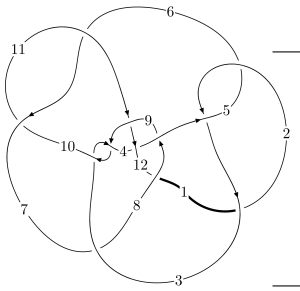
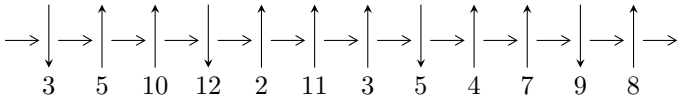
## $12n_{0393}$ $(K12n_{0393})$




A knot diagram[1]

**Linearized knot diagam**




**Solving Sequence**

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

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

$$I_1^u = \langle 1.15453 \times 10^{112} u^{51} + 5.72428 \times 10^{112} u^{50} + \cdots + 1.21115 \times 10^{113} b - 3.01826 \times 10^{112},$$
$$- 2.72037 \times 10^{112} u^{51} + 1.17488 \times 10^{112} u^{50} + \cdots + 3.63345 \times 10^{113} a + 5.57200 \times 10^{113},$$
$$u^{52} + 3u^{51} + \cdots - 24u + 3 \rangle$$
$$I_2^u = \langle 2.01791 \times 10^{18} u^{27} - 2.77559 \times 10^{18} u^{26} + \cdots + 3.98012 \times 10^{18} b - 1.63190 \times 10^{18},$$
$$2.25156 \times 10^{18} u^{27} - 4.18384 \times 10^{18} u^{26} + \cdots + 3.98012 \times 10^{18} a - 1.75552 \times 10^{19},\ u^{28} - 2u^{27} + \cdots - 2u + 1 \rangle$$

* 2 irreducible components of $\dim_{\mathbb{C}} = 0$, with total 80 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.** $\boldsymbol{I_1^u = \langle 1.15 \times 10^{112} u^{51} + 5.72 \times 10^{112} u^{50} + \cdots + 1.21 \times 10^{113} b - 3.02 \times 10^{112},\ -2.72 \times 10^{112} u^{51} + 1.17 \times 10^{112} u^{50} + \cdots + 3.63 \times 10^{113} a + 5.57 \times 10^{113},\ u^{52} + 3u^{51} + \cdots - 24u + 3 \rangle}$

**(i) Arc colorings**

$$a_4 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

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

$$a_5 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} 0.0748701u^{51} - 0.0323350u^{50} + \cdots - 79.8705u - 1.53353 \\ -0.0953248u^{51} - 0.472631u^{50} + \cdots - 14.8071u + 0.249205 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} 0.434214u^{51} + 1.30766u^{50} + \cdots + 80.9069u - 0.00257423 \\ 0.125422u^{51} + 0.440759u^{50} + \cdots + 12.0661u - 0.102321 \end{pmatrix}$$

$$a_2 = \begin{pmatrix} 0.449835u^{51} + 1.36244u^{50} + \cdots + 67.6586u + 0.0846844 \\ 0.136943u^{51} + 0.472556u^{50} + \cdots + 12.2091u - 0.126050 \end{pmatrix}$$

$$a_1 = \begin{pmatrix} -0.210032u^{51} - 0.352594u^{50} + \cdots + 18.9538u - 4.39279 \\ 0.100422u^{51} + 0.347381u^{50} + \cdots + 5.52097u - 0.778643 \end{pmatrix}$$

$$a_9 = \begin{pmatrix} 0.170195u^{51} + 0.440296u^{50} + \cdots - 65.0634u - 1.78273 \\ -0.0953248u^{51} - 0.472631u^{50} + \cdots - 14.8071u + 0.249205 \end{pmatrix}$$

$$a_8 = \begin{pmatrix} 0.0583544u^{51} - 0.0330339u^{50} + \cdots - 77.6730u - 1.74439 \\ -0.148627u^{51} - 0.687874u^{50} + \cdots - 17.7790u + 0.662631 \end{pmatrix}$$

$$a_7 = \begin{pmatrix} -0.413231u^{51} - 1.41532u^{50} + \cdots + 17.1606u - 7.46569 \\ -0.137010u^{51} - 0.426980u^{50} + \cdots + 3.83576u - 1.09048 \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} -0.520836u^{51} - 1.12514u^{50} + \cdots + 27.2715u - 4.83237 \\ -0.0594728u^{51} - 0.0801733u^{50} + \cdots + 7.51076u - 0.926376 \end{pmatrix}$$

$$a_6 = \begin{pmatrix} 0.347122u^{51} + 0.924158u^{50} + \cdots + 10.6820u - 4.29445 \\ 0.0547632u^{51} + 0.162363u^{50} + \cdots + 2.60360u - 0.602166 \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= -0.254491u^{51} - 0.628287u^{50} + \cdots - 59.5014u - 3.23771$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $u^{52} + 81u^{51} + \cdots - 3491600u + 40000$ |
| $c_2, c_5$ | $u^{52} + u^{51} + \cdots - 3900u + 200$ |
| $c_3, c_9$ | $u^{52} + u^{51} + \cdots + 343u + 41$ |
| $c_4$ | $u^{52} + 3u^{51} + \cdots - 24u + 3$ |
| $c_6, c_{10}$ | $u^{52} - 3u^{51} + \cdots + 1117u + 63$ |
| $c_7$ | $u^{52} + u^{51} + \cdots + 47432u + 12463$ |
| $c_8$ | $u^{52} + 4u^{51} + \cdots - 863539u + 134517$ |
| $c_{11}$ | $u^{52} - 6u^{51} + \cdots + 6257u + 2969$ |
| $c_{12}$ | $u^{52} - u^{51} + \cdots + 11094479u + 1097059$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $y^{52} - 195y^{51} + \cdots - 1710357280000y + 1600000000$ |
| $c_2, c_5$ | $y^{52} + 81y^{51} + \cdots - 3491600y + 40000$ |
| $c_3, c_9$ | $y^{52} + 47y^{51} + \cdots - 47539y + 1681$ |
| $c_4$ | $y^{52} - 11y^{51} + \cdots + 2274y + 9$ |
| $c_6, c_{10}$ | $y^{52} + 53y^{51} + \cdots - 286435y + 3969$ |
| $c_7$ | $y^{52} + 93y^{51} + \cdots + 4931535532y + 155326369$ |
| $c_8$ | $y^{52} - 48y^{51} + \cdots + 2165579994401y + 18094823289$ |
| $c_{11}$ | $y^{52} - 22y^{51} + \cdots + 15360791y + 8814961$ |
| $c_{12}$ | $y^{52} + 101y^{51} + \cdots - 10565760499085y + 1203538449481$ |

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

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-0.708724+0.680164I$<br>$a=-0.100097+0.191987I$<br>$b=-0.595963+0.249087I$ | $0.03503+2.05162I$ | $5.39897-4.92822I$ |
| $u=-0.708724-0.680164I$<br>$a=-0.100097-0.191987I$<br>$b=-0.595963-0.249087I$ | $0.03503-2.05162I$ | $5.39897+4.92822I$ |
| $u=\ 0.878775+0.357102I$<br>$a=-0.97636-1.27394I$<br>$b=\ 0.53011-1.39925I$ | $-8.07817-5.41935I$ | $-4.45843+4.52929I$ |
| $u=\ 0.878775-0.357102I$<br>$a=-0.97636+1.27394I$<br>$b=\ 0.53011+1.39925I$ | $-8.07817+5.41935I$ | $-4.45843-4.52929I$ |
| $u=-0.881457+0.277287I$<br>$a=\ 0.0599084-0.0718366I$<br>$b=\ 1.284870+0.271797I$ | $-4.17741+1.20590I$ | $-2.75221-2.59899I$ |
| $u=-0.881457-0.277287I$<br>$a=\ 0.0599084+0.0718366I$<br>$b=\ 1.284870-0.271797I$ | $-4.17741-1.20590I$ | $-2.75221+2.59899I$ |
| $u=-0.749902+0.508872I$<br>$a=-1.43683-0.65321I$<br>$b=-0.169969+0.090507I$ | $-3.76658+1.68389I$ | $-2.84617-3.64063I$ |
| $u=-0.749902-0.508872I$<br>$a=-1.43683+0.65321I$<br>$b=-0.169969-0.090507I$ | $-3.76658-1.68389I$ | $-2.84617+3.64063I$ |
| $u=-0.802192+0.772090I$<br>$a=\ 1.42692-0.99934I$<br>$b=-0.225361-1.345420I$ | $-5.14249+5.73182I$ | $0.-6.15629I$ |
| $u=-0.802192-0.772090I$<br>$a=\ 1.42692+0.99934I$<br>$b=-0.225361+1.345420I$ | $-5.14249-5.73182I$ | $0.+6.15629I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-1.115030+0.173053I$<br>$a=\ \ 0.113863+1.162840I$<br>$b=-0.85985+1.58005I$ | $-19.5669-0.5894I$ | $-4.05584+0.I$ |
| $u=-1.115030-0.173053I$<br>$a=\ \ 0.113863-1.162840I$<br>$b=-0.85985-1.58005I$ | $-19.5669+0.5894I$ | $-4.05584+0.I$ |
| $u=-0.841443+0.214420I$<br>$a=-0.59150-2.64999I$<br>$b=\ \ 0.175662-1.294030I$ | $-11.89730+0.93127I$ | $-4.76253+3.15286I$ |
| $u=-0.841443-0.214420I$<br>$a=-0.59150+2.64999I$<br>$b=\ \ 0.175662+1.294030I$ | $-11.89730-0.93127I$ | $-4.76253-3.15286I$ |
| $u=\ \ 0.695977+0.910130I$<br>$a=\ \ 0.257161-1.365910I$<br>$b=\ \ 0.757695+0.250125I$ | $-14.2666+1.4637I$ | $0$ |
| $u=\ \ 0.695977-0.910130I$<br>$a=\ \ 0.257161+1.365910I$<br>$b=\ \ 0.757695-0.250125I$ | $-14.2666-1.4637I$ | $0$ |
| $u=\ \ 0.815804+0.187793I$<br>$a=\ \ 1.01232+1.74860I$<br>$b=-0.265590+1.277780I$ | $-4.38589-0.71014I$ | $-1.35930-0.66728I$ |
| $u=\ \ 0.815804-0.187793I$<br>$a=\ \ 1.01232-1.74860I$<br>$b=-0.265590-1.277780I$ | $-4.38589+0.71014I$ | $-1.35930+0.66728I$ |
| $u=\ \ 0.812522+0.190053I$<br>$a=-1.73658-2.02290I$<br>$b=-0.131544-1.319490I$ | $-7.92837+3.04454I$ | $-7.11238-3.82066I$ |
| $u=\ \ 0.812522-0.190053I$<br>$a=-1.73658+2.02290I$<br>$b=-0.131544+1.319490I$ | $-7.92837-3.04454I$ | $-7.11238+3.82066I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-0.979985+0.697974I$<br>$a=-0.611258+1.164100I$<br>$b=\ \ 0.476167+1.030450I$ | $-0.90089+3.29423I$ | 0 |
| $u=-0.979985-0.697974I$<br>$a=-0.611258-1.164100I$<br>$b=\ \ 0.476167-1.030450I$ | $-0.90089-3.29423I$ | 0 |
| $u=\ \ 0.964261+0.735548I$<br>$a=-0.376689+0.280094I$<br>$b=\ \ 0.374982-0.351059I$ | $-8.81601-2.96366I$ | 0 |
| $u=\ \ 0.964261-0.735548I$<br>$a=-0.376689-0.280094I$<br>$b=\ \ 0.374982+0.351059I$ | $-8.81601+2.96366I$ | 0 |
| $u=-1.103090+0.621634I$<br>$a=\ \ 0.396484-1.133500I$<br>$b=-0.14752-1.46554I$ | $-6.17949-0.04065I$ | 0 |
| $u=-1.103090-0.621634I$<br>$a=\ \ 0.396484+1.133500I$<br>$b=-0.14752+1.46554I$ | $-6.17949+0.04065I$ | 0 |
| $u=\ \ 0.633067+0.299009I$<br>$a=\ \ 0.975776+0.355361I$<br>$b=-0.595127-0.034941I$ | $-0.80784-2.80941I$ | $6.07107-0.12951I$ |
| $u=\ \ 0.633067-0.299009I$<br>$a=\ \ 0.975776-0.355361I$<br>$b=-0.595127+0.034941I$ | $-0.80784+2.80941I$ | $6.07107+0.12951I$ |
| $u=\ \ 1.105660+0.703039I$<br>$a=-0.139321+0.319582I$<br>$b=-1.392190+0.234949I$ | $-15.6989-7.5261I$ | 0 |
| $u=\ \ 1.105660-0.703039I$<br>$a=-0.139321-0.319582I$<br>$b=-1.392190-0.234949I$ | $-15.6989+7.5261I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.256521 + 0.579369I$<br>$a = -0.381053 + 0.298557I$<br>$b = 0.504015 + 0.385095I$ | $0.936572 + 0.614095I$ | $8.99495 - 4.11967I$ |
| $u = 0.256521 - 0.579369I$<br>$a = -0.381053 - 0.298557I$<br>$b = 0.504015 - 0.385095I$ | $0.936572 - 0.614095I$ | $8.99495 + 4.11967I$ |
| $u = -0.594426 + 0.168375I$<br>$a = 1.21600 + 6.58426I$<br>$b = 0.282057 + 1.244100I$ | $-17.3212 + 2.2018I$ | $-9.43793 - 5.50317I$ |
| $u = -0.594426 - 0.168375I$<br>$a = 1.21600 - 6.58426I$<br>$b = 0.282057 - 1.244100I$ | $-17.3212 - 2.2018I$ | $-9.43793 + 5.50317I$ |
| $u = 1.23149 + 0.71950I$<br>$a = 0.53492 + 1.59800I$<br>$b = -0.421372 + 1.155520I$ | $-2.55953 - 6.00845I$ | 0 |
| $u = 1.23149 - 0.71950I$<br>$a = 0.53492 - 1.59800I$<br>$b = -0.421372 - 1.155520I$ | $-2.55953 + 6.00845I$ | 0 |
| $u = 0.74873 + 1.36600I$<br>$a = 0.157923 + 0.928465I$<br>$b = 0.294781 + 1.140120I$ | $0.109056 - 1.147700I$ | 0 |
| $u = 0.74873 - 1.36600I$<br>$a = 0.157923 - 0.928465I$<br>$b = 0.294781 - 1.140120I$ | $0.109056 + 1.147700I$ | 0 |
| $u = -0.50494 + 1.49032I$<br>$a = -0.151007 + 0.507289I$<br>$b = 0.074898 + 0.780251I$ | $1.27937 + 2.65970I$ | 0 |
| $u = -0.50494 - 1.49032I$<br>$a = -0.151007 - 0.507289I$<br>$b = 0.074898 - 0.780251I$ | $1.27937 - 2.65970I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.32086 + 0.90728I$<br>$a = -0.377846 - 1.253450I$<br>$b = 0.41422 - 1.59450I$ | $-10.50430 - 7.26761I$ | 0 |
| $u = 1.32086 - 0.90728I$<br>$a = -0.377846 + 1.253450I$<br>$b = 0.41422 + 1.59450I$ | $-10.50430 + 7.26761I$ | 0 |
| $u = -1.29148 + 0.99643I$<br>$a = 0.66417 - 1.37600I$<br>$b = -0.55364 - 1.55688I$ | $18.0895 + 14.3293I$ | 0 |
| $u = -1.29148 - 0.99643I$<br>$a = 0.66417 + 1.37600I$<br>$b = -0.55364 + 1.55688I$ | $18.0895 - 14.3293I$ | 0 |
| $u = 1.05120 + 1.25196I$<br>$a = -0.803070 - 0.868324I$<br>$b = -0.01326 - 1.44826I$ | $-9.16955 - 1.20799I$ | 0 |
| $u = 1.05120 - 1.25196I$<br>$a = -0.803070 + 0.868324I$<br>$b = -0.01326 + 1.44826I$ | $-9.16955 + 1.20799I$ | 0 |
| $u = -1.04234 + 1.47547I$<br>$a = 0.399903 - 0.795864I$<br>$b = 0.31303 - 1.49004I$ | $19.4826 - 5.4787I$ | 0 |
| $u = -1.04234 - 1.47547I$<br>$a = 0.399903 + 0.795864I$<br>$b = 0.31303 + 1.49004I$ | $19.4826 + 5.4787I$ | 0 |
| $u = -1.42616 + 1.26843I$<br>$a = -0.476867 + 1.122810I$<br>$b = 0.15933 + 1.51184I$ | $-15.2344 + 5.0637I$ | 0 |
| $u = -1.42616 - 1.26843I$<br>$a = -0.476867 - 1.122810I$<br>$b = 0.15933 - 1.51184I$ | $-15.2344 - 5.0637I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = \quad 0.0262988 + 0.0695915I$ | | |
| $a = -4.55689 - 4.96984I$ | $-1.83496 + 2.22975I$ | $-2.73852 - 6.11093I$ |
| $b = -0.770424 - 0.600625I$ | | |
| $u = \quad 0.0262988 - 0.0695915I$ | | |
| $a = -4.55689 + 4.96984I$ | $-1.83496 - 2.22975I$ | $-2.73852 + 6.11093I$ |
| $b = -0.770424 + 0.600625I$ | | |

**II.**

$\boldsymbol{I_2^u = \langle 2.02\times 10^{18}u^{27} - 2.78\times 10^{18}u^{26} + \cdots + 3.98\times 10^{18}b - 1.63\times 10^{18},\ 2.25\times 10^{18}u^{27} - 4.18\times 10^{18}u^{26} + \cdots + 3.98\times 10^{18}a - 1.76\times 10^{19},\ u^{28} - 2u^{27} + \cdots - 2u + 1\rangle}$

**(i) Arc colorings**

$$a_4 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

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

$$a_5 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} -0.565702u^{27} + 1.05118u^{26} + \cdots - 5.77226u + 4.41073 \\ -0.506997u^{27} + 0.697363u^{26} + \cdots - 3.04835u + 0.410013 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} -0.104193u^{27} + 0.658612u^{26} + \cdots - 9.55638u + 0.700265 \\ -0.0157737u^{27} + 0.222925u^{26} + \cdots + 0.262195u - 0.371218 \end{pmatrix}$$

$$a_2 = \begin{pmatrix} -0.321907u^{27} + 0.668581u^{26} + \cdots - 8.81393u + 0.621257 \\ -0.235371u^{27} + 0.587360u^{26} + \cdots - 0.371007u + 0.0542399 \end{pmatrix}$$

$$a_1 = \begin{pmatrix} 0.407606u^{27} - 3.01277u^{26} + \cdots + 21.3963u - 3.81808 \\ 0.526919u^{27} - 1.24495u^{26} + \cdots - 0.0602728u + 0.118550 \end{pmatrix}$$

$$a_9 = \begin{pmatrix} -0.0587047u^{27} + 0.353821u^{26} + \cdots - 2.72391u + 4.00072 \\ -0.506997u^{27} + 0.697363u^{26} + \cdots - 3.04835u + 0.410013 \end{pmatrix}$$

$$a_8 = \begin{pmatrix} -0.576417u^{27} + 0.920531u^{26} + \cdots - 6.30379u + 4.64714 \\ -0.673214u^{27} + 1.14674u^{26} + \cdots - 3.46806u + 0.878726 \end{pmatrix}$$

$$a_7 = \begin{pmatrix} -2.14853u^{27} + 4.24022u^{26} + \cdots - 3.79489u - 1.02880 \\ -0.223741u^{27} + 0.185180u^{26} + \cdots + 1.93274u - 0.665710 \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} -0.356798u^{27} - 0.321712u^{26} + \cdots + 16.0454u - 0.792188 \\ 0.258849u^{27} - 0.928798u^{26} + \cdots + 0.894645u + 0.0884191 \end{pmatrix}$$

$$a_6 = \begin{pmatrix} 2.72555u^{27} - 4.80908u^{26} + \cdots + 2.79742u + 2.38076 \\ -0.348792u^{27} + 0.765969u^{26} + \cdots - 3.86859u + 2.05108 \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= -\frac{736448018193272236}{39801220707837627 81}u^{27} + \frac{976636596843390286}{3980122070783762781}u^{26} + \cdots - \frac{16460922416404249957}{3980122070783762781}u + \frac{28875842086844262 07}{3980122070783762781}$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $u^{28} - 32u^{27} + \cdots - 278u + 9$ |
| $c_2$ | $u^{28} + 16u^{26} + \cdots + 2u + 3$ |
| $c_3$ | $u^{28} + 11u^{26} + \cdots - 3u + 9$ |
| $c_4$ | $u^{28} - 2u^{27} + \cdots - 2u + 1$ |
| $c_5$ | $u^{28} + 16u^{26} + \cdots - 2u + 3$ |
| $c_6$ | $u^{28} - 2u^{27} + \cdots + 3u + 1$ |
| $c_7$ | $u^{28} + 18u^{26} + \cdots + 118u + 27$ |
| $c_8$ | $u^{28} - u^{27} + \cdots + 3u + 1$ |
| $c_9$ | $u^{28} + 11u^{26} + \cdots + 3u + 9$ |
| $c_{10}$ | $u^{28} + 2u^{27} + \cdots - 3u + 1$ |
| $c_{11}$ | $u^{28} + 3u^{27} + \cdots + 23u + 3$ |
| $c_{12}$ | $u^{28} + 8u^{26} + \cdots - 3u + 9$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $y^{28} - 48y^{27} + \cdots - 5950y + 81$ |
| $c_2, c_5$ | $y^{28} + 32y^{27} + \cdots + 278y + 9$ |
| $c_3, c_9$ | $y^{28} + 22y^{27} + \cdots + 765y + 81$ |
| $c_4$ | $y^{28} + 4y^{26} + \cdots + 2y + 1$ |
| $c_6, c_{10}$ | $y^{28} + 16y^{27} + \cdots + 17y + 1$ |
| $c_7$ | $y^{28} + 36y^{27} + \cdots - 10468y + 729$ |
| $c_8$ | $y^{28} - 5y^{27} + \cdots + 9y + 1$ |
| $c_{11}$ | $y^{28} + y^{27} + \cdots + 11y + 9$ |
| $c_{12}$ | $y^{28} + 16y^{27} + \cdots - 801y + 81$ |

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

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-0.802001+0.664072I$<br>$a=-0.308745-0.187754I$<br>$b=-0.836807+0.306501I$ | $-0.978219+0.992558I$ | $0.438824-0.555457I$ |
| $u=-0.802001-0.664072I$<br>$a=-0.308745+0.187754I$<br>$b=-0.836807-0.306501I$ | $-0.978219-0.992558I$ | $0.438824+0.555457I$ |
| $u=-0.416978+0.849082I$<br>$a=\ \ 0.692013+0.012965I$<br>$b=-0.313501-1.303070I$ | $-6.11964+4.39239I$ | $-1.68626-2.90655I$ |
| $u=-0.416978-0.849082I$<br>$a=\ \ 0.692013-0.012965I$<br>$b=-0.313501+1.303070I$ | $-6.11964-4.39239I$ | $-1.68626+2.90655I$ |
| $u=\ \ 1.002310+0.361222I$<br>$a=-0.66314-1.73655I$<br>$b=-0.14938-1.41596I$ | $-7.03266+2.28630I$ | $-1.74706-0.37676I$ |
| $u=\ \ 1.002310-0.361222I$<br>$a=-0.66314+1.73655I$<br>$b=-0.14938+1.41596I$ | $-7.03266-2.28630I$ | $-1.74706+0.37676I$ |
| $u=-1.031490+0.268798I$<br>$a=\ \ 0.34522+2.22542I$<br>$b=-0.053226+1.300840I$ | $-11.84170+1.80297I$ | $-4.19824-5.34890I$ |
| $u=-1.031490-0.268798I$<br>$a=\ \ 0.34522-2.22542I$<br>$b=-0.053226-1.300840I$ | $-11.84170-1.80297I$ | $-4.19824+5.34890I$ |
| $u=-0.713533+0.497827I$<br>$a=-0.424380+0.234003I$<br>$b=\ \ 0.735148+0.137416I$ | $-1.14749+3.45704I$ | $0.35787-9.54916I$ |
| $u=-0.713533-0.497827I$<br>$a=-0.424380-0.234003I$<br>$b=\ \ 0.735148-0.137416I$ | $-1.14749-3.45704I$ | $0.35787+9.54916I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.964407 + 0.669877I$<br>$a = 0.930850 + 0.043791I$<br>$b = -0.161243 + 0.771524I$ | $-9.59714 - 2.80983I$ | $-5.67144 + 1.85970I$ |
| $u = 0.964407 - 0.669877I$<br>$a = 0.930850 - 0.043791I$<br>$b = -0.161243 - 0.771524I$ | $-9.59714 + 2.80983I$ | $-5.67144 - 1.85970I$ |
| $u = -1.015050 + 0.642162I$<br>$a = -0.663021 + 1.059570I$<br>$b = 0.506351 + 0.822892I$ | $-1.59932 + 3.89227I$ | $-1.52620 - 5.73593I$ |
| $u = -1.015050 - 0.642162I$<br>$a = -0.663021 - 1.059570I$<br>$b = 0.506351 - 0.822892I$ | $-1.59932 - 3.89227I$ | $-1.52620 + 5.73593I$ |
| $u = 0.935710 + 0.760631I$<br>$a = -0.92714 - 1.55124I$<br>$b = 0.31481 - 1.43449I$ | $-6.48639 - 7.46692I$ | $-1.34669 + 7.26562I$ |
| $u = 0.935710 - 0.760631I$<br>$a = -0.92714 + 1.55124I$<br>$b = 0.31481 + 1.43449I$ | $-6.48639 + 7.46692I$ | $-1.34669 - 7.26562I$ |
| $u = 0.608556 + 0.500617I$<br>$a = 0.067655 + 0.537076I$<br>$b = 0.883004 + 0.833993I$ | $-1.58392 + 1.43412I$ | $-0.76558 + 2.52420I$ |
| $u = 0.608556 - 0.500617I$<br>$a = 0.067655 - 0.537076I$<br>$b = 0.883004 - 0.833993I$ | $-1.58392 - 1.43412I$ | $-0.76558 - 2.52420I$ |
| $u = 1.150320 + 0.612536I$<br>$a = 0.52209 + 1.86608I$<br>$b = -0.532530 + 1.150530I$ | $-3.53200 - 5.98304I$ | $-4.48162 + 6.36220I$ |
| $u = 1.150320 - 0.612536I$<br>$a = 0.52209 - 1.86608I$<br>$b = -0.532530 - 1.150530I$ | $-3.53200 + 5.98304I$ | $-4.48162 - 6.36220I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.397838 + 0.304983I$<br>$a = 1.13622 - 2.12301I$<br>$b = -0.779294 - 0.640146I$ | $-3.32810 - 0.27983I$ | $-0.952303 + 0.046698I$ |
| $u = 0.397838 - 0.304983I$<br>$a = 1.13622 + 2.12301I$<br>$b = -0.779294 + 0.640146I$ | $-3.32810 + 0.27983I$ | $-0.952303 - 0.046698I$ |
| $u = -0.136188 + 0.418915I$<br>$a = 5.84836 - 1.23036I$<br>$b = 0.394968 - 1.162260I$ | $-16.7744 - 1.7460I$ | $-0.101965 - 1.402576I$ |
| $u = -0.136188 - 0.418915I$<br>$a = 5.84836 + 1.23036I$<br>$b = 0.394968 + 1.162260I$ | $-16.7744 + 1.7460I$ | $-0.101965 + 1.402576I$ |
| $u = -0.51542 + 1.49486I$<br>$a = 0.054047 + 0.586058I$<br>$b = -0.000501 + 0.703360I$ | $1.46784 + 2.27349I$ | $8.23182 + 4.49154I$ |
| $u = -0.51542 - 1.49486I$<br>$a = 0.054047 - 0.586058I$<br>$b = -0.000501 - 0.703360I$ | $1.46784 - 2.27349I$ | $8.23182 - 4.49154I$ |
| $u = 0.57152 + 1.58504I$<br>$a = 0.389974 + 0.825194I$<br>$b = -0.007796 + 1.208110I$ | $-0.53410 - 2.32818I$ | $-1.55116 + 3.88201I$ |
| $u = 0.57152 - 1.58504I$<br>$a = 0.389974 - 0.825194I$<br>$b = -0.007796 - 1.208110I$ | $-0.53410 + 2.32818I$ | $-1.55116 - 3.88201I$ |

**III. u-Polynomials**

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $(u^{28}-32u^{27}+\cdots-278u+9)$ $\cdot(u^{52}+81u^{51}+\cdots-3491600u+40000)$ |
| $c_2$ | $(u^{28}+16u^{26}+\cdots+2u+3)(u^{52}+u^{51}+\cdots-3900u+200)$ |
| $c_3$ | $(u^{28}+11u^{26}+\cdots-3u+9)(u^{52}+u^{51}+\cdots+343u+41)$ |
| $c_4$ | $(u^{28}-2u^{27}+\cdots-2u+1)(u^{52}+3u^{51}+\cdots-24u+3)$ |
| $c_5$ | $(u^{28}+16u^{26}+\cdots-2u+3)(u^{52}+u^{51}+\cdots-3900u+200)$ |
| $c_6$ | $(u^{28}-2u^{27}+\cdots+3u+1)(u^{52}-3u^{51}+\cdots+1117u+63)$ |
| $c_7$ | $(u^{28}+18u^{26}+\cdots+118u+27)(u^{52}+u^{51}+\cdots+47432u+12463)$ |
| $c_8$ | $(u^{28}-u^{27}+\cdots+3u+1)(u^{52}+4u^{51}+\cdots-863539u+134517)$ |
| $c_9$ | $(u^{28}+11u^{26}+\cdots+3u+9)(u^{52}+u^{51}+\cdots+343u+41)$ |
| $c_{10}$ | $(u^{28}+2u^{27}+\cdots-3u+1)(u^{52}-3u^{51}+\cdots+1117u+63)$ |
| $c_{11}$ | $(u^{28}+3u^{27}+\cdots+23u+3)(u^{52}-6u^{51}+\cdots+6257u+2969)$ |
| $c_{12}$ | $(u^{28}+8u^{26}+\cdots-3u+9)(u^{52}-u^{51}+\cdots+1.10945\times10^{7}u+1097059)$ |

**IV. Riley Polynomials**

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $(y^{28} - 48y^{27} + \cdots - 5950y + 81)$ $\cdot (y^{52} - 195y^{51} + \cdots - 1710357280000y + 1600000000)$ |
| $c_2, c_5$ | $(y^{28} + 32y^{27} + \cdots + 278y + 9)$ $\cdot (y^{52} + 81y^{51} + \cdots - 3491600y + 40000)$ |
| $c_3, c_9$ | $(y^{28} + 22y^{27} + \cdots + 765y + 81)(y^{52} + 47y^{51} + \cdots - 47539y + 1681)$ |
| $c_4$ | $(y^{28} + 4y^{26} + \cdots + 2y + 1)(y^{52} - 11y^{51} + \cdots + 2274y + 9)$ |
| $c_6, c_{10}$ | $(y^{28} + 16y^{27} + \cdots + 17y + 1)(y^{52} + 53y^{51} + \cdots - 286435y + 3969)$ |
| $c_7$ | $(y^{28} + 36y^{27} + \cdots - 10468y + 729)$ $\cdot (y^{52} + 93y^{51} + \cdots + 4931535532y + 155326369)$ |
| $c_8$ | $(y^{28} - 5y^{27} + \cdots + 9y + 1)$ $\cdot (y^{52} - 48y^{51} + \cdots + 2165579994401y + 18094823289)$ |
| $c_{11}$ | $(y^{28} + y^{27} + \cdots + 11y + 9)$ $\cdot (y^{52} - 22y^{51} + \cdots + 15360791y + 8814961)$ |
| $c_{12}$ | $(y^{28} + 16y^{27} + \cdots - 801y + 81)$ $\cdot (y^{52} + 101y^{51} + \cdots - 10565760499085y + 1203538449481)$ |