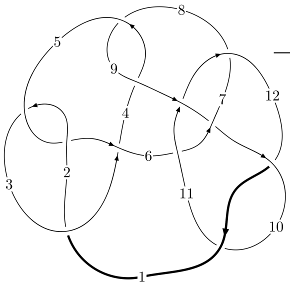
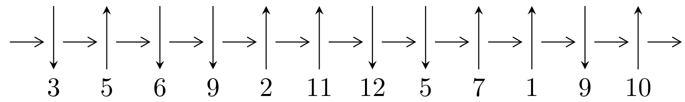
# $12n_{0030}$ $(K12n_{0030})$




A knot diagram[1]

### Linearized knot diagam




### Solving Sequence

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

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

$$\begin{aligned}
I_1^u = \langle & 3.62545 \times 10^{313} u^{83} + 6.15170 \times 10^{313} u^{82} + \cdots + 6.32484 \times 10^{315} b + 7.92185 \times 10^{316}, \\
& - 3.59853 \times 10^{313} u^{83} - 1.80819 \times 10^{314} u^{82} + \cdots + 2.52993 \times 10^{316} a - 6.87140 \times 10^{317}, \\
& u^{84} + 2u^{83} + \cdots + 3072u + 1024 \rangle \\
I_2^u = \langle & 2u^3 + u^2 + b + 5u + 1,\ -3u^3 - 4u^2 + a - 8u - 8,\ u^4 + u^3 + 3u^2 + 2u + 1 \rangle
\end{aligned}$$

$$\begin{aligned}
I_1^v = \langle & a,\ 1728v^9 - 4936v^8 + 9872v^7 + 12908v^6 - 24680v^5 - 34552v^4 + 91527v^3 + 4936v^2 + 3335b - 613, \\
& v^{10} - 3v^9 + 6v^8 + 7v^7 - 16v^6 - 19v^5 + 58v^4 - 2v^3 - 7v^2 - v + 1 \rangle
\end{aligned}$$

* 3 irreducible components of $\dim_{\mathbb{C}} = 0$, with total 98 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.** $\boldsymbol{I_1^u = \langle 3.63 \times 10^{313} u^{83} + 6.15 \times 10^{313} u^{82} + \cdots + 6.32 \times 10^{315} b + 7.92 \times 10^{316},\ -3.60 \times 10^{313} u^{83} - 1.81 \times 10^{314} u^{82} + \cdots + 2.53 \times 10^{316} a - 6.87 \times 10^{317},\ u^{84} + 2u^{83} + \cdots + 3072u + 1024\rangle}$

**(i) Arc colorings**

$$a_5 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_8 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$
$$a_4 = \begin{pmatrix} u \\ u^3 + u \end{pmatrix}$$
$$a_{12} = \begin{pmatrix} 0.00142238u^{83} + 0.00714717u^{82} + \cdots + 4.37921u + 27.1604 \\ -0.00573208u^{83} - 0.00972627u^{82} + \cdots - 21.7493u - 12.5250 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} -0.00440220u^{83} - 0.0155721u^{82} + \cdots - 21.1672u - 21.6501 \\ 0.00850686u^{83} + 0.0117475u^{82} + \cdots + 21.9408u + 4.77851 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} -0.00557181u^{83} - 0.00516502u^{82} + \cdots - 14.6483u + 9.47061 \\ 0.000335853u^{83} + 0.000887942u^{82} + \cdots - 1.07766u + 3.84523 \end{pmatrix}$$
$$a_1 = \begin{pmatrix} 0.00764905u^{83} + 0.0136726u^{82} + \cdots + 20.6805u + 20.3223 \\ 0.00313239u^{83} + 0.00646405u^{82} + \cdots + 8.74407u + 11.6319 \end{pmatrix}$$
$$a_{11} = \begin{pmatrix} -0.000790893u^{83} + 0.00283051u^{82} + \cdots - 2.69654u + 19.0410 \\ -0.00542175u^{83} - 0.00957199u^{82} + \cdots - 19.8204u - 12.6375 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} 0.00451666u^{83} + 0.00720851u^{82} + \cdots + 11.9364u + 8.69044 \\ -0.00262839u^{83} - 0.00551221u^{82} + \cdots - 7.76333u - 9.76326 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} -0.0106686u^{83} - 0.0158171u^{82} + \cdots - 36.1449u - 16.7400 \\ -0.00641780u^{83} - 0.0100395u^{82} + \cdots - 20.3360u - 13.7909 \end{pmatrix}$$
$$a_2 = \begin{pmatrix} -0.0106686u^{83} - 0.0158171u^{82} + \cdots - 36.1449u - 16.7400 \\ -0.00837526u^{83} - 0.0135852u^{82} + \cdots - 26.3690u - 19.4434 \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= -0.0168619u^{83} - 0.00458246u^{82} + \cdots + 15.0455u + 47.7451$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $u^{84} + 43u^{83} + \cdots - 18u + 1$ |
| $c_2, c_5$ | $u^{84} + 7u^{83} + \cdots + 8u + 1$ |
| $c_3$ | $u^{84} - 7u^{83} + \cdots + 18564u + 47236$ |
| $c_4, c_8$ | $u^{84} + 2u^{83} + \cdots + 3072u + 1024$ |
| $c_6$ | $u^{84} - 5u^{83} + \cdots + 78942u + 33589$ |
| $c_7$ | $u^{84} + u^{83} + \cdots - 1664u + 101$ |
| $c_9$ | $u^{84} + 4u^{83} + \cdots + 3u + 1$ |
| $c_{10}, c_{12}$ | $u^{84} + 7u^{83} + \cdots + 19u + 1$ |
| $c_{11}$ | $u^{84} - 13u^{83} + \cdots + 104u + 16$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $y^{84} + 3y^{83} + \cdots - 590y + 1$ |
| $c_2, c_5$ | $y^{84} + 43y^{83} + \cdots - 18y + 1$ |
| $c_3$ | $y^{84} - 37y^{83} + \cdots - 5800852456y + 2231239696$ |
| $c_4, c_8$ | $y^{84} - 50y^{83} + \cdots - 22020096y + 1048576$ |
| $c_6$ | $y^{84} + 85y^{83} + \cdots - 18778069822y + 1128220921$ |
| $c_7$ | $y^{84} + 69y^{83} + \cdots - 1278338y + 10201$ |
| $c_9$ | $y^{84} - 24y^{83} + \cdots + 11y + 1$ |
| $c_{10}, c_{12}$ | $y^{84} - 49y^{83} + \cdots - 211y + 1$ |
| $c_{11}$ | $y^{84} - 21y^{83} + \cdots - 19776y + 256$ |

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

| Solutions to $I_1^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.841987 + 0.437455I$<br>$a = -0.264125 - 1.135590I$<br>$b = -0.274994 - 0.228453I$ | $-0.303408 + 1.335140I$ | $0$ |
| $u = -0.841987 - 0.437455I$<br>$a = -0.264125 + 1.135590I$<br>$b = -0.274994 + 0.228453I$ | $-0.303408 - 1.335140I$ | $0$ |
| $u = 0.886655 + 0.055494I$<br>$a = -1.59300 + 1.49212I$<br>$b = -0.527659 + 0.467864I$ | $-0.72347 + 3.79694I$ | $-4.78687 - 5.26590I$ |
| $u = 0.886655 - 0.055494I$<br>$a = -1.59300 - 1.49212I$<br>$b = -0.527659 - 0.467864I$ | $-0.72347 - 3.79694I$ | $-4.78687 + 5.26590I$ |
| $u = 1.072820 + 0.309098I$<br>$a = 0.342724 - 0.766994I$<br>$b = 0.220027 + 1.047230I$ | $0.99043 - 3.63889I$ | $0$ |
| $u = 1.072820 - 0.309098I$<br>$a = 0.342724 + 0.766994I$<br>$b = 0.220027 - 1.047230I$ | $0.99043 + 3.63889I$ | $0$ |
| $u = -1.141120 + 0.127904I$<br>$a = -0.75584 + 1.46099I$<br>$b = -0.19924 + 2.65235I$ | $-0.637274 + 0.732588I$ | $0$ |
| $u = -1.141120 - 0.127904I$<br>$a = -0.75584 - 1.46099I$<br>$b = -0.19924 - 2.65235I$ | $-0.637274 - 0.732588I$ | $0$ |
| $u = -0.046941 + 1.155630I$<br>$a = 0.338929 + 0.087109I$<br>$b = 0.748631 + 0.426172I$ | $-3.15026 - 4.66896I$ | $0$ |
| $u = -0.046941 - 1.155630I$<br>$a = 0.338929 - 0.087109I$<br>$b = 0.748631 - 0.426172I$ | $-3.15026 + 4.66896I$ | $0$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -1.186540 + 0.223808I$<br>$a = 1.61465 + 0.24749I$<br>$b = 0.276148 - 0.192975I$ | $-0.33247 + 3.91395I$ | $0$ |
| $u = -1.186540 - 0.223808I$<br>$a = 1.61465 - 0.24749I$<br>$b = 0.276148 + 0.192975I$ | $-0.33247 - 3.91395I$ | $0$ |
| $u = 0.790274$<br>$a = 2.22730$<br>$b = -0.0927414$ | $2.51357$ | $6.43370$ |
| $u = 0.471133 + 1.126030I$<br>$a = 0.225686 + 0.214193I$<br>$b = 0.489548 + 0.020552I$ | $-2.28832 + 2.96266I$ | $0$ |
| $u = 0.471133 - 1.126030I$<br>$a = 0.225686 - 0.214193I$<br>$b = 0.489548 - 0.020552I$ | $-2.28832 - 2.96266I$ | $0$ |
| $u = -1.229850 + 0.012969I$<br>$a = 0.363787 + 0.498046I$<br>$b = 0.341018 - 1.175440I$ | $-2.69617 + 0.11948I$ | $0$ |
| $u = -1.229850 - 0.012969I$<br>$a = 0.363787 - 0.498046I$<br>$b = 0.341018 + 1.175440I$ | $-2.69617 - 0.11948I$ | $0$ |
| $u = -0.231724 + 0.709721I$<br>$a = 1.98561 + 2.84121I$<br>$b = -0.396332 - 0.930995I$ | $1.55672 - 3.93406I$ | $5.95351 + 6.01840I$ |
| $u = -0.231724 - 0.709721I$<br>$a = 1.98561 - 2.84121I$<br>$b = -0.396332 + 0.930995I$ | $1.55672 + 3.93406I$ | $5.95351 - 6.01840I$ |
| $u = 0.443646 + 0.570101I$<br>$a = 2.38081 - 1.64856I$<br>$b = -0.357450 + 0.659687I$ | $2.97676 + 0.06912I$ | $8.15601 - 0.00886I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.443646 - 0.570101I$<br>$a = 2.38081 + 1.64856I$<br>$b = -0.357450 - 0.659687I$ | $2.97676 - 0.06912I$ | $8.15601 + 0.00886I$ |
| $u = 0.535311 + 0.479375I$<br>$a = 0.553170 + 0.091063I$<br>$b = 0.530724 - 0.879230I$ | $-0.20954 + 2.08673I$ | $-1.51899 - 3.33594I$ |
| $u = 0.535311 - 0.479375I$<br>$a = 0.553170 - 0.091063I$<br>$b = 0.530724 + 0.879230I$ | $-0.20954 - 2.08673I$ | $-1.51899 + 3.33594I$ |
| $u = -0.446102 + 0.557829I$<br>$a = 0.651382 - 0.372945I$<br>$b = -0.221050 - 0.694468I$ | $-0.194651 + 1.319340I$ | $-1.46532 - 4.00362I$ |
| $u = -0.446102 - 0.557829I$<br>$a = 0.651382 + 0.372945I$<br>$b = -0.221050 + 0.694468I$ | $-0.194651 - 1.319340I$ | $-1.46532 + 4.00362I$ |
| $u = 0.597250 + 0.382933I$<br>$a = 0.86560 - 2.16525I$<br>$b = 0.402385 + 0.725463I$ | $2.92160 - 2.77404I$ | $6.32422 + 8.38902I$ |
| $u = 0.597250 - 0.382933I$<br>$a = 0.86560 + 2.16525I$<br>$b = 0.402385 - 0.725463I$ | $2.92160 + 2.77404I$ | $6.32422 - 8.38902I$ |
| $u = -0.100108 + 0.676504I$<br>$a = 2.46560 + 3.99891I$<br>$b = -0.62925 - 1.63616I$ | $0.83780 + 1.60534I$ | $11.55428 - 5.80054I$ |
| $u = -0.100108 - 0.676504I$<br>$a = 2.46560 - 3.99891I$<br>$b = -0.62925 + 1.63616I$ | $0.83780 - 1.60534I$ | $11.55428 + 5.80054I$ |
| $u = -0.210845 + 0.645700I$<br>$a = 0.524500 - 0.248408I$<br>$b = 0.297103 - 0.522586I$ | $-0.081645 + 1.388350I$ | $-0.20547 - 3.77437I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.210845 - 0.645700I$<br>$a = 0.524500 + 0.248408I$<br>$b = 0.297103 + 0.522586I$ | $-0.081645 - 1.388350I$ | $-0.20547 + 3.77437I$ |
| $u = -0.449648 + 0.505965I$<br>$a = 0.733323 - 0.546576I$<br>$b = 0.002097 - 0.373578I$ | $-0.176677 + 1.378470I$ | $-2.64856 - 4.43072I$ |
| $u = -0.449648 - 0.505965I$<br>$a = 0.733323 + 0.546576I$<br>$b = 0.002097 + 0.373578I$ | $-0.176677 - 1.378470I$ | $-2.64856 + 4.43072I$ |
| $u = 0.232207 + 1.303470I$<br>$a = 0.0976042 - 0.0966176I$<br>$b = -1.032530 + 0.870360I$ | $2.64295 + 5.32501I$ | 0 |
| $u = 0.232207 - 1.303470I$<br>$a = 0.0976042 + 0.0966176I$<br>$b = -1.032530 - 0.870360I$ | $2.64295 - 5.32501I$ | 0 |
| $u = -1.263120 + 0.405364I$<br>$a = 0.179173 + 0.675618I$<br>$b = 0.126913 - 1.133430I$ | $-1.81006 + 8.25159I$ | 0 |
| $u = -1.263120 - 0.405364I$<br>$a = 0.179173 - 0.675618I$<br>$b = 0.126913 + 1.133430I$ | $-1.81006 - 8.25159I$ | 0 |
| $u = 1.339460 + 0.104413I$<br>$a = -0.361683 + 1.004890I$<br>$b = -0.61375 + 2.46446I$ | $-4.18720 - 3.29608I$ | 0 |
| $u = 1.339460 - 0.104413I$<br>$a = -0.361683 - 1.004890I$<br>$b = -0.61375 - 2.46446I$ | $-4.18720 + 3.29608I$ | 0 |
| $u = 1.328400 + 0.308712I$<br>$a = 1.40163 + 0.29106I$<br>$b = 1.08954 + 0.93988I$ | $2.03077 - 8.41785I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.328400 - 0.308712I$<br>$a = 1.40163 - 0.29106I$<br>$b = 1.08954 - 0.93988I$ | $2.03077 + 8.41785I$ | $0$ |
| $u = -1.359410 + 0.160067I$<br>$a = 1.185480 - 0.430459I$<br>$b = 1.059200 - 0.760145I$ | $1.64539 + 2.41566I$ | $0$ |
| $u = -1.359410 - 0.160067I$<br>$a = 1.185480 + 0.430459I$<br>$b = 1.059200 + 0.760145I$ | $1.64539 - 2.41566I$ | $0$ |
| $u = 1.337020 + 0.298292I$<br>$a = -0.982452 - 0.930609I$<br>$b = -0.38347 - 2.94198I$ | $-3.79074 - 5.18593I$ | $0$ |
| $u = 1.337020 - 0.298292I$<br>$a = -0.982452 + 0.930609I$<br>$b = -0.38347 + 2.94198I$ | $-3.79074 + 5.18593I$ | $0$ |
| $u = -0.353810 + 0.514641I$<br>$a = -8.96206 - 5.53073I$<br>$b = -0.61059 + 3.96105I$ | $1.40295 + 1.45862I$ | $-89.698 - 115.931I$ |
| $u = -0.353810 - 0.514641I$<br>$a = -8.96206 + 5.53073I$<br>$b = -0.61059 - 3.96105I$ | $1.40295 - 1.45862I$ | $-89.698 + 115.931I$ |
| $u = 1.341220 + 0.421284I$<br>$a = -1.49100 + 0.04191I$<br>$b = -0.975466 - 0.634144I$ | $-4.54665 - 5.72043I$ | $0$ |
| $u = 1.341220 - 0.421284I$<br>$a = -1.49100 - 0.04191I$<br>$b = -0.975466 + 0.634144I$ | $-4.54665 + 5.72043I$ | $0$ |
| $u = 0.465396 + 0.288139I$<br>$a = 0.0853726 - 0.0912661I$<br>$b = -0.509528 + 1.280680I$ | $5.71423 + 6.06522I$ | $-1.77330 + 4.32385I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.465396 - 0.288139I$<br>$a = 0.0853726 + 0.0912661I$<br>$b = -0.509528 - 1.280680I$ | $5.71423 - 6.06522I$ | $-1.77330 - 4.32385I$ |
| $u = -0.490366 + 0.227601I$<br>$a = 0.0855734 - 0.0910038I$<br>$b = -0.361826 + 1.222090I$ | $5.61123 + 2.65441I$ | $-4.29638 - 9.51286I$ |
| $u = -0.490366 - 0.227601I$<br>$a = 0.0855734 + 0.0910038I$<br>$b = -0.361826 - 1.222090I$ | $5.61123 - 2.65441I$ | $-4.29638 + 9.51286I$ |
| $u = -0.40463 + 1.41385I$<br>$a = 0.0930273 + 0.1036470I$<br>$b = -1.20423 - 1.01593I$ | $-0.55121 - 10.15270I$ | 0 |
| $u = -0.40463 - 1.41385I$<br>$a = 0.0930273 - 0.1036470I$<br>$b = -1.20423 + 1.01593I$ | $-0.55121 + 10.15270I$ | 0 |
| $u = -1.27769 + 0.73843I$<br>$a = -0.689832 - 0.368710I$<br>$b = -0.510369 + 0.405135I$ | $-2.21135 + 4.59052I$ | 0 |
| $u = -1.27769 - 0.73843I$<br>$a = -0.689832 + 0.368710I$<br>$b = -0.510369 - 0.405135I$ | $-2.21135 - 4.59052I$ | 0 |
| $u = -0.08024 + 1.47776I$<br>$a = 0.114890 + 0.102038I$<br>$b = -1.193040 - 0.588194I$ | $-1.47667 - 1.22264I$ | 0 |
| $u = -0.08024 - 1.47776I$<br>$a = 0.114890 - 0.102038I$<br>$b = -1.193040 + 0.588194I$ | $-1.47667 + 1.22264I$ | 0 |
| $u = -0.431983 + 0.240711I$<br>$a = 3.56103 + 4.41691I$<br>$b = 0.741583 - 0.575469I$ | $2.34989 - 1.68894I$ | $-3.22664 - 4.70152I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-0.431983-0.240711I$<br>$a=\ 3.56103-4.41691I$<br>$b=\ 0.741583+0.575469I$ | $2.34989+1.68894I$ | $-3.22664+4.70152I$ |
| $u=-1.48932+0.27924I$<br>$a=\ 0.952437+0.255511I$<br>$b=\ 1.385620-0.031678I$ | $-3.91699+0.49402I$ | $0$ |
| $u=-1.48932-0.27924I$<br>$a=\ 0.952437-0.255511I$<br>$b=\ 1.385620+0.031678I$ | $-3.91699-0.49402I$ | $0$ |
| $u=\ 1.39972+0.58890I$<br>$a=-0.771211+0.440695I$<br>$b=-0.730765-0.241151I$ | $-7.54628-1.28985I$ | $0$ |
| $u=\ 1.39972-0.58890I$<br>$a=-0.771211-0.440695I$<br>$b=-0.730765+0.241151I$ | $-7.54628+1.28985I$ | $0$ |
| $u=-1.50848+0.24962I$<br>$a=-1.270500+0.118685I$<br>$b=-1.058770+0.479119I$ | $-9.11776+1.81197I$ | $0$ |
| $u=-1.50848-0.24962I$<br>$a=-1.270500-0.118685I$<br>$b=-1.058770-0.479119I$ | $-9.11776-1.81197I$ | $0$ |
| $u=-1.42256+0.56215I$<br>$a=-1.374560-0.199389I$<br>$b=-1.055600+0.714255I$ | $-7.54281+10.87570I$ | $0$ |
| $u=-1.42256-0.56215I$<br>$a=-1.374560+0.199389I$<br>$b=-1.055600-0.714255I$ | $-7.54281-10.87570I$ | $0$ |
| $u=\ 0.460345$<br>$a=\ 2.98021$<br>$b=-0.432563$ | 2.55442 | 4.59390 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.31857 + 0.81362I$<br>$a = -0.742286 + 0.349720I$<br>$b = -0.568332 - 0.538548I$ | $-4.74130 - 10.12840I$ | 0 |
| $u = 1.31857 - 0.81362I$<br>$a = -0.742286 - 0.349720I$<br>$b = -0.568332 + 0.538548I$ | $-4.74130 + 10.12840I$ | 0 |
| $u = 1.39322 + 0.68481I$<br>$a = 1.380420 - 0.253552I$<br>$b = 1.22232 + 1.28720I$ | $-1.06531 - 12.31450I$ | 0 |
| $u = 1.39322 - 0.68481I$<br>$a = 1.380420 + 0.253552I$<br>$b = 1.22232 - 1.28720I$ | $-1.06531 + 12.31450I$ | 0 |
| $u = 1.53635 + 0.47412I$<br>$a = 0.932224 - 0.321024I$<br>$b = 1.56257 + 0.23956I$ | $-7.27588 - 5.64053I$ | 0 |
| $u = 1.53635 - 0.47412I$<br>$a = 0.932224 + 0.321024I$<br>$b = 1.56257 - 0.23956I$ | $-7.27588 + 5.64053I$ | 0 |
| $u = -1.40379 + 0.79175I$<br>$a = 1.320760 + 0.367634I$<br>$b = 1.23754 - 1.38161I$ | $-3.7955 + 17.8954I$ | 0 |
| $u = -1.40379 - 0.79175I$<br>$a = 1.320760 - 0.367634I$<br>$b = 1.23754 + 1.38161I$ | $-3.7955 - 17.8954I$ | 0 |
| $u = -0.07827 + 1.61239I$<br>$a = 0.0768134 - 0.0133793I$<br>$b = -0.502088 + 0.081114I$ | $8.34326 + 3.21240I$ | 0 |
| $u = -0.07827 - 1.61239I$<br>$a = 0.0768134 + 0.0133793I$<br>$b = -0.502088 - 0.081114I$ | $8.34326 - 3.21240I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -1.55633 + 0.59261I$<br>$a = 1.222390 + 0.124537I$<br>$b = 1.37056 - 1.18960I$ | $-6.44809 + 8.61020I$ | 0 |
| $u = -1.55633 - 0.59261I$<br>$a = 1.222390 - 0.124537I$<br>$b = 1.37056 + 1.18960I$ | $-6.44809 - 8.61020I$ | 0 |
| $u = 1.68119 + 0.16001I$<br>$a = 0.920196 - 0.227277I$<br>$b = 1.57545 - 0.24084I$ | $-8.44334 + 3.92581I$ | 0 |
| $u = 1.68119 - 0.16001I$<br>$a = 0.920196 + 0.227277I$<br>$b = 1.57545 + 0.24084I$ | $-8.44334 - 3.92581I$ | 0 |

**II.**

$$\boldsymbol{I^u_2 = \langle 2u^3+u^2+b+5u+1,\ -3u^3-4u^2+a-8u-8,\ u^4+u^3+3u^2+2u+1\rangle}$$

**(i) Arc colorings**

$$a_5 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_8 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$
$$a_4 = \begin{pmatrix} u \\ u^3+u \end{pmatrix}$$
$$a_{12} = \begin{pmatrix} 3u^3+4u^2+8u+8 \\ -2u^3-u^2-5u-1 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} 8u^3+19u-3 \\ 3u^3+4u^2+8u+8 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} 3u^3+5u^2+8u+9 \\ -2u^3-5u-1 \end{pmatrix}$$
$$a_1 = \begin{pmatrix} -u^2-1 \\ -u^2 \end{pmatrix}$$
$$a_{11} = \begin{pmatrix} 3u^3+4u^2+8u+8 \\ -2u^3-u^2-5u-1 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} u^3+2u \\ u^3+u \end{pmatrix}$$
$$a_2 = \begin{pmatrix} u^3+2u \\ u^3+u^2+2u+1 \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= 15u^3+3u^2+46u+36$

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

| Crossings | u-Polynomials at each crossing |
| --- | --- |
| $c_1, c_4$ | $u^4 - u^3 + 3u^2 - 2u + 1$ |
| $c_2$ | $u^4 - u^3 + u^2 + 1$ |
| $c_3$ | $u^4 + u^3 + 5u^2 - u + 2$ |
| $c_5$ | $u^4 + u^3 + u^2 + 1$ |
| $c_6, c_7$ | $u^4 - 2u^3 + 7u^2 - 5u + 1$ |
| $c_8$ | $u^4 + u^3 + 3u^2 + 2u + 1$ |
| $c_9$ | $u^4 - 5u^3 + 7u^2 - 2u + 1$ |
| $c_{10}$ | $(u+1)^4$ |
| $c_{11}$ | $u^4$ |
| $c_{12}$ | $(u-1)^4$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_4, c_8$ | $y^4 + 5y^3 + 7y^2 + 2y + 1$ |
| $c_2, c_5$ | $y^4 + y^3 + 3y^2 + 2y + 1$ |
| $c_3$ | $y^4 + 9y^3 + 31y^2 + 19y + 4$ |
| $c_6, c_7$ | $y^4 + 10y^3 + 31y^2 - 11y + 1$ |
| $c_9$ | $y^4 - 11y^3 + 31y^2 + 10y + 1$ |
| $c_{10}, c_{12}$ | $(y-1)^4$ |
| $c_{11}$ | $y^4$ |

### (vi) Complex Volumes and Cusp Shapes

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.395123 + 0.506844I$<br>$a = 5.16441 + 2.77418I$<br>$b = 0.59074 - 2.34806I$ | $1.43393 + 1.41510I$ | $21.1644 + 23.7210I$ |
| $u = -0.395123 - 0.506844I$<br>$a = 5.16441 - 2.77418I$<br>$b = 0.59074 + 2.34806I$ | $1.43393 - 1.41510I$ | $21.1644 - 23.7210I$ |
| $u = -0.10488 + 1.55249I$<br>$a = -0.164409 + 0.045467I$<br>$b = 0.409261 - 0.055548I$ | $8.43568 + 3.16396I$ | $35.3356 + 15.0782I$ |
| $u = -0.10488 - 1.55249I$<br>$a = -0.164409 - 0.045467I$<br>$b = 0.409261 + 0.055548I$ | $8.43568 - 3.16396I$ | $35.3356 - 15.0782I$ |

**III.** $I_1^v = \langle a,\ 1728v^9 - 4936v^8 + \cdots + 3335b - 613,\ v^{10} - 3v^9 + \cdots - v + 1\rangle$

**(i) Arc colorings**

$$a_5 = \begin{pmatrix} v \\ 0 \end{pmatrix}$$
$$a_8 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_4 = \begin{pmatrix} v \\ 0 \end{pmatrix}$$
$$a_{12} = \begin{pmatrix} 0 \\ -0.518141v^9 + 1.48006v^8 + \cdots - 1.48006v^2 + 0.183808 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} 1 \\ -0.462969v^9 + 1.33373v^8 + \cdots - 1.33373v^2 + 1.81379 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} 0.462969v^9 - 1.33373v^8 + \cdots + 1.33373v^2 - 0.813793 \\ 1.14783v^9 - 3.29565v^8 + \cdots + 3.29565v^2 - 1.75652 \end{pmatrix}$$
$$a_1 = \begin{pmatrix} 0.684858v^9 - 1.96192v^8 + \cdots + 1.96192v^2 - 0.942729 \\ 1.14783v^9 - 3.29565v^8 + \cdots + 3.29565v^2 - 1.75652 \end{pmatrix}$$
$$a_{11} = \begin{pmatrix} -0.518141v^9 + 1.48006v^8 + \cdots - 1.48006v^2 + 0.183808 \\ -0.518141v^9 + 1.48006v^8 + \cdots - 1.48006v^2 + 0.183808 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} -0.684858v^9 + 1.96192v^8 + \cdots - 1.96192v^2 + 0.942729 \\ -1.14783v^9 + 3.29565v^8 + \cdots - 3.29565v^2 + 1.75652 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} 0.0737631v^9 - 0.147526v^8 + \cdots + 5.22189v - 0.331634 \\ 0.147826v^9 - 0.295652v^8 + \cdots + 7v - 0.756522 \end{pmatrix}$$
$$a_2 = \begin{pmatrix} -0.0740630v^9 + 0.278561v^8 + \cdots + 5.22189v - 0.183808 \\ 0.147826v^9 - 0.295652v^8 + \cdots + 7v - 0.756522 \end{pmatrix}$$

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

**(iii) Cusp Shapes**
$= -\frac{75}{667}v^9 - \frac{30}{29}v^8 + \frac{2395}{667}v^7 - \frac{6267}{667}v^6 - \frac{4697}{667}v^5 + \frac{16833}{667}v^4 + \frac{537}{29}v^3 - \frac{55309}{667}v^2 + \frac{263}{23}v + \frac{8994}{667}$

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

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

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

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

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

| Solutions to $I_1^v$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $v = 1.38814 + 0.78973I$<br>$a = 0$<br>$b = 0.339110 + 0.822375I$ | $0.329100 + 0.499304I$ | $2.01870 + 2.82203I$ |
| $v = 1.38814 - 0.78973I$<br>$a = 0$<br>$b = 0.339110 - 0.822375I$ | $0.329100 - 0.499304I$ | $2.01870 - 2.82203I$ |
| $v = -1.37799 + 0.80730I$<br>$a = 0$<br>$b = 0.339110 + 0.822375I$ | $0.32910 - 3.56046I$ | $1.95395 + 6.01185I$ |
| $v = -1.37799 - 0.80730I$<br>$a = 0$<br>$b = 0.339110 - 0.822375I$ | $0.32910 + 3.56046I$ | $1.95395 - 6.01185I$ |
| $v = -0.294694 + 0.220725I$<br>$a = 0$<br>$b = -0.455697 - 1.200150I$ | $5.87256 - 6.43072I$ | $6.8570 + 13.9114I$ |
| $v = -0.294694 - 0.220725I$<br>$a = 0$<br>$b = -0.455697 + 1.200150I$ | $5.87256 + 6.43072I$ | $6.8570 - 13.9114I$ |
| $v = 0.338500 + 0.144851I$<br>$a = 0$<br>$b = -0.455697 - 1.200150I$ | $5.87256 - 2.37095I$ | $9.93110 - 5.20350I$ |
| $v = 0.338500 - 0.144851I$<br>$a = 0$<br>$b = -0.455697 + 1.200150I$ | $5.87256 + 2.37095I$ | $9.93110 + 5.20350I$ |
| $v = 1.44605 + 2.50463I$<br>$a = 0$<br>$b = -0.766826$ | $2.40108 - 2.02988I$ | $-2.76075 + 10.60420I$ |
| $v = 1.44605 - 2.50463I$<br>$a = 0$<br>$b = -0.766826$ | $2.40108 + 2.02988I$ | $-2.76075 - 10.60420I$ |

## IV. u-Polynomials

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $((u^2-u+1)^5)(u^4-u^3+3u^2-2u+1)(u^{84}+43u^{83}+\cdots-18u+1)$ |
| $c_2$ | $((u^2+u+1)^5)(u^4-u^3+u^2+1)(u^{84}+7u^{83}+\cdots+8u+1)$ |
| $c_3$ | $(u^2-u+1)^5(u^4+u^3+5u^2-u+2)$ $\cdot(u^{84}-7u^{83}+\cdots+18564u+47236)$ |
| $c_4$ | $u^{10}(u^4-u^3+3u^2-2u+1)(u^{84}+2u^{83}+\cdots+3072u+1024)$ |
| $c_5$ | $((u^2-u+1)^5)(u^4+u^3+u^2+1)(u^{84}+7u^{83}+\cdots+8u+1)$ |
| $c_6$ | $(u^4-2u^3+7u^2-5u+1)(u^5-u^4-2u^3+u^2+u+1)^2$ $\cdot(u^{84}-5u^{83}+\cdots+78942u+33589)$ |
| $c_7$ | $(u^4-2u^3+7u^2-5u+1)(u^5+u^4+2u^3+u^2+u+1)^2$ $\cdot(u^{84}+u^{83}+\cdots-1664u+101)$ |
| $c_8$ | $u^{10}(u^4+u^3+3u^2+2u+1)(u^{84}+2u^{83}+\cdots+3072u+1024)$ |
| $c_9$ | $(u^4-5u^3+7u^2-2u+1)(u^5-3u^4+4u^3-u^2-u+1)^2$ $\cdot(u^{84}+4u^{83}+\cdots+3u+1)$ |
| $c_{10}$ | $((u+1)^4)(u^5-u^4+\cdots+u+1)^2(u^{84}+7u^{83}+\cdots+19u+1)$ |
| $c_{11}$ | $u^4(u^5-u^4+\cdots+u-1)^2(u^{84}-13u^{83}+\cdots+104u+16)$ |
| $c_{12}$ | $((u-1)^4)(u^5+u^4+\cdots+u-1)^2(u^{84}+7u^{83}+\cdots+19u+1)$ |

## V. Riley Polynomials

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $((y^2+y+1)^5)(y^4+5y^3+\cdots+2y+1)(y^{84}+3y^{83}+\cdots-590y+1)$ |
| $c_2, c_5$ | $((y^2+y+1)^5)(y^4+y^3+3y^2+2y+1)(y^{84}+43y^{83}+\cdots-18y+1)$ |
| $c_3$ | $(y^2+y+1)^5(y^4+9y^3+31y^2+19y+4)$<br>$\cdot(y^{84}-37y^{83}+\cdots-5800852456y+2231239696)$ |
| $c_4, c_8$ | $y^{10}(y^4+5y^3+7y^2+2y+1)$<br>$\cdot(y^{84}-50y^{83}+\cdots-22020096y+1048576)$ |
| $c_6$ | $(y^4+10y^3+31y^2-11y+1)(y^5-5y^4+8y^3-3y^2-y-1)^2$<br>$\cdot(y^{84}+85y^{83}+\cdots-18778069822y+1128220921)$ |
| $c_7$ | $(y^4+10y^3+31y^2-11y+1)(y^5+3y^4+4y^3+y^2-y-1)^2$<br>$\cdot(y^{84}+69y^{83}+\cdots-1278338y+10201)$ |
| $c_9$ | $(y^4-11y^3+31y^2+10y+1)(y^5-y^4+8y^3-3y^2+3y-1)^2$<br>$\cdot(y^{84}-24y^{83}+\cdots+11y+1)$ |
| $c_{10}, c_{12}$ | $(y-1)^4(y^5-5y^4+8y^3-3y^2-y-1)^2$<br>$\cdot(y^{84}-49y^{83}+\cdots-211y+1)$ |
| $c_{11}$ | $y^4(y^5+3y^4+\cdots-y-1)^2(y^{84}-21y^{83}+\cdots-19776y+256)$ |