.0472106u^{155} + \cdots - 53.5035u + 12.0020 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} 0.268823u^{156} - 0.214033u^{155} + \cdots + 253.388u - 43.3447 \\ -0.205428u^{156} + 0.161209u^{155} + \cdots - 149.106u + 29.4286 \end{pmatrix}$$

$$a_8 = \begin{pmatrix} 0.173692u^{156} - 0.162984u^{155} + \cdots + 150.878u - 32.2694 \\ 0.0543462u^{156} - 0.0363523u^{155} + \cdots + 29.2802u - 2.81016 \end{pmatrix}$$

$$a_6 = \begin{pmatrix} -0.231849u^{156} + 0.226710u^{155} + \cdots - 264.361u + 53.3549 \\ 0.109896u^{156} - 0.0881361u^{155} + \cdots + 89.3275u - 19.1200 \end{pmatrix}$$

$$a_7 = \begin{pmatrix} -0.00668521u^{156} - 0.000568235u^{155} + \cdots + 25.5452u - 11.8966 \\ 0.0533812u^{156} - 0.0363507u^{155} + \cdots + 48.9661u - 5.83195 \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} 0.0294108u^{156} - 0.0135338u^{155} + \cdots + 12.9035u + 6.64770 \\ 0.117190u^{156} - 0.0887343u^{155} + \cdots + 86.4006u - 17.0782 \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= 0.205349u^{156} - 0.170433u^{155} + \cdots + 170.257u - 38.4072$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $u^{157} + 5u^{156} + \cdots + 11551514u - 666271$ |
| $c_2$ | $u^{157} - u^{156} + \cdots - 1628098428u - 107670653$ |
| $c_3$ | $u^{157} + u^{156} + \cdots - 6882417969378u - 579271043533$ |
| $c_4$ | $u^{157} - 37u^{155} + \cdots + 445344963u - 17796191$ |
| $c_5, c_8$ | $u^{157} + 10u^{156} + \cdots - 968u - 181$ |
| $c_6, c_{10}$ | $u^{157} - 3u^{156} + \cdots + 7u - 1$ |
| $c_7$ | $u^{157} + 38u^{155} + \cdots + 132651545u - 435199883$ |
| $c_9, c_{12}$ | $u^{157} + 2u^{156} + \cdots - 1089u - 181$ |
| $c_{11}$ | $u^{157} + 12u^{156} + \cdots + 844976503738u + 47066586319$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $y^{157} - 49y^{156} + \cdots + 104808094653642y - 443917045441$ |
| $c_2$ | $y^{157} + 59y^{156} + \cdots - 404534046342627964y - 115929695174464 09$ |
| $c_3$ | $y^{157} + 111y^{156} + \cdots - 4.36 \times 10^{24}y - 3.36 \times 10^{23}$ |
| $c_4$ | $y^{157} - 74y^{156} + \cdots + 112157843337933533y - 316704414108481$ |
| $c_5, c_8$ | $y^{157} + 150y^{156} + \cdots + 9673532y - 32761$ |
| $c_6, c_{10}$ | $y^{157} + 111y^{156} + \cdots + 165y - 1$ |
| $c_7$ | $y^{157} + 76y^{156} + \cdots - 801491013938418801y - 189398938163213689$ |
| $c_9, c_{12}$ | $y^{157} - 118y^{156} + \cdots + 1444751y - 32761$ |
| $c_{11}$ | $y^{157} + 84y^{156} + \cdots + 1.62 \times 10^{22}y - 2.22 \times 10^{21}$ |

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

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.911310 + 0.293013I$<br>$a = 0.422959 - 0.500306I$<br>$b = 0.675145 + 0.486620I$ | $-1.96969 - 1.58228I$ | 0 |
| $u = 0.911310 - 0.293013I$<br>$a = 0.422959 + 0.500306I$<br>$b = 0.675145 - 0.486620I$ | $-1.96969 + 1.58228I$ | 0 |
| $u = -0.387840 + 0.973856I$<br>$a = -1.200220 + 0.398785I$<br>$b = 1.255970 + 0.451783I$ | $-5.67139 - 4.88778I$ | 0 |
| $u = -0.387840 - 0.973856I$<br>$a = -1.200220 - 0.398785I$<br>$b = 1.255970 - 0.451783I$ | $-5.67139 + 4.88778I$ | 0 |
| $u = -1.058010 + 0.108048I$<br>$a = 1.078700 - 0.213102I$<br>$b = 0.635902 - 0.081974I$ | $0.108417 + 0.376808I$ | 0 |
| $u = -1.058010 - 0.108048I$<br>$a = 1.078700 + 0.213102I$<br>$b = 0.635902 + 0.081974I$ | $0.108417 - 0.376808I$ | 0 |
| $u = 1.062930 + 0.087493I$<br>$a = -0.704856 + 0.159930I$<br>$b = -1.22300 - 0.79175I$ | $-1.27458 - 1.99100I$ | 0 |
| $u = 1.062930 - 0.087493I$<br>$a = -0.704856 - 0.159930I$<br>$b = -1.22300 + 0.79175I$ | $-1.27458 + 1.99100I$ | 0 |
| $u = -1.059890 + 0.177175I$<br>$a = -0.232872 - 1.389900I$<br>$b = -0.959988 + 0.026640I$ | $-7.39949 - 1.96456I$ | 0 |
| $u = -1.059890 - 0.177175I$<br>$a = -0.232872 + 1.389900I$<br>$b = -0.959988 - 0.026640I$ | $-7.39949 + 1.96456I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.285052 + 1.070700I$<br>$a = -1.116590 - 0.322100I$<br>$b = 0.904472 + 0.446905I$ | $-3.72967 - 2.43277I$ | 0 |
| $u = 0.285052 - 1.070700I$<br>$a = -1.116590 + 0.322100I$<br>$b = 0.904472 - 0.446905I$ | $-3.72967 + 2.43277I$ | 0 |
| $u = -1.083450 + 0.247951I$<br>$a = -0.644397 - 0.231290I$<br>$b = -1.34277 + 0.53989I$ | $-3.56097 + 6.59812I$ | 0 |
| $u = -1.083450 - 0.247951I$<br>$a = -0.644397 + 0.231290I$<br>$b = -1.34277 - 0.53989I$ | $-3.56097 - 6.59812I$ | 0 |
| $u = -0.071448 + 0.876093I$<br>$a = 0.807592 + 0.554786I$<br>$b = -0.542808 - 0.487692I$ | $1.65200 - 2.03206I$ | 0 |
| $u = -0.071448 - 0.876093I$<br>$a = 0.807592 - 0.554786I$<br>$b = -0.542808 + 0.487692I$ | $1.65200 + 2.03206I$ | 0 |
| $u = 0.025069 + 0.871018I$<br>$a = 0.324040 - 1.093510I$<br>$b = -0.724981 + 0.867463I$ | $-4.55498 + 8.98621I$ | 0 |
| $u = 0.025069 - 0.871018I$<br>$a = 0.324040 + 1.093510I$<br>$b = -0.724981 - 0.867463I$ | $-4.55498 - 8.98621I$ | 0 |
| $u = 0.816425 + 0.301933I$<br>$a = 0.888162 + 0.435117I$<br>$b = 0.369688 + 0.168423I$ | $-2.25118 + 2.07318I$ | 0 |
| $u = 0.816425 - 0.301933I$<br>$a = 0.888162 - 0.435117I$<br>$b = 0.369688 - 0.168423I$ | $-2.25118 - 2.07318I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-0.562324+0.663290I$<br>$a=\ \ 0.300737+0.551236I$<br>$b=\ \ 0.312522-0.887888I$ | $-1.93889+2.36574I$ | 0 |
| $u=-0.562324-0.663290I$<br>$a=\ \ 0.300737-0.551236I$<br>$b=\ \ 0.312522+0.887888I$ | $-1.93889-2.36574I$ | 0 |
| $u=\ \ 0.109075+0.850935I$<br>$a=\ \ 1.45809+0.06873I$<br>$b=-0.421659+0.344018I$ | $-4.13875-0.45277I$ | 0 |
| $u=\ \ 0.109075-0.850935I$<br>$a=\ \ 1.45809-0.06873I$<br>$b=-0.421659-0.344018I$ | $-4.13875+0.45277I$ | 0 |
| $u=\ \ 0.203065+0.818259I$<br>$a=\ \ 0.426590-0.467011I$<br>$b=-0.117108+0.690407I$ | $0.31892-2.30117I$ | 0 |
| $u=\ \ 0.203065-0.818259I$<br>$a=\ \ 0.426590+0.467011I$<br>$b=-0.117108-0.690407I$ | $0.31892+2.30117I$ | 0 |
| $u=-1.127040+0.286631I$<br>$a=-0.155259+1.281970I$<br>$b=\ \ 1.02908-1.05517I$ | $-7.06540+4.25964I$ | 0 |
| $u=-1.127040-0.286631I$<br>$a=-0.155259-1.281970I$<br>$b=\ \ 1.02908+1.05517I$ | $-7.06540-4.25964I$ | 0 |
| $u=-0.511375+0.641545I$<br>$a=-1.15205+1.02638I$<br>$b=\ \ 0.945841-0.812489I$ | $-6.15954+4.38374I$ | 0 |
| $u=-0.511375-0.641545I$<br>$a=-1.15205-1.02638I$<br>$b=\ \ 0.945841+0.812489I$ | $-6.15954-4.38374I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.146420 + 0.282827I$<br>$a = 0.059500 + 1.162600I$<br>$b = -2.47482 - 1.00807I$ | $-5.86937 - 5.52403I$ | 0 |
| $u = 1.146420 - 0.282827I$<br>$a = 0.059500 - 1.162600I$<br>$b = -2.47482 + 1.00807I$ | $-5.86937 + 5.52403I$ | 0 |
| $u = -0.209869 + 1.166200I$<br>$a = 1.122180 - 0.557720I$<br>$b = -1.089000 + 0.437874I$ | $-9.80923 + 1.62435I$ | 0 |
| $u = -0.209869 - 1.166200I$<br>$a = 1.122180 + 0.557720I$<br>$b = -1.089000 - 0.437874I$ | $-9.80923 - 1.62435I$ | 0 |
| $u = -0.409177 + 0.702159I$<br>$a = 1.241600 - 0.498069I$<br>$b = -0.090274 - 0.431184I$ | $-4.77025 - 0.31291I$ | 0 |
| $u = -0.409177 - 0.702159I$<br>$a = 1.241600 + 0.498069I$<br>$b = -0.090274 + 0.431184I$ | $-4.77025 + 0.31291I$ | 0 |
| $u = 1.189150 + 0.065835I$<br>$a = 1.32660 + 1.68779I$<br>$b = 0.582672 - 0.103953I$ | $-10.58110 - 3.52794I$ | 0 |
| $u = 1.189150 - 0.065835I$<br>$a = 1.32660 - 1.68779I$<br>$b = 0.582672 + 0.103953I$ | $-10.58110 + 3.52794I$ | 0 |
| $u = -0.105700 + 0.795367I$<br>$a = 0.47745 + 1.35701I$<br>$b = -0.715614 - 0.818067I$ | $0.12808 - 2.69568I$ | 0 |
| $u = -0.105700 - 0.795367I$<br>$a = 0.47745 - 1.35701I$<br>$b = -0.715614 + 0.818067I$ | $0.12808 + 2.69568I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.203040 + 0.008942I$<br>$a = -0.198657 + 1.178480I$<br>$b = -0.74398 - 1.74170I$ | $-5.90098 - 1.32698I$ | 0 |
| $u = 1.203040 - 0.008942I$<br>$a = -0.198657 - 1.178480I$<br>$b = -0.74398 + 1.74170I$ | $-5.90098 + 1.32698I$ | 0 |
| $u = -1.219570 + 0.080866I$<br>$a = 0.21773 + 1.65618I$<br>$b = 0.679364 - 0.560900I$ | $-8.15885 + 4.55843I$ | 0 |
| $u = -1.219570 - 0.080866I$<br>$a = 0.21773 - 1.65618I$<br>$b = 0.679364 + 0.560900I$ | $-8.15885 - 4.55843I$ | 0 |
| $u = -1.226330 + 0.030478I$<br>$a = -0.078080 - 1.085440I$<br>$b = 1.42536 + 2.47249I$ | $-12.4468 + 8.7063I$ | 0 |
| $u = -1.226330 - 0.030478I$<br>$a = -0.078080 + 1.085440I$<br>$b = 1.42536 - 2.47249I$ | $-12.4468 - 8.7063I$ | 0 |
| $u = 1.229440 + 0.033233I$<br>$a = -0.140944 - 1.063410I$<br>$b = 1.81098 + 2.36753I$ | $-8.10718 + 2.67612I$ | 0 |
| $u = 1.229440 - 0.033233I$<br>$a = -0.140944 + 1.063410I$<br>$b = 1.81098 - 2.36753I$ | $-8.10718 - 2.67612I$ | 0 |
| $u = -1.223800 + 0.143688I$<br>$a = -0.688658 - 0.155320I$<br>$b = -0.947532 - 0.374202I$ | $-8.01860 + 0.56370I$ | 0 |
| $u = -1.223800 - 0.143688I$<br>$a = -0.688658 + 0.155320I$<br>$b = -0.947532 + 0.374202I$ | $-8.01860 - 0.56370I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-1.192140+0.339484I$<br>$a=-0.295026+0.007479I$<br>$b=\ \ 1.26469+1.01291I$ | $-8.38489+7.01477I$ | 0 |
| $u=-1.192140-0.339484I$<br>$a=-0.295026-0.007479I$<br>$b=\ \ 1.26469-1.01291I$ | $-8.38489-7.01477I$ | 0 |
| $u=\ \ 0.187120+1.227880I$<br>$a=\ \ 1.116150+0.471964I$<br>$b=-1.040910-0.481051I$ | $-5.44071-7.78794I$ | 0 |
| $u=\ \ 0.187120-1.227880I$<br>$a=\ \ 1.116150-0.471964I$<br>$b=-1.040910+0.481051I$ | $-5.44071+7.78794I$ | 0 |
| $u=\ \ 1.211920+0.305750I$<br>$a=\ \ 0.103129-0.668493I$<br>$b=\ \ 1.213310+0.596760I$ | $-2.65166-1.52279I$ | 0 |
| $u=\ \ 1.211920-0.305750I$<br>$a=\ \ 0.103129+0.668493I$<br>$b=\ \ 1.213310-0.596760I$ | $-2.65166+1.52279I$ | 0 |
| $u=\ \ 1.226510+0.242806I$<br>$a=\ \ 1.328860-0.461346I$<br>$b=\ \ 0.813409+0.426128I$ | $-8.77757+0.33371I$ | 0 |
| $u=\ \ 1.226510-0.242806I$<br>$a=\ \ 1.328860+0.461346I$<br>$b=\ \ 0.813409-0.426128I$ | $-8.77757-0.33371I$ | 0 |
| $u=-1.248870+0.137665I$<br>$a=-0.425029+1.090960I$<br>$b=-0.319704-0.833737I$ | $-8.21844+3.28429I$ | 0 |
| $u=-1.248870-0.137665I$<br>$a=-0.425029-1.090960I$<br>$b=-0.319704+0.833737I$ | $-8.21844-3.28429I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-1.157310+0.489575I$<br>$a=\ \ 0.220657-1.082950I$<br>$b=-2.02740+0.58217I$ | $-8.20597+10.22550I$ | 0 |
| $u=-1.157310-0.489575I$<br>$a=\ \ 0.220657+1.082950I$<br>$b=-2.02740-0.58217I$ | $-8.20597-10.22550I$ | 0 |
| $u=\ \ 0.532975+0.506131I$<br>$a=-0.475730-1.109100I$<br>$b=\ \ 0.079097+1.042380I$ | $-1.19552-5.32895I$ | 0 |
| $u=\ \ 0.532975-0.506131I$<br>$a=-0.475730+1.109100I$<br>$b=\ \ 0.079097-1.042380I$ | $-1.19552+5.32895I$ | 0 |
| $u=\ \ 1.194760+0.429563I$<br>$a=-0.365252+0.391335I$<br>$b=-0.609159-0.067017I$ | $-2.12867-3.13973I$ | 0 |
| $u=\ \ 1.194760-0.429563I$<br>$a=-0.365252-0.391335I$<br>$b=-0.609159+0.067017I$ | $-2.12867+3.13973I$ | 0 |
| $u=\ \ 1.118440+0.609576I$<br>$a=\ \ 0.428228+1.175980I$<br>$b=-0.782616-0.337010I$ | $-6.14403-3.55452I$ | 0 |
| $u=\ \ 1.118440-0.609576I$<br>$a=\ \ 0.428228-1.175980I$<br>$b=-0.782616+0.337010I$ | $-6.14403+3.55452I$ | 0 |
| $u=\ \ 1.275150+0.002952I$<br>$a=-0.261175-1.065170I$<br>$b=-1.48181+0.57404I$ | $-11.73280-1.55484I$ | 0 |
| $u=\ \ 1.275150-0.002952I$<br>$a=-0.261175+1.065170I$<br>$b=-1.48181-0.57404I$ | $-11.73280+1.55484I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-0.201303+1.259530I$<br>$a=\ \ 1.069270-0.450583I$<br>$b=-1.046480+0.531440I$ | $-9.9833+13.5973I$ | 0 |
| $u=-0.201303-1.259530I$<br>$a=\ \ 1.069270+0.450583I$<br>$b=-1.046480-0.531440I$ | $-9.9833-13.5973I$ | 0 |
| $u=-1.218820+0.382319I$<br>$a=\ \ 0.997761+0.945068I$<br>$b=\ \ 0.852353-0.738063I$ | $-3.30954+6.99042I$ | 0 |
| $u=-1.218820-0.382319I$<br>$a=\ \ 0.997761-0.945068I$<br>$b=\ \ 0.852353+0.738063I$ | $-3.30954-6.99042I$ | 0 |
| $u=\ \ 1.261720+0.271546I$<br>$a=-0.274866-0.068292I$<br>$b=\ \ 1.30851-0.68247I$ | $-4.28726-0.95064I$ | 0 |
| $u=\ \ 1.261720-0.271546I$<br>$a=-0.274866+0.068292I$<br>$b=\ \ 1.30851+0.68247I$ | $-4.28726+0.95064I$ | 0 |
| $u=\ \ 1.220380+0.436218I$<br>$a=-0.209956-1.086730I$<br>$b=\ \ 1.23819+1.06369I$ | $-7.53371-4.40226I$ | 0 |
| $u=\ \ 1.220380-0.436218I$<br>$a=-0.209956+1.086730I$<br>$b=\ \ 1.23819-1.06369I$ | $-7.53371+4.40226I$ | 0 |
| $u=\ \ 0.390190+1.241450I$<br>$a=\ \ 0.225603+0.112248I$<br>$b=-0.0788818+0.0150552I$ | $0.98104-2.36407I$ | 0 |
| $u=\ \ 0.390190-1.241450I$<br>$a=\ \ 0.225603-0.112248I$<br>$b=-0.0788818-0.0150552I$ | $0.98104+2.36407I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-1.304700+0.064009I$<br>$a=-0.202816-1.083110I$<br>$b=-1.071360+0.485002I$ | $-8.50595-0.57835I$ | 0 |
| $u=-1.304700-0.064009I$<br>$a=-0.202816+1.083110I$<br>$b=-1.071360-0.485002I$ | $-8.50595+0.57835I$ | 0 |
| $u=-1.305250+0.122767I$<br>$a=-0.104675-1.049100I$<br>$b=-1.81215+1.34415I$ | $-12.39500+3.26323I$ | 0 |
| $u=-1.305250-0.122767I$<br>$a=-0.104675+1.049100I$<br>$b=-1.81215-1.34415I$ | $-12.39500-3.26323I$ | 0 |
| $u=-1.285630+0.275375I$<br>$a=-0.509917-0.188009I$<br>$b=-1.083480+0.371298I$ | $-4.36740+4.63711I$ | 0 |
| $u=-1.285630-0.275375I$<br>$a=-0.509917+0.188009I$<br>$b=-1.083480-0.371298I$ | $-4.36740-4.63711I$ | 0 |
| $u=-1.263370+0.394223I$<br>$a=0.304510+0.959034I$<br>$b=1.128880-0.825849I$ | $-2.11296+6.55075I$ | 0 |
| $u=-1.263370-0.394223I$<br>$a=0.304510-0.959034I$<br>$b=1.128880+0.825849I$ | $-2.11296-6.55075I$ | 0 |
| $u=1.282080+0.333002I$<br>$a=-0.515935+0.232992I$<br>$b=-1.240080-0.178040I$ | $-7.77963-5.59755I$ | 0 |
| $u=1.282080-0.333002I$<br>$a=-0.515935-0.232992I$<br>$b=-1.240080+0.178040I$ | $-7.77963+5.59755I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-1.323140+0.066085I$<br>$a=-0.133973+0.976479I$<br>$b=1.55902-1.86120I$ | $-12.86170+3.15445I$ | 0 |
| $u=-1.323140-0.066085I$<br>$a=-0.133973-0.976479I$<br>$b=1.55902+1.86120I$ | $-12.86170-3.15445I$ | 0 |
| $u=1.334230+0.070752I$<br>$a=0.401432-1.314610I$<br>$b=0.965002+0.418389I$ | $-14.1806-9.1584I$ | 0 |
| $u=1.334230-0.070752I$<br>$a=0.401432+1.314610I$<br>$b=0.965002-0.418389I$ | $-14.1806+9.1584I$ | 0 |
| $u=0.053416+1.336190I$<br>$a=-0.994527-0.021397I$<br>$b=1.117740-0.211272I$ | $-8.14522+2.26381I$ | 0 |
| $u=0.053416-1.336190I$<br>$a=-0.994527+0.021397I$<br>$b=1.117740+0.211272I$ | $-8.14522-2.26381I$ | 0 |
| $u=0.082485+0.654656I$<br>$a=0.0336564+0.1336630I$<br>$b=0.749979-0.411677I$ | $-3.97774+1.83394I$ | 0 |
| $u=0.082485-0.654656I$<br>$a=0.0336564-0.1336630I$<br>$b=0.749979+0.411677I$ | $-3.97774-1.83394I$ | 0 |
| $u=1.283640+0.394667I$<br>$a=0.818474-0.699626I$<br>$b=1.001120+0.700906I$ | $-8.4998-13.5199I$ | 0 |
| $u=1.283640-0.394667I$<br>$a=0.818474+0.699626I$<br>$b=1.001120-0.700906I$ | $-8.4998+13.5199I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.309936 + 0.569902I$<br>$a = -1.80178 - 0.82346I$<br>$b = 1.186560 - 0.623080I$ | $-3.35016 + 2.17414I$ | $0. - 10.08503I$ |
| $u = 0.309936 - 0.569902I$<br>$a = -1.80178 + 0.82346I$<br>$b = 1.186560 + 0.623080I$ | $-3.35016 - 2.17414I$ | $0. + 10.08503I$ |
| $u = 0.632702 + 0.021856I$<br>$a = -0.316366 + 0.386584I$<br>$b = 0.388409 - 1.211850I$ | $0.292023 + 0.985465I$ | $0. + 6.38445I$ |
| $u = 0.632702 - 0.021856I$<br>$a = -0.316366 - 0.386584I$<br>$b = 0.388409 + 1.211850I$ | $0.292023 - 0.985465I$ | $0. - 6.38445I$ |
| $u = -0.032035 + 0.626297I$<br>$a = 0.00239 - 1.58337I$<br>$b = -0.774832 + 0.698228I$ | $-5.02728 - 3.47358I$ | $0. + 2.40010I$ |
| $u = -0.032035 - 0.626297I$<br>$a = 0.00239 + 1.58337I$<br>$b = -0.774832 - 0.698228I$ | $-5.02728 + 3.47358I$ | $0. - 2.40010I$ |
| $u = -0.460443 + 0.412363I$<br>$a = -0.093943 + 1.308690I$<br>$b = -0.021668 - 0.869632I$ | $1.62290 + 1.91080I$ | $9.73277 - 5.30227I$ |
| $u = -0.460443 - 0.412363I$<br>$a = -0.093943 - 1.308690I$<br>$b = -0.021668 + 0.869632I$ | $1.62290 - 1.91080I$ | $9.73277 + 5.30227I$ |
| $u = -1.353410 + 0.321476I$<br>$a = -0.222354 + 0.030091I$<br>$b = 0.962270 + 0.666542I$ | $-8.98239 - 4.57847I$ | $0$ |
| $u = -1.353410 - 0.321476I$<br>$a = -0.222354 - 0.030091I$<br>$b = 0.962270 - 0.666542I$ | $-8.98239 + 4.57847I$ | $0$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.386770 + 0.194395I$<br>$a = -0.477965 + 0.091290I$<br>$b = -1.032300 - 0.556440I$ | $-8.08998 - 5.03019I$ | 0 |
| $u = 1.386770 - 0.194395I$<br>$a = -0.477965 - 0.091290I$<br>$b = -1.032300 + 0.556440I$ | $-8.08998 + 5.03019I$ | 0 |
| $u = 0.195324 + 0.540720I$<br>$a = 0.161334 - 0.384132I$<br>$b = 0.317580 + 0.669189I$ | $0.01319 - 1.53438I$ | $0. + 2.18135I$ |
| $u = 0.195324 - 0.540720I$<br>$a = 0.161334 + 0.384132I$<br>$b = 0.317580 - 0.669189I$ | $0.01319 + 1.53438I$ | $0. - 2.18135I$ |
| $u = -0.436025 + 0.374350I$<br>$a = -0.158934 - 0.238668I$<br>$b = 0.765839 + 0.994186I$ | $-1.45841 - 3.84960I$ | $8.80545 - 1.94078I$ |
| $u = -0.436025 - 0.374350I$<br>$a = -0.158934 + 0.238668I$<br>$b = 0.765839 - 0.994186I$ | $-1.45841 + 3.84960I$ | $8.80545 + 1.94078I$ |
| $u = -1.37025 + 0.41816I$<br>$a = -0.348247 - 0.208090I$<br>$b = -0.654502 + 0.392807I$ | $-4.65108 + 6.89732I$ | 0 |
| $u = -1.37025 - 0.41816I$<br>$a = -0.348247 + 0.208090I$<br>$b = -0.654502 - 0.392807I$ | $-4.65108 - 6.89732I$ | 0 |
| $u = 1.47572 + 0.12042I$<br>$a = -0.127528 + 0.972093I$<br>$b = -0.869101 - 0.330100I$ | $-12.58140 + 1.19304I$ | 0 |
| $u = 1.47572 - 0.12042I$<br>$a = -0.127528 - 0.972093I$<br>$b = -0.869101 + 0.330100I$ | $-12.58140 - 1.19304I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.44330 + 0.46551I$<br>$a = 0.008890 - 1.136310I$<br>$b = 1.46674 + 0.96219I$ | $-15.0746 - 7.2788I$ | 0 |
| $u = 1.44330 - 0.46551I$<br>$a = 0.008890 + 1.136310I$<br>$b = 1.46674 - 0.96219I$ | $-15.0746 + 7.2788I$ | 0 |
| $u = 1.49989 + 0.32562I$<br>$a = 0.038446 + 0.896131I$<br>$b = -1.61629 - 1.25506I$ | $-12.6069 - 8.2225I$ | 0 |
| $u = 1.49989 - 0.32562I$<br>$a = 0.038446 - 0.896131I$<br>$b = -1.61629 + 1.25506I$ | $-12.6069 + 8.2225I$ | 0 |
| $u = -1.46256 + 0.47052I$<br>$a = 0.123796 - 0.904738I$<br>$b = -1.52745 + 0.88864I$ | $-9.19632 + 7.97024I$ | 0 |
| $u = -1.46256 - 0.47052I$<br>$a = 0.123796 + 0.904738I$<br>$b = -1.52745 - 0.88864I$ | $-9.19632 - 7.97024I$ | 0 |
| $u = -1.45476 + 0.49908I$<br>$a = -0.059503 + 1.102770I$<br>$b = 1.52288 - 0.99576I$ | $-10.6541 + 13.7630I$ | 0 |
| $u = -1.45476 - 0.49908I$<br>$a = -0.059503 - 1.102770I$<br>$b = 1.52288 + 0.99576I$ | $-10.6541 - 13.7630I$ | 0 |
| $u = 1.47393 + 0.50971I$<br>$a = -0.059005 - 1.061220I$<br>$b = 1.55556 + 0.98856I$ | $-15.3003 - 19.7302I$ | 0 |
| $u = 1.47393 - 0.50971I$<br>$a = -0.059005 + 1.061220I$<br>$b = 1.55556 - 0.98856I$ | $-15.3003 + 19.7302I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-1.43365+0.66796I$<br>$a=-0.455394+0.775518I$<br>$b=\ 1.231470-0.277788I$ | $-13.5574+5.1779I$ | 0 |
| $u=-1.43365-0.66796I$<br>$a=-0.455394-0.775518I$<br>$b=\ 1.231470+0.277788I$ | $-13.5574-5.1779I$ | 0 |
| $u=\ 1.48254+0.59930I$<br>$a=\ 0.176757+0.872906I$<br>$b=-1.49086-0.58990I$ | $-12.7827-9.1355I$ | 0 |
| $u=\ 1.48254-0.59930I$<br>$a=\ 0.176757-0.872906I$<br>$b=-1.49086+0.58990I$ | $-12.7827+9.1355I$ | 0 |
| $u=-1.53863+0.51193I$<br>$a=\ 0.131537-0.893803I$<br>$b=-1.074660+0.438106I$ | $-13.4470+4.4325I$ | 0 |
| $u=-1.53863-0.51193I$<br>$a=\ 0.131537+0.893803I$<br>$b=-1.074660-0.438106I$ | $-13.4470-4.4325I$ | 0 |
| $u=\ 1.53829+0.64750I$<br>$a=-0.390426-0.751644I$<br>$b=\ 1.056920+0.397211I$ | $-9.57892+0.61989I$ | 0 |
| $u=\ 1.53829-0.64750I$<br>$a=-0.390426+0.751644I$<br>$b=\ 1.056920-0.397211I$ | $-9.57892-0.61989I$ | 0 |
| $u=\ 0.321079+0.035122I$<br>$a=\ 0.12364+3.61617I$<br>$b=\ 0.504977+0.588514I$ | $-3.11018-1.32399I$ | $-1.76701+6.87746I$ |
| $u=\ 0.321079-0.035122I$<br>$a=\ 0.12364-3.61617I$<br>$b=\ 0.504977-0.588514I$ | $-3.11018+1.32399I$ | $-1.76701-6.87746I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-1.63395+0.45377I$<br>$a=\ \ 0.104676-0.820257I$<br>$b=-1.04982+1.11229I$ | $-9.62314+9.61798I$ | 0 |
| $u=-1.63395-0.45377I$<br>$a=\ \ 0.104676+0.820257I$<br>$b=-1.04982-1.11229I$ | $-9.62314-9.61798I$ | 0 |
| $u=\ \ 1.60077+0.57239I$<br>$a=\ \ 0.167160+0.830932I$<br>$b=-0.958851-0.760911I$ | $-7.70800-6.00365I$ | 0 |
| $u=\ \ 1.60077-0.57239I$<br>$a=\ \ 0.167160-0.830932I$<br>$b=-0.958851+0.760911I$ | $-7.70800+6.00365I$ | 0 |
| $u=\ \ 0.266358+0.076924I$<br>$a=\ \ 0.69309-5.90952I$<br>$b=-0.628211+0.726558I$ | $-7.82699+2.81005I$ | $-2.05004-4.17671I$ |
| $u=\ \ 0.266358-0.076924I$<br>$a=\ \ 0.69309+5.90952I$<br>$b=-0.628211-0.726558I$ | $-7.82699-2.81005I$ | $-2.05004+4.17671I$ |
| $u=-0.258040$<br>$a=\ \ 2.29127$<br>$b=-0.205583$ | 0.939166 | 10.9090 |
| $u=-1.58678+0.71978I$<br>$a=-0.392451+0.701425I$<br>$b=\ \ 0.923596-0.304910I$ | $-14.0263-6.1147I$ | 0 |
| $u=-1.58678-0.71978I$<br>$a=-0.392451-0.701425I$<br>$b=\ \ 0.923596+0.304910I$ | $-14.0263+6.1147I$ | 0 |
| $u=\ \ 0.27931+1.74156I$<br>$a=-0.735916-0.115230I$<br>$b=\ \ 0.684886+0.124948I$ | $-2.56542-2.25526I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.27931 - 1.74156I$<br>$a = -0.735916 + 0.115230I$<br>$b = 0.684886 - 0.124948I$ | $-2.56542 + 2.25526I$ | 0 |
| $u = 0.016687 + 0.213216I$<br>$a = 6.58988 + 2.24408I$<br>$b = -0.928066 + 0.565692I$ | $-4.54266 - 3.40660I$ | $1.33724 + 1.39588I$ |
| $u = 0.016687 - 0.213216I$<br>$a = 6.58988 - 2.24408I$<br>$b = -0.928066 - 0.565692I$ | $-4.54266 + 3.40660I$ | $1.33724 - 1.39588I$ |
| $u = -0.198845 + 0.036946I$<br>$a = -0.75339 - 6.98230I$<br>$b = -1.064120 - 0.749102I$ | $-9.27449 + 8.53790I$ | $-1.32710 - 3.00621I$ |
| $u = -0.198845 - 0.036946I$<br>$a = -0.75339 + 6.98230I$<br>$b = -1.064120 + 0.749102I$ | $-9.27449 - 8.53790I$ | $-1.32710 + 3.00621I$ |
| $u = 0.088086 + 0.179431I$<br>$a = -5.61211 - 2.93635I$<br>$b = 1.295130 + 0.435626I$ | $-7.94738 - 1.93505I$ | $-10.00846 + 2.42087I$ |
| $u = 0.088086 - 0.179431I$<br>$a = -5.61211 + 2.93635I$<br>$b = 1.295130 - 0.435626I$ | $-7.94738 + 1.93505I$ | $-10.00846 - 2.42087I$ |

**II.**

$\boldsymbol{I_2^u = \langle 1.93\times10^{42}u^{46}-3.43\times10^{42}u^{45}+\cdots+7.76\times10^{42}b+1.10\times10^{43},\ -2.95\times10^{43}u^{46}+3.11\times10^{43}u^{45}+\cdots+5.43\times10^{43}a-9.32\times10^{43},\ u^{47}-u^{46}+\cdots+8u+7\rangle}$

**(i) Arc colorings**

$$a_9 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$

$$a_{12} = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

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

$$a_5 = \begin{pmatrix} 0.543683u^{46} - 0.572974u^{45} + \cdots - 2.43609u + 1.71659 \\ -0.248321u^{46} + 0.442799u^{45} + \cdots + 1.27515u - 1.42251 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} -u \\ -u^3 + u \end{pmatrix}$$

$$a_4 = \begin{pmatrix} 0.295362u^{46} - 0.130175u^{45} + \cdots - 1.16093u + 0.294072 \\ -0.248321u^{46} + 0.442799u^{45} + \cdots + 1.27515u - 1.42251 \end{pmatrix}$$

$$a_2 = \begin{pmatrix} -0.292411u^{46} - 0.510115u^{45} + \cdots + 6.01704u + 4.46331 \\ 0.331691u^{46} - 0.211820u^{45} + \cdots - 1.96356u - 1.49233 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} 0.875374u^{46} - 0.784794u^{45} + \cdots - 4.39965u + 1.22426 \\ -0.0901609u^{46} + 0.188574u^{45} + \cdots + 1.05065u - 1.83045 \end{pmatrix}$$

$$a_8 = \begin{pmatrix} -0.547979u^{46} - 0.0701769u^{45} + \cdots + 5.17330u + 2.61174 \\ 0.00196930u^{46} + 0.344626u^{45} + \cdots - 2.95390u - 2.46779 \end{pmatrix}$$

$$a_6 = \begin{pmatrix} 0.164627u^{46} - 0.114388u^{45} + \cdots - 2.05774u + 0.501399 \\ -0.663566u^{46} + 0.264039u^{45} + \cdots + 8.11121u + 2.42920 \end{pmatrix}$$

$$a_7 = \begin{pmatrix} -0.629225u^{46} + 0.257355u^{45} + \cdots + 4.85889u + 1.81505 \\ -0.166344u^{46} + 0.351082u^{45} + \cdots - 2.11960u - 2.09841 \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} 0.290805u^{46} - 0.869049u^{45} + \cdots + 3.34391u + 3.38171 \\ 0.170839u^{46} - 0.468642u^{45} + \cdots - 1.00393u + 0.985910 \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= -0.402555u^{46} + 2.01455u^{45} + \cdots - 3.11324u - 12.4094$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $u^{47} - 18u^{46} + \cdots - 19u + 1$ |
| $c_2$ | $u^{47} - 4u^{46} + \cdots + 5u + 1$ |
| $c_3$ | $u^{47} + 17u^{45} + \cdots + 201u + 53$ |
| $c_4$ | $u^{47} - 3u^{46} + \cdots + 118u + 23$ |
| $c_5$ | $u^{47} + u^{46} + \cdots + 97u + 7$ |
| $c_6$ | $u^{47} - 2u^{46} + \cdots + 4u + 1$ |
| $c_7$ | $u^{47} + u^{46} + \cdots - 8u - 7$ |
| $c_8$ | $u^{47} - u^{46} + \cdots + 97u - 7$ |
| $c_9$ | $u^{47} + u^{46} + \cdots + 8u - 7$ |
| $c_{10}$ | $u^{47} + 2u^{46} + \cdots + 4u - 1$ |
| $c_{11}$ | $u^{47} + 3u^{46} + \cdots + 105u - 25$ |
| $c_{12}$ | $u^{47} - u^{46} + \cdots + 8u + 7$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $y^{47} - 6y^{46} + \cdots + 33y - 1$ |
| $c_2$ | $y^{47} + 10y^{46} + \cdots - 21y - 1$ |
| $c_3$ | $y^{47} + 34y^{46} + \cdots - 80121y - 2809$ |
| $c_4$ | $y^{47} - 19y^{46} + \cdots + 10152y - 529$ |
| $c_5, c_8$ | $y^{47} + 49y^{46} + \cdots - 293y - 49$ |
| $c_6, c_{10}$ | $y^{47} + 30y^{46} + \cdots + 44y - 1$ |
| $c_7$ | $y^{47} + 23y^{46} + \cdots - 846y - 49$ |
| $c_9, c_{12}$ | $y^{47} - 31y^{46} + \cdots + 302y - 49$ |
| $c_{11}$ | $y^{47} + 15y^{46} + \cdots + 3325y - 625$ |

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

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.933622 + 0.337236I$<br>$a = -0.050656 - 1.328560I$<br>$b = 1.41071 - 0.63361I$ | $-10.06350 - 9.54931I$ | $-5.51983 + 7.95922I$ |
| $u = 0.933622 - 0.337236I$<br>$a = -0.050656 + 1.328560I$<br>$b = 1.41071 + 0.63361I$ | $-10.06350 + 9.54931I$ | $-5.51983 - 7.95922I$ |
| $u = 1.008200 + 0.252570I$<br>$a = 0.67104 - 1.39141I$<br>$b = 0.621135 - 0.248959I$ | $-8.98504 + 2.08439I$ | $-7.60861 - 1.95572I$ |
| $u = 1.008200 - 0.252570I$<br>$a = 0.67104 + 1.39141I$<br>$b = 0.621135 + 0.248959I$ | $-8.98504 - 2.08439I$ | $-7.60861 + 1.95572I$ |
| $u = -1.05346$<br>$a = 1.04313$<br>$b = 0.700240$ | $-0.127925$ | $-5.82880$ |
| $u = -1.005540 + 0.368577I$<br>$a = -0.173962 + 1.391310I$<br>$b = 1.306870 - 0.349530I$ | $-5.70952 + 4.46475I$ | $-0.47206 - 4.72792I$ |
| $u = -1.005540 - 0.368577I$<br>$a = -0.173962 - 1.391310I$<br>$b = 1.306870 + 0.349530I$ | $-5.70952 - 4.46475I$ | $-0.47206 + 4.72792I$ |
| $u = 0.022821 + 0.913508I$<br>$a = -1.315960 - 0.117369I$<br>$b = 1.143450 + 0.411747I$ | $-6.47567 - 2.39339I$ | $-2.31990 + 2.71323I$ |
| $u = 0.022821 - 0.913508I$<br>$a = -1.315960 + 0.117369I$<br>$b = 1.143450 - 0.411747I$ | $-6.47567 + 2.39339I$ | $-2.31990 - 2.71323I$ |
| $u = 1.141180 + 0.133775I$<br>$a = 0.83832 + 1.52239I$<br>$b = -0.105971 - 0.740119I$ | $-9.74964 - 3.79239I$ | $-5.55418 + 5.58656I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.141180 - 0.133775I$<br>$a = 0.83832 - 1.52239I$<br>$b = -0.105971 + 0.740119I$ | $-9.74964 + 3.79239I$ | $-5.55418 - 5.58656I$ |
| $u = -1.074650 + 0.423405I$<br>$a = -0.250222 + 1.272630I$<br>$b = 1.173140 - 0.631329I$ | $-5.70157 + 4.44835I$ | $1.88120 - 5.04597I$ |
| $u = -1.074650 - 0.423405I$<br>$a = -0.250222 - 1.272630I$<br>$b = 1.173140 + 0.631329I$ | $-5.70157 - 4.44835I$ | $1.88120 + 5.04597I$ |
| $u = -0.042101 + 0.751382I$<br>$a = -0.369420 + 0.959858I$<br>$b = 0.566309 - 0.658726I$ | $0.81552 + 2.11176I$ | $5.50874 - 3.67506I$ |
| $u = -0.042101 - 0.751382I$<br>$a = -0.369420 - 0.959858I$<br>$b = 0.566309 + 0.658726I$ | $0.81552 - 2.11176I$ | $5.50874 + 3.67506I$ |
| $u = -1.260200 + 0.084193I$<br>$a = 0.162424 - 1.114470I$<br>$b = -0.84981 + 1.50917I$ | $-7.37061 - 2.20658I$ | $0$ |
| $u = -1.260200 - 0.084193I$<br>$a = 0.162424 + 1.114470I$<br>$b = -0.84981 - 1.50917I$ | $-7.37061 + 2.20658I$ | $0$ |
| $u = -1.269010 + 0.071735I$<br>$a = -0.797206 + 0.990637I$<br>$b = -0.878175 - 0.119043I$ | $-9.65128 + 2.69268I$ | $-7.30948 + 0.I$ |
| $u = -1.269010 - 0.071735I$<br>$a = -0.797206 - 0.990637I$<br>$b = -0.878175 + 0.119043I$ | $-9.65128 - 2.69268I$ | $-7.30948 + 0.I$ |
| $u = -0.067844 + 0.719430I$<br>$a = -1.83153 + 0.15928I$<br>$b = 1.017990 - 0.624288I$ | $-5.14572 + 3.40894I$ | $-0.12989 - 3.11179I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-0.067844-0.719430I$<br>$a=-1.83153-0.15928I$<br>$b=\ \ 1.017990+0.624288I$ | $-5.14572-3.40894I$ | $-0.12989+3.11179I$ |
| $u=-0.330241+1.235790I$<br>$a=-0.254694+0.205137I$<br>$b=\ \ 0.304410-0.214145I$ | $0.93681+2.50324I$ | $0.-27.8967I$ |
| $u=-0.330241-1.235790I$<br>$a=-0.254694-0.205137I$<br>$b=\ \ 0.304410+0.214145I$ | $0.93681-2.50324I$ | $0.+27.8967I$ |
| $u=\ \ 1.257460+0.377075I$<br>$a=-0.664726+0.930750I$<br>$b=-1.001610-0.745094I$ | $-3.07306-6.29403I$ | $0$ |
| $u=\ \ 1.257460-0.377075I$<br>$a=-0.664726-0.930750I$<br>$b=-1.001610+0.745094I$ | $-3.07306+6.29403I$ | $0$ |
| $u=-1.290450+0.262700I$<br>$a=\ \ 0.064159-0.398065I$<br>$b=-1.47985+0.22573I$ | $-3.60150+2.21616I$ | $0$ |
| $u=-1.290450-0.262700I$<br>$a=\ \ 0.064159+0.398065I$<br>$b=-1.47985-0.22573I$ | $-3.60150-2.21616I$ | $0$ |
| $u=\ \ 1.312730+0.309942I$<br>$a=-0.204318+0.004507I$<br>$b=-1.037160-0.227661I$ | $-5.45845-6.46998I$ | $0$ |
| $u=\ \ 1.312730-0.309942I$<br>$a=-0.204318-0.004507I$<br>$b=-1.037160+0.227661I$ | $-5.45845+6.46998I$ | $0$ |
| $u=-0.444896+0.447221I$<br>$a=\ \ 1.54074-1.16271I$<br>$b=-0.381198-0.815706I$ | $-2.79435-0.69475I$ | $4.38573-2.14919I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-0.444896-0.447221I$<br>$a=\ \ 1.54074+1.16271I$<br>$b=-0.381198+0.815706I$ | $-2.79435+0.69475I$ | $4.38573+2.14919I$ |
| $u=\ \ 1.368170+0.137705I$<br>$a=-0.065394+0.844721I$<br>$b=-1.46472-0.58181I$ | $-11.51760-0.94978I$ | $0$ |
| $u=\ \ 1.368170-0.137705I$<br>$a=-0.065394-0.844721I$<br>$b=-1.46472+0.58181I$ | $-11.51760+0.94978I$ | $0$ |
| $u=-0.603330+0.126435I$<br>$a=\ \ 0.478986+0.511798I$<br>$b=\ \ 0.376555-1.097320I$ | $0.44602+1.44219I$ | $6.32929-7.86238I$ |
| $u=-0.603330-0.126435I$<br>$a=\ \ 0.478986-0.511798I$<br>$b=\ \ 0.376555+1.097320I$ | $0.44602-1.44219I$ | $6.32929+7.86238I$ |
| $u=\ \ 1.383220+0.120127I$<br>$a=\ \ 0.239027+0.989389I$<br>$b=-0.173856-1.401380I$ | $-12.02440+7.04653I$ | $0$ |
| $u=\ \ 1.383220-0.120127I$<br>$a=\ \ 0.239027-0.989389I$<br>$b=-0.173856+1.401380I$ | $-12.02440-7.04653I$ | $0$ |
| $u=\ \ 0.441225+0.250818I$<br>$a=\ \ 0.728122+0.682784I$<br>$b=\ \ 0.632056-0.961669I$ | $-1.83711+4.09290I$ | $-6.11412-7.37496I$ |
| $u=\ \ 0.441225-0.250818I$<br>$a=\ \ 0.728122-0.682784I$<br>$b=\ \ 0.632056+0.961669I$ | $-1.83711-4.09290I$ | $-6.11412+7.37496I$ |
| $u=-0.046754+0.487928I$<br>$a=\ \ 1.84472-0.48404I$<br>$b=\ \ 0.477826+0.449721I$ | $-5.13650-1.37698I$ | $-5.49470+4.51886I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-0.046754-0.487928I$<br>$a=\ \ 1.84472+0.48404I$<br>$b=\ \ 0.477826-0.449721I$ | $-5.13650+1.37698I$ | $-5.49470-4.51886I$ |
| $u=-1.48100+0.41714I$<br>$a=\ \ 0.044144-0.873550I$<br>$b=-1.50397+0.90421I$ | $-11.65880+7.45553I$ | 0 |
| $u=-1.48100-0.41714I$<br>$a=\ \ 0.044144+0.873550I$<br>$b=-1.50397-0.90421I$ | $-11.65880-7.45553I$ | 0 |
| $u=\ \ 1.48849+0.47761I$<br>$a=\ \ 0.158285+0.890316I$<br>$b=-1.47114-0.94830I$ | $-10.35690-8.44766I$ | 0 |
| $u=\ \ 1.48849-0.47761I$<br>$a=\ \ 0.158285-0.890316I$<br>$b=-1.47114+0.94830I$ | $-10.35690+8.44766I$ | 0 |
| $u=-0.41435+1.61050I$<br>$a=\ \ 0.757985-0.177953I$<br>$b=-0.533120+0.016083I$ | $-2.35262+1.99862I$ | 0 |
| $u=-0.41435-1.61050I$<br>$a=\ \ 0.757985+0.177953I$<br>$b=-0.533120-0.016083I$ | $-2.35262-1.99862I$ | 0 |

**III. u-Polynomials**

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $(u^{47}-18u^{46}+\cdots-19u+1)$ $\cdot(u^{157}+5u^{156}+\cdots+11551514u-666271)$ |
| $c_2$ | $(u^{47}-4u^{46}+\cdots+5u+1)$ $\cdot(u^{157}-u^{156}+\cdots-1628098428u-107670653)$ |
| $c_3$ | $(u^{47}+17u^{45}+\cdots+201u+53)$ $\cdot(u^{157}+u^{156}+\cdots-6882417969378u-579271043533)$ |
| $c_4$ | $(u^{47}-3u^{46}+\cdots+118u+23)$ $\cdot(u^{157}-37u^{155}+\cdots+445344963u-17796191)$ |
| $c_5$ | $(u^{47}+u^{46}+\cdots+97u+7)(u^{157}+10u^{156}+\cdots-968u-181)$ |
| $c_6$ | $(u^{47}-2u^{46}+\cdots+4u+1)(u^{157}-3u^{156}+\cdots+7u-1)$ |
| $c_7$ | $(u^{47}+u^{46}+\cdots-8u-7)$ $\cdot(u^{157}+38u^{155}+\cdots+132651545u-435199883)$ |
| $c_8$ | $(u^{47}-u^{46}+\cdots+97u-7)(u^{157}+10u^{156}+\cdots-968u-181)$ |
| $c_9$ | $(u^{47}+u^{46}+\cdots+8u-7)(u^{157}+2u^{156}+\cdots-1089u-181)$ |
| $c_{10}$ | $(u^{47}+2u^{46}+\cdots+4u-1)(u^{157}-3u^{156}+\cdots+7u-1)$ |
| $c_{11}$ | $(u^{47}+3u^{46}+\cdots+105u-25)$ $\cdot(u^{157}+12u^{156}+\cdots+844976503738u+47066586319)$ |
| $c_{12}$ | $(u^{47}-u^{46}+\cdots+8u+7)(u^{157}+2u^{156}+\cdots-1089u-181)$ |

**IV. Riley Polynomials**

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $(y^{47}-6y^{46}+\cdots+33y-1)$ $\cdot(y^{157}-49y^{156}+\cdots+104808094653642y-443917045441)$ |
| $c_2$ | $(y^{47}+10y^{46}+\cdots-21y-1)$ $\cdot(y^{157}+59y^{156}+\cdots-404534046342627964y-11592969517446409)$ |
| $c_3$ | $(y^{47}+34y^{46}+\cdots-80121y-2809)$ $\cdot(y^{157}+111y^{156}+\cdots-4.36\times10^{24}y-3.36\times10^{23})$ |
| $c_4$ | $(y^{47}-19y^{46}+\cdots+10152y-529)$ $\cdot(y^{157}-74y^{156}+\cdots+112157843337933533y-316704414108481)$ |
| $c_5, c_8$ | $(y^{47}+49y^{46}+\cdots-293y-49)$ $\cdot(y^{157}+150y^{156}+\cdots+9673532y-32761)$ |
| $c_6, c_{10}$ | $(y^{47}+30y^{46}+\cdots+44y-1)(y^{157}+111y^{156}+\cdots+165y-1)$ |
| $c_7$ | $(y^{47}+23y^{46}+\cdots-846y-49)$ $\cdot(y^{157}+76y^{156}+\cdots-801491013938418801y-189398938163213689)$ |
| $c_9, c_{12}$ | $(y^{47}-31y^{46}+\cdots+302y-49)$ $\cdot(y^{157}-118y^{156}+\cdots+1444751y-32761)$ |
| $c_{11}$ | $(y^{47}+15y^{46}+\cdots+3325y-625)$ $\cdot(y^{157}+84y^{156}+\cdots+1.62\times10^{22}y-2.22\times10^{21})$ |