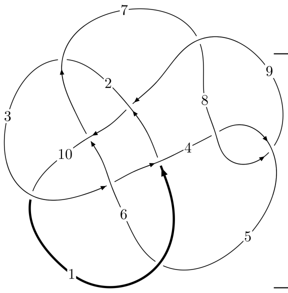
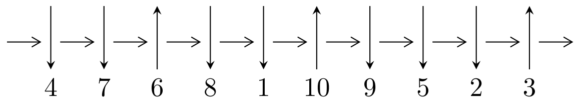
# $10_{113}$ ($K10a_{36}$)



A knot diagram[1]

**Linearized knot diagam**




**Solving Sequence**

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

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

$$I_1^u = \langle 1.09017 \times 10^{16} u^{25} - 1.42680 \times 10^{17} u^{24} + \cdots + 1.22316 \times 10^{16} b - 1.07995 \times 10^{16},$$
$$1.10038 \times 10^{16} u^{25} - 1.55970 \times 10^{17} u^{24} + \cdots + 2.44631 \times 10^{16} a - 3.72028 \times 10^{16},\ u^{26} - 14u^{25} + \cdots - 5u +$$
$$I_2^u = \langle u^{18} a + u^{18} + \cdots - 2a + 1,\ 2u^{18} a + 3u^{18} + \cdots - 18a - 13,\ u^{19} + 9u^{18} + \cdots - u - 2 \rangle$$
$$I_3^u = \langle -u^2 + b - u - 1,\ u^3 + 3a - u - 1,\ u^4 + 3u^3 + 5u^2 + 5u + 3 \rangle$$
$$I_4^u = \langle u^2 + b + 2u + 2,\ -u^2 + a - u - 2,\ u^3 + 2u^2 + 3u + 1 \rangle$$

$$I_1^v = \langle a,\ b + v,\ v^2 - v + 1 \rangle$$

* 5 irreducible components of $\dim_{\mathbb{C}} = 0$, with total 73 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.** $\boldsymbol{I_1^u =}$
$\boldsymbol{\langle 1.09\times10^{16}u^{25}-1.43\times10^{17}u^{24}+\cdots+1.22\times10^{16}b-1.08\times10^{16},\ 1.10\times10^{16}u^{25}-1.56\times10^{17}u^{24}+\cdots+2.45\times10^{16}a-3.72\times10^{16},\ u^{26}-14u^{25}+\cdots-5u+2\rangle}$

**(i) Arc colorings**

$$a_3 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_1 = \begin{pmatrix} 1 \\ -u^2 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} -0.449813u^{25}+6.37572u^{24}+\cdots-2.20872u+1.52077 \\ -0.891275u^{25}+11.6649u^{24}+\cdots-2.84515u+0.882924 \end{pmatrix}$$
$$a_2 = \begin{pmatrix} 0.129701u^{25}-2.02435u^{24}+\cdots-4.90429u+1.76047 \\ 0.0404708u^{25}-0.734657u^{24}+\cdots-1.02816u+0.178460 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} 0.441462u^{25}-5.28919u^{24}+\cdots+0.636436u+0.637845 \\ -0.891275u^{25}+11.6649u^{24}+\cdots-2.84515u+0.882924 \end{pmatrix}$$
$$a_4 = \begin{pmatrix} 0.993712u^{25}-13.0075u^{24}+\cdots+1.68701u-0.405418 \\ -0.904482u^{25}+11.7178u^{24}+\cdots-3.56314u+1.98742 \end{pmatrix}$$
$$a_5 = \begin{pmatrix} 0.363122u^{25}-4.69350u^{24}+\cdots+1.36473u-0.261781 \\ -0.0933259u^{25}+1.56850u^{24}+\cdots-0.496488u-0.119215 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} -0.433618u^{25}+6.06965u^{24}+\cdots+9.02432u-0.696343 \\ 0.0726845u^{25}-0.832738u^{24}+\cdots+2.33024u-0.595532 \end{pmatrix}$$
$$a_8 = \begin{pmatrix} -0.101086u^{25}+1.86335u^{24}+\cdots+7.57533u-0.827238 \\ -0.651226u^{25}+8.60822u^{24}+\cdots+0.0145807u+0.0950498 \end{pmatrix}$$

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

**(iii) Cusp Shapes**
$= -\frac{12238612154218315}{12231573450758407}u^{25}+\frac{120808672137987925}{12231573450758407}u^{24}+\cdots+\frac{208460927880809}{12231573450758407}u-\frac{140870794716261400}{12231573450758407}$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1, c_9$ | $u^{26} + 4u^{25} + \cdots - 2u + 1$ |
| $c_2, c_5$ | $u^{26} + 3u^{24} + \cdots - 2u + 1$ |
| $c_3, c_6$ | $u^{26} + 2u^{25} + \cdots + 2u + 1$ |
| $c_4, c_8$ | $u^{26} + 6u^{25} + \cdots + 25u + 4$ |
| $c_7$ | $u^{26} + 10u^{25} + \cdots + 81u + 16$ |
| $c_{10}$ | $u^{26} + 14u^{25} + \cdots + 5u + 2$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_9$ | $y^{26} - 10y^{25} + \cdots - 18y + 1$ |
| $c_2, c_5$ | $y^{26} + 6y^{25} + \cdots + 6y + 1$ |
| $c_3, c_6$ | $y^{26} + 14y^{25} + \cdots + 30y + 1$ |
| $c_4, c_8$ | $y^{26} - 10y^{25} + \cdots - 81y + 16$ |
| $c_7$ | $y^{26} + 10y^{25} + \cdots + 9439y + 256$ |
| $c_{10}$ | $y^{26} + 8y^{24} + \cdots - 21y + 4$ |

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

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.056680 + 0.510753I$<br>$a = -0.215461 + 0.700629I$<br>$b = 1.09337 + 1.26772I$ | $1.49747 + 5.09068I$ | $-3.0367 - 14.8892I$ |
| $u = 1.056680 - 0.510753I$<br>$a = -0.215461 - 0.700629I$<br>$b = 1.09337 - 1.26772I$ | $1.49747 - 5.09068I$ | $-3.0367 + 14.8892I$ |
| $u = -1.197700 + 0.220817I$<br>$a = 0.079663 - 0.840370I$<br>$b = 0.005740 - 0.465412I$ | $2.92221 - 2.66541I$ | $1.40924 + 2.72285I$ |
| $u = -1.197700 - 0.220817I$<br>$a = 0.079663 + 0.840370I$<br>$b = 0.005740 + 0.465412I$ | $2.92221 + 2.66541I$ | $1.40924 - 2.72285I$ |
| $u = 1.306830 + 0.079067I$<br>$a = -0.107470 + 0.279551I$<br>$b = -0.215760 + 1.218550I$ | $-0.13330 + 3.14853I$ | $-10.05225 - 4.78603I$ |
| $u = 1.306830 - 0.079067I$<br>$a = -0.107470 - 0.279551I$<br>$b = -0.215760 - 1.218550I$ | $-0.13330 - 3.14853I$ | $-10.05225 + 4.78603I$ |
| $u = 0.493624 + 0.435869I$<br>$a = 0.905680 - 0.839887I$<br>$b = -0.941763 - 0.771472I$ | $-2.18699 - 0.53885I$ | $-10.45014 + 2.98932I$ |
| $u = 0.493624 - 0.435869I$<br>$a = 0.905680 + 0.839887I$<br>$b = -0.941763 + 0.771472I$ | $-2.18699 + 0.53885I$ | $-10.45014 - 2.98932I$ |
| $u = 1.022930 + 0.871070I$<br>$a = 0.149244 - 0.992194I$<br>$b = -0.98451 - 1.19337I$ | $-4.53791 + 8.53907I$ | $-8.63796 - 7.50515I$ |
| $u = 1.022930 - 0.871070I$<br>$a = 0.149244 + 0.992194I$<br>$b = -0.98451 + 1.19337I$ | $-4.53791 - 8.53907I$ | $-8.63796 + 7.50515I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.129304 + 0.643314I$ | | |
| $a = 0.984267 - 0.517979I$ | $-0.924615 - 1.060120I$ | $-5.32469 + 4.59251I$ |
| $b = -0.031311 - 0.673436I$ | | |
| $u = 0.129304 - 0.643314I$ | | |
| $a = 0.984267 + 0.517979I$ | $-0.924615 + 1.060120I$ | $-5.32469 - 4.59251I$ |
| $b = -0.031311 + 0.673436I$ | | |
| $u = 0.967641 + 1.016650I$ | | |
| $a = -0.486502 + 0.264040I$ | $-4.93342 - 1.67636I$ | $-14.6461 + 4.2929I$ |
| $b = -0.211831 + 0.733834I$ | | |
| $u = 0.967641 - 1.016650I$ | | |
| $a = -0.486502 - 0.264040I$ | $-4.93342 + 1.67636I$ | $-14.6461 - 4.2929I$ |
| $b = -0.211831 - 0.733834I$ | | |
| $u = 1.26531 + 0.92939I$ | | |
| $a = 0.020000 + 0.955891I$ | $2.62082 + 10.45440I$ | $-1.93774 - 5.95159I$ |
| $b = 0.97670 + 1.20748I$ | | |
| $u = 1.26531 - 0.92939I$ | | |
| $a = 0.020000 - 0.955891I$ | $2.62082 - 10.45440I$ | $-1.93774 + 5.95159I$ |
| $b = 0.97670 - 1.20748I$ | | |
| $u = -0.014473 + 0.410285I$ | | |
| $a = -2.05321 + 1.74511I$ | $-1.92544 + 2.11547I$ | $-8.52748 - 4.72090I$ |
| $b = 0.284111 + 0.970184I$ | | |
| $u = -0.014473 - 0.410285I$ | | |
| $a = -2.05321 - 1.74511I$ | $-1.92544 - 2.11547I$ | $-8.52748 + 4.72090I$ |
| $b = 0.284111 - 0.970184I$ | | |
| $u = 0.34430 + 1.56008I$ | | |
| $a = 0.493219 - 0.417449I$ | $0.16560 - 2.24390I$ | $-7.60792 + 3.01225I$ |
| $b = 0.152881 - 0.590554I$ | | |
| $u = 0.34430 - 1.56008I$ | | |
| $a = 0.493219 + 0.417449I$ | $0.16560 + 2.24390I$ | $-7.60792 - 3.01225I$ |
| $b = 0.152881 + 0.590554I$ | | |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.26295 + 1.01918I$<br>$a = -0.042904 - 1.006760I$<br>$b = -0.97925 - 1.20625I$ | $0.9109 + 16.4735I$ | $-4.00000 - 9.70500I$ |
| $u = 1.26295 - 1.01918I$<br>$a = -0.042904 + 1.006760I$<br>$b = -0.97925 + 1.20625I$ | $0.9109 - 16.4735I$ | $-4.00000 + 9.70500I$ |
| $u = -0.281192 + 0.094635I$<br>$a = -1.01688 + 4.90932I$<br>$b = 0.054013 + 1.156590I$ | $-1.56544 - 2.09555I$ | $-7.86102 + 3.20965I$ |
| $u = -0.281192 - 0.094635I$<br>$a = -1.01688 - 4.90932I$<br>$b = 0.054013 - 1.156590I$ | $-1.56544 + 2.09555I$ | $-7.86102 - 3.20965I$ |
| $u = 0.64380 + 1.75632I$<br>$a = -0.459645 + 0.377201I$<br>$b = -0.202381 + 0.586735I$ | $-0.95700 - 7.52275I$ | 0 |
| $u = 0.64380 - 1.75632I$<br>$a = -0.459645 - 0.377201I$<br>$b = -0.202381 - 0.586735I$ | $-0.95700 + 7.52275I$ | 0 |

**II.** $\boldsymbol{I_2^u =}$
$\boldsymbol{\langle u^{18}a+u^{18}+\cdots-2a+1,\ 2u^{18}a+3u^{18}+\cdots-18a-13,\ u^{19}+9u^{18}+\cdots-u-2\rangle}$

**(i) Arc colorings**

$$a_3 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_1 = \begin{pmatrix} 1 \\ -u^2 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} a \\ -u^{18}a - u^{18} + \cdots + 2a - 1 \end{pmatrix}$$
$$a_2 = \begin{pmatrix} u^{18}a + \frac{1}{2}u^{18} + \cdots - a - \frac{3}{2} \\ u^{18} + 8u^{17} + \cdots - 2a - 1 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} u^{18}a + u^{18} + \cdots - a + 1 \\ -u^{18}a - u^{18} + \cdots + 2a - 1 \end{pmatrix}$$
$$a_4 = \begin{pmatrix} u^{18}a - \frac{1}{2}u^{18} + \cdots + a + \frac{1}{2} \\ -1 \end{pmatrix}$$
$$a_5 = \begin{pmatrix} u^{18}a + 8u^{17}a + \cdots - a + 2 \\ -u^{18}a - 2u^{18} + \cdots + 2a + 1 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} -\frac{1}{2}u^{18} - \frac{7}{2}u^{17} + \cdots - a + \frac{1}{2} \\ -u^{18}a + u^{18} + \cdots + u - 3 \end{pmatrix}$$
$$a_8 = \begin{pmatrix} u^{17}a - \frac{1}{2}u^{18} + \cdots + 2a + \frac{1}{2} \\ -u^{17} - 8u^{16} + \cdots - 3u - 2 \end{pmatrix}$$

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

**(iii) Cusp Shapes**
$= -5u^{18} - 43u^{17} - 177u^{16} - 432u^{15} - 640u^{14} - 457u^{13} + 209u^{12} + 824u^{11} + 687u^{10} - 101u^{9} - 627u^{8} - 368u^{7} + 164u^{6} + 274u^{5} + 34u^{4} - 104u^{3} - 41u^{2} + 25u + 9$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1, c_9$ | $u^{38} - 3u^{37} + \cdots + 10u - 1$ |
| $c_2, c_5$ | $u^{38} + 2u^{37} + \cdots + 109u + 11$ |
| $c_3, c_6$ | $u^{38} + 4u^{37} + \cdots + 7u + 1$ |
| $c_4, c_8$ | $(u^{19} - 2u^{18} + \cdots - 4u + 1)^2$ |
| $c_7$ | $(u^{19} + 8u^{18} + \cdots + 4u + 1)^2$ |
| $c_{10}$ | $(u^{19} - 9u^{18} + \cdots - u + 2)^2$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_9$ | $y^{38} + 13y^{37} + \cdots + 2y + 1$ |
| $c_2, c_5$ | $y^{38} + 4y^{37} + \cdots - 13311y + 121$ |
| $c_3, c_6$ | $y^{38} - 8y^{37} + \cdots + 5y + 1$ |
| $c_4, c_8$ | $(y^{19} - 8y^{18} + \cdots + 4y - 1)^2$ |
| $c_7$ | $(y^{19} + 8y^{18} + \cdots - 16y - 1)^2$ |
| $c_{10}$ | $(y^{19} - 3y^{18} + \cdots + 37y - 4)^2$ |

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

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.488744 + 1.038280I$<br>$a = -0.478820 + 0.914222I$<br>$b = -1.13156 + 1.02165I$ | $-1.59095 - 7.59815I$ | $-9.53397 + 8.95368I$ |
| $u = -0.488744 + 1.038280I$<br>$a = -1.01797 - 1.24322I$<br>$b = 0.207487 - 0.730234I$ | $-1.59095 - 7.59815I$ | $-9.53397 + 8.95368I$ |
| $u = -0.488744 - 1.038280I$<br>$a = -0.478820 - 0.914222I$<br>$b = -1.13156 - 1.02165I$ | $-1.59095 + 7.59815I$ | $-9.53397 - 8.95368I$ |
| $u = -0.488744 - 1.038280I$<br>$a = -1.01797 + 1.24322I$<br>$b = 0.207487 + 0.730234I$ | $-1.59095 + 7.59815I$ | $-9.53397 - 8.95368I$ |
| $u = -0.752606 + 0.874521I$<br>$a = 0.794589 + 0.607095I$<br>$b = -0.361281 + 0.577577I$ | $0.10793 - 3.14909I$ | $-5.58222 + 3.79428I$ |
| $u = -0.752606 + 0.874521I$<br>$a = 0.312041 - 0.899421I$<br>$b = 0.895728 - 0.988619I$ | $0.10793 - 3.14909I$ | $-5.58222 + 3.79428I$ |
| $u = -0.752606 - 0.874521I$<br>$a = 0.794589 - 0.607095I$<br>$b = -0.361281 - 0.577577I$ | $0.10793 + 3.14909I$ | $-5.58222 - 3.79428I$ |
| $u = -0.752606 - 0.874521I$<br>$a = 0.312041 + 0.899421I$<br>$b = 0.895728 + 0.988619I$ | $0.10793 + 3.14909I$ | $-5.58222 - 3.79428I$ |
| $u = -1.211130 + 0.137559I$<br>$a = 0.091441 - 0.907433I$<br>$b = 0.287046 - 0.731500I$ | $2.95026 - 2.66622I$ | $1.58619 + 3.20879I$ |
| $u = -1.211130 + 0.137559I$<br>$a = 0.040607 - 0.755883I$<br>$b = -0.261106 - 0.186172I$ | $2.95026 - 2.66622I$ | $1.58619 + 3.20879I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -1.211130 - 0.137559I$<br>$a = 0.091441 + 0.907433I$<br>$b = 0.287046 + 0.731500I$ | $2.95026 + 2.66622I$ | $1.58619 - 3.20879I$ |
| $u = -1.211130 - 0.137559I$<br>$a = 0.040607 + 0.755883I$<br>$b = -0.261106 + 0.186172I$ | $2.95026 + 2.66622I$ | $1.58619 - 3.20879I$ |
| $u = 0.687103 + 0.235969I$<br>$a = -0.068144 + 1.145470I$<br>$b = -1.44986 + 0.74441I$ | $2.42247 + 8.22022I$ | $-0.13214 - 8.57000I$ |
| $u = 0.687103 + 0.235969I$<br>$a = 0.69993 - 2.21894I$<br>$b = -0.854742 - 0.601611I$ | $2.42247 + 8.22022I$ | $-0.13214 - 8.57000I$ |
| $u = 0.687103 - 0.235969I$<br>$a = -0.068144 - 1.145470I$<br>$b = -1.44986 - 0.74441I$ | $2.42247 - 8.22022I$ | $-0.13214 + 8.57000I$ |
| $u = 0.687103 - 0.235969I$<br>$a = 0.69993 + 2.21894I$<br>$b = -0.854742 + 0.601611I$ | $2.42247 - 8.22022I$ | $-0.13214 + 8.57000I$ |
| $u = 0.689008 + 0.139635I$<br>$a = -0.128846 - 1.148580I$<br>$b = 1.37561 - 0.64670I$ | $4.26470 + 2.32942I$ | $3.40004 - 3.00608I$ |
| $u = 0.689008 + 0.139635I$<br>$a = -0.76853 + 1.84609I$<br>$b = 0.966499 + 0.555876I$ | $4.26470 + 2.32942I$ | $3.40004 - 3.00608I$ |
| $u = 0.689008 - 0.139635I$<br>$a = -0.128846 + 1.148580I$<br>$b = 1.37561 + 0.64670I$ | $4.26470 - 2.32942I$ | $3.40004 + 3.00608I$ |
| $u = 0.689008 - 0.139635I$<br>$a = -0.76853 - 1.84609I$<br>$b = 0.966499 - 0.555876I$ | $4.26470 - 2.32942I$ | $3.40004 + 3.00608I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-0.378245+0.567353I$<br>$a=-0.400712+1.127850I$<br>$b=-1.02428+1.44155I$ | $-3.84277-0.76131I$ | $-13.4982+7.0538I$ |
| $u=-0.378245+0.567353I$<br>$a=-2.53438-0.54959I$<br>$b=\ \ 0.057884-0.472439I$ | $-3.84277-0.76131I$ | $-13.4982+7.0538I$ |
| $u=-0.378245-0.567353I$<br>$a=-0.400712-1.127850I$<br>$b=-1.02428-1.44155I$ | $-3.84277+0.76131I$ | $-13.4982-7.0538I$ |
| $u=-0.378245-0.567353I$<br>$a=-2.53438+0.54959I$<br>$b=\ \ 0.057884+0.472439I$ | $-3.84277+0.76131I$ | $-13.4982-7.0538I$ |
| $u=-0.865146+1.042810I$<br>$a=\ \ 0.422088+0.852186I$<br>$b=-0.475702+0.708695I$ | $0.09217-3.26203I$ | $-7.82857+4.58696I$ |
| $u=-0.865146+1.042810I$<br>$a=\ \ 0.299650-0.748328I$<br>$b=\ \ 0.926354-0.812087I$ | $0.09217-3.26203I$ | $-7.82857+4.58696I$ |
| $u=-0.865146-1.042810I$<br>$a=\ \ 0.422088-0.852186I$<br>$b=-0.475702-0.708695I$ | $0.09217+3.26203I$ | $-7.82857-4.58696I$ |
| $u=-0.865146-1.042810I$<br>$a=\ \ 0.299650+0.748328I$<br>$b=\ \ 0.926354+0.812087I$ | $0.09217+3.26203I$ | $-7.82857-4.58696I$ |
| $u=\ \ 0.494703$<br>$a=\ \ 0.176592$<br>$b=-1.65217$ | $-2.37666$ | $7.11410$ |
| $u=\ \ 0.494703$<br>$a=\ \ 2.43502$<br>$b=-0.904693$ | $-2.37666$ | $7.11410$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-1.23842+1.01885I$<br>$a=\ \ 0.079408-1.045930I$<br>$b=\ \ 0.651625-0.880608I$ | $2.68628-1.90197I$ | $1.62421+1.37993I$ |
| $u=-1.23842+1.01885I$<br>$a=-0.214414+0.212371I$<br>$b=-0.877077+0.378271I$ | $2.68628-1.90197I$ | $1.62421+1.37993I$ |
| $u=-1.23842-1.01885I$<br>$a=\ \ 0.079408+1.045930I$<br>$b=\ \ 0.651625+0.880608I$ | $2.68628+1.90197I$ | $1.62421-1.37993I$ |
| $u=-1.23842-1.01885I$<br>$a=-0.214414-0.212371I$<br>$b=-0.877077-0.378271I$ | $2.68628+1.90197I$ | $1.62421-1.37993I$ |
| $u=-1.18917+1.13858I$<br>$a=-0.003038+1.092820I$<br>$b=-0.617784+0.888572I$ | $2.32292-6.77576I$ | $-0.09240+8.89089I$ |
| $u=-1.18917+1.13858I$<br>$a=\ \ 0.319294-0.326713I$<br>$b=\ \ 0.963591-0.457047I$ | $2.32292-6.77576I$ | $-0.09240+8.89089I$ |
| $u=-1.18917-1.13858I$<br>$a=-0.003038-1.092820I$<br>$b=-0.617784-0.888572I$ | $2.32292+6.77576I$ | $-0.09240-8.89089I$ |
| $u=-1.18917-1.13858I$<br>$a=\ \ 0.319294+0.326713I$<br>$b=\ \ 0.963591+0.457047I$ | $2.32292+6.77576I$ | $-0.09240-8.89089I$ |

**III.** $\boldsymbol{I_3^u = \langle -u^2 + b - u - 1,\ u^3 + 3a - u - 1,\ u^4 + 3u^3 + 5u^2 + 5u + 3\rangle}$

**(i) Arc colorings**

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

$$a_{10} = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

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

$$a_7 = \begin{pmatrix} -\frac{1}{3}u^3 + \frac{1}{3}u + \frac{1}{3} \\ u^2 + u + 1 \end{pmatrix}$$

$$a_2 = \begin{pmatrix} -\frac{1}{3}u^3 - u^2 - \frac{5}{3}u - \frac{2}{3} \\ u + 1 \end{pmatrix}$$

$$a_6 = \begin{pmatrix} -\frac{1}{3}u^3 - u^2 - \frac{2}{3}u - \frac{2}{3} \\ u^2 + u + 1 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} \frac{2}{3}u^3 + u^2 + \frac{4}{3}u + \frac{1}{3} \\ -u^3 - 2u^2 - 2u - 2 \end{pmatrix}$$

$$a_5 = \begin{pmatrix} \frac{2}{3}u^3 + u^2 + \frac{4}{3}u + \frac{1}{3} \\ -u - 2 \end{pmatrix}$$

$$a_9 = \begin{pmatrix} \frac{1}{3}u^3 + u^2 + \frac{2}{3}u + \frac{2}{3} \\ -u^2 - 2u - 1 \end{pmatrix}$$

$$a_8 = \begin{pmatrix} 0 \\ -u^3 - 2u^2 - 2u \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= 3u^3 + 8u^2 + 16u + 9$

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

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

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_7, c_9$ | $y^4 + 3y^3 + 6y^2 + 4y + 1$ |
| $c_2, c_4, c_5$ $c_8$ | $y^4 - y^3 + 2y^2 + 1$ |
| $c_3, c_6$ | $y^4 + 2y^2 - y + 1$ |
| $c_{10}$ | $y^4 + y^3 + y^2 + 5y + 9$ |

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

| Solutions to $I_3^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.324902 + 1.227920I$<br>$a = -0.253420 + 0.896839I$<br>$b = -0.727136 + 0.430014I$ | $0.20545 - 7.54387I$ | $-3.11022 + 8.87572I$ |
| $u = -0.324902 - 1.227920I$<br>$a = -0.253420 - 0.896839I$<br>$b = -0.727136 - 0.430014I$ | $0.20545 + 7.54387I$ | $-3.11022 - 8.87572I$ |
| $u = -1.175100 + 0.691825I$<br>$a = -0.079913 - 0.614328I$<br>$b = \phantom{-}0.727136 - 0.934099I$ | $1.43949 - 4.22398I$ | $-2.38978 + 5.66623I$ |
| $u = -1.175100 - 0.691825I$<br>$a = -0.079913 + 0.614328I$<br>$b = \phantom{-}0.727136 + 0.934099I$ | $1.43949 + 4.22398I$ | $-2.38978 - 5.66623I$ |

**IV.** $\boldsymbol{I_4^u = \langle u^2 + b + 2u + 2,\ -u^2 + a - u - 2,\ u^3 + 2u^2 + 3u + 1\rangle}$

**(i) Arc colorings**

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

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

**(iii) Cusp Shapes** $= -11u^2 - 14u - 24$

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

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

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

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

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

| Solutions to $I_4^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.78492 + 1.30714I$<br>$a = \ 0.122561 - 0.744862I$<br>$b = \ 0.662359 - 0.562280I$ | $1.37919 - 2.82812I$ | $-0.99341 + 4.27206I$ |
| $u = -0.78492 - 1.30714I$<br>$a = \ 0.122561 + 0.744862I$<br>$b = \ 0.662359 + 0.562280I$ | $1.37919 + 2.82812I$ | $-0.99341 - 4.27206I$ |
| $u = -0.430160$<br>$a = \ 1.75488$<br>$b = -1.32472$ | $-2.75839$ | $-20.0130$ |

## V. $I_1^v = \langle a,\ b+v,\ v^2-v+1\rangle$

**(i) Arc colorings**

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

$$a_{10} = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

$$a_1 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

$$a_7 = \begin{pmatrix} 0 \\ -v \end{pmatrix}$$

$$a_2 = \begin{pmatrix} v \\ 1 \end{pmatrix}$$

$$a_6 = \begin{pmatrix} v \\ -v \end{pmatrix}$$

$$a_4 = \begin{pmatrix} v-1 \\ 1 \end{pmatrix}$$

$$a_5 = \begin{pmatrix} 0 \\ -v \end{pmatrix}$$

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

$$a_8 = \begin{pmatrix} -v+1 \\ -v-1 \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= -9$

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

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

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

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

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

| Solutions to $I_1^v$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $v = 0.500000 + 0.866025I$<br>$a = 0$<br>$b = -0.500000 - 0.866025I$ | $-3.28987$ | $-9.00000$ |
| $v = 0.500000 - 0.866025I$<br>$a = 0$<br>$b = -0.500000 + 0.866025I$ | $-3.28987$ | $-9.00000$ |

## VI. u-Polynomials

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1, c_9$ | $((u-1)^2)(u^3-u^2+2u-1)(u^4-u^3+2u^2+1)(u^{26}+4u^{25}+\cdots-2u+1)$ <br> $\cdot\,(u^{38}-3u^{37}+\cdots+10u-1)$ |
| $c_2, c_5$ | $(u^2-u+1)(u^3+u^2-1)(u^4-u^3+1)(u^{26}+3u^{24}+\cdots-2u+1)$ <br> $\cdot\,(u^{38}+2u^{37}+\cdots+109u+11)$ |
| $c_3, c_6$ | $(u^2-u+1)(u^3-u-1)(u^4-u+1)(u^{26}+2u^{25}+\cdots+2u+1)$ <br> $\cdot\,(u^{38}+4u^{37}+\cdots+7u+1)$ |
| $c_4$ | $((u-1)^2)(u^3-u-1)(u^4+u^3+1)(u^{19}-2u^{18}+\cdots-4u+1)^2$ <br> $\cdot\,(u^{26}+6u^{25}+\cdots+25u+4)$ |
| $c_7$ | $(u-1)^2(u^3-2u^2+u-1)(u^4-u^3+2u^2+1)$ <br> $\cdot\,((u^{19}+8u^{18}+\cdots+4u+1)^2)(u^{26}+10u^{25}+\cdots+81u+16)$ |
| $c_8$ | $((u+1)^2)(u^3-u+1)(u^4-u^3+1)(u^{19}-2u^{18}+\cdots-4u+1)^2$ <br> $\cdot\,(u^{26}+6u^{25}+\cdots+25u+4)$ |
| $c_{10}$ | $u^2(u^3+2u^2+3u+1)(u^4+3u^3+5u^2+5u+3)$ <br> $\cdot\,((u^{19}-9u^{18}+\cdots-u+2)^2)(u^{26}+14u^{25}+\cdots+5u+2)$ |

## VII. Riley Polynomials

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_9$ | $(y-1)^2(y^3+3y^2+2y-1)(y^4+3y^3+6y^2+4y+1)$ <br> $\cdot\,(y^{26}-10y^{25}+\cdots-18y+1)(y^{38}+13y^{37}+\cdots+2y+1)$ |
| $c_2, c_5$ | $(y^2+y+1)(y^3-y^2+2y-1)(y^4-y^3+2y^2+1)(y^{26}+6y^{25}+\cdots+6y+1)$ <br> $\cdot\,(y^{38}+4y^{37}+\cdots-13311y+121)$ |
| $c_3, c_6$ | $(y^2+y+1)(y^3-2y^2+y-1)(y^4+2y^2-y+1)$ <br> $\cdot\,(y^{26}+14y^{25}+\cdots+30y+1)(y^{38}-8y^{37}+\cdots+5y+1)$ |
| $c_4, c_8$ | $(y-1)^2(y^3-2y^2+y-1)(y^4-y^3+2y^2+1)$ <br> $\cdot\,((y^{19}-8y^{18}+\cdots+4y-1)^2)(y^{26}-10y^{25}+\cdots-81y+16)$ |
| $c_7$ | $(y-1)^2(y^3-2y^2-3y-1)(y^4+3y^3+6y^2+4y+1)$ <br> $\cdot\,((y^{19}+8y^{18}+\cdots-16y-1)^2)(y^{26}+10y^{25}+\cdots+9439y+256)$ |
| $c_{10}$ | $y^2(y^3+2y^2+5y-1)(y^4+y^3+y^2+5y+9)$ <br> $\cdot\,((y^{19}-3y^{18}+\cdots+37y-4)^2)(y^{26}+8y^{24}+\cdots-21y+4)$ |