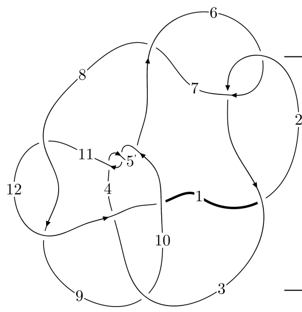
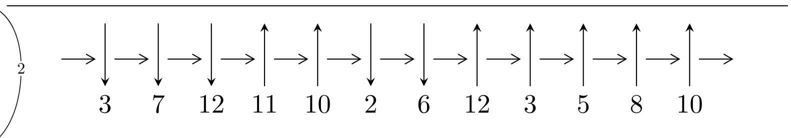
# $12n_{0580}$ ($K12n_{0580}$)




A knot diagram[1]

**Linearized knot diagam**




**Solving Sequence**

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

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

$$\begin{aligned}
I_1^u &= \langle -3u^{20} + 14u^{19} + \cdots + 2b - 4,\ -u^{20} + 3u^{19} + \cdots + 2a + 3,\ u^{21} - 6u^{20} + \cdots + 26u - 4 \rangle \\
I_2^u &= \langle -463u^5a^3 - 277u^5a^2 + \cdots - 1475a - 789,\ -u^5a^3 - 2u^5a^2 + \cdots - 2a + 6,\ u^6 + u^5 - u^4 - 2u^3 + u + 1 \rangle \\
I_3^u &= \langle -u^{11} + 2u^9 - u^8 - 5u^7 + u^6 + 5u^5 - 2u^4 - 5u^3 + u^2 + b + u, \\
&\quad - u^{10} + 2u^8 - u^7 - 5u^6 + u^5 + 5u^4 - 2u^3 - 5u^2 + a + u + 1, \\
&\quad u^{13} - u^{12} - 2u^{11} + 3u^{10} + 4u^9 - 6u^8 - 4u^7 + 8u^6 + 3u^5 - 7u^4 + 3u^2 - 1 \rangle
\end{aligned}$$

* 3 irreducible components of $\dim_{\mathbb{C}} = 0$, with total 58 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. $I_1^u = \langle -3u^{20}+14u^{19}+\cdots+2b-4,\ -u^{20}+3u^{19}+\cdots+2a+3,\ u^{21}-6u^{20}+\cdots+26u-4 \rangle$

**(i) Arc colorings**

$$a_2 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

$$a_7 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$

$$a_3 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$

$$a_1 = \begin{pmatrix} -u^2+1 \\ -u^4 \end{pmatrix}$$

$$a_6 = \begin{pmatrix} u \\ u \end{pmatrix}$$

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

$$a_{10} = \begin{pmatrix} \frac{1}{2}u^{20} - \frac{3}{2}u^{19} + \cdots + 13u - \frac{3}{2} \\ \frac{3}{2}u^{20} - 7u^{19} + \cdots - \frac{29}{2}u + 2 \end{pmatrix}$$

$$a_5 = \begin{pmatrix} -\frac{1}{4}u^{20} + 3u^{19} + \cdots + \frac{79}{4}u - 4 \\ \frac{3}{2}u^{20} - 5u^{19} + \cdots + \frac{7}{2}u - 1 \end{pmatrix}$$

$$a_9 = \begin{pmatrix} u^{20} - \frac{9}{2}u^{19} + \cdots - \frac{19}{2}u + \frac{5}{2} \\ \frac{3}{2}u^{20} - 6u^{19} + \cdots - \frac{25}{2}u + 2 \end{pmatrix}$$

$$a_{12} = \begin{pmatrix} \frac{7}{4}u^{20} - 7u^{19} + \cdots - \frac{21}{4}u + 2 \\ \frac{7}{2}u^{20} - 16u^{19} + \cdots - \frac{89}{2}u + 7 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} u^{20} - \frac{5}{2}u^{19} + \cdots + \frac{25}{2}u - \frac{3}{2} \\ \frac{3}{2}u^{20} - 6u^{19} + \cdots - \frac{25}{2}u + 2 \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} \frac{15}{4}u^{20} - 14u^{19} + \cdots + \frac{35}{4}u - 2 \\ \frac{17}{2}u^{20} - 40u^{19} + \cdots - \frac{221}{2}u + 17 \end{pmatrix}$$

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

**(iii) Cusp Shapes**
$= -3u^{20} + 15u^{19} - 25u^{18} - 10u^{17} + 97u^{16} - 118u^{15} - 47u^{14} + 243u^{13} - 133u^{12} - 247u^{11} + 362u^{10} + 66u^9 - 512u^8 + 368u^7 + 162u^6 - 389u^5 + 165u^4 + 104u^3 - 120u^2 + 34u + 10$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1, c_7$ | $u^{21} + 8u^{20} + \cdots + 188u + 16$ |
| $c_2, c_6$ | $u^{21} - 6u^{20} + \cdots + 26u - 4$ |
| $c_3$ | $u^{21} - 2u^{20} + \cdots + 5u - 1$ |
| $c_4, c_5, c_9$ <br> $c_{10}$ | $u^{21} + 13u^{19} + \cdots + u - 1$ |
| $c_8, c_{11}$ | $u^{21} - 16u^{20} + \cdots + 480u - 64$ |
| $c_{12}$ | $u^{21} - 3u^{20} + \cdots - 11u - 1$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_7$ | $y^{21} + 12y^{20} + \cdots + 9072y - 256$ |
| $c_2, c_6$ | $y^{21} - 8y^{20} + \cdots + 188y - 16$ |
| $c_3$ | $y^{21} - 36y^{20} + \cdots + 47y - 1$ |
| $c_4, c_5, c_9$<br>$c_{10}$ | $y^{21} + 26y^{20} + \cdots - y - 1$ |
| $c_8, c_{11}$ | $y^{21} - 6y^{20} + \cdots - 7168y - 4096$ |
| $c_{12}$ | $y^{21} + 33y^{20} + \cdots + 43y - 1$ |

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

| Solutions to $I_1^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.935175 + 0.517534I$<br>$a = -1.110460 - 0.861684I$<br>$b = -0.59252 - 1.38052I$ | $0.24926 - 3.91469I$ | $2.72764 + 7.21725I$ |
| $u = 0.935175 - 0.517534I$<br>$a = -1.110460 + 0.861684I$<br>$b = -0.59252 + 1.38052I$ | $0.24926 + 3.91469I$ | $2.72764 - 7.21725I$ |
| $u = 0.448329 + 0.989827I$<br>$a = -0.363224 - 1.287660I$<br>$b = 1.11171 - 0.93682I$ | $-10.43170 + 7.68453I$ | $-0.20664 - 3.05097I$ |
| $u = 0.448329 - 0.989827I$<br>$a = -0.363224 + 1.287660I$<br>$b = 1.11171 + 0.93682I$ | $-10.43170 - 7.68453I$ | $-0.20664 + 3.05097I$ |
| $u = 0.528861 + 1.017090I$<br>$a = -0.085943 + 1.202340I$<br>$b = -1.268340 + 0.548462I$ | $-9.86050 - 1.84914I$ | $-0.90690 + 1.69467I$ |
| $u = 0.528861 - 1.017090I$<br>$a = -0.085943 - 1.202340I$<br>$b = -1.268340 - 0.548462I$ | $-9.86050 + 1.84914I$ | $-0.90690 - 1.69467I$ |
| $u = -0.821760 + 0.209360I$<br>$a = 0.270782 - 0.182803I$<br>$b = -0.184246 + 0.206911I$ | $-1.40817 + 0.64438I$ | $-3.79274 - 1.22685I$ |
| $u = -0.821760 - 0.209360I$<br>$a = 0.270782 + 0.182803I$<br>$b = -0.184246 - 0.206911I$ | $-1.40817 - 0.64438I$ | $-3.79274 + 1.22685I$ |
| $u = -0.896473 + 0.746587I$<br>$a = -0.309151 + 0.124372I$<br>$b = 0.184291 - 0.342305I$ | $4.28731 + 2.84851I$ | $0.39482 - 1.73871I$ |
| $u = -0.896473 - 0.746587I$<br>$a = -0.309151 - 0.124372I$<br>$b = 0.184291 + 0.342305I$ | $4.28731 - 2.84851I$ | $0.39482 + 1.73871I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.677418 + 0.397216I$<br>$a = 1.51417 + 0.36850I$<br>$b = 0.879349 + 0.851081I$ | $1.096940 - 0.102856I$ | $7.06481 + 1.59045I$ |
| $u = 0.677418 - 0.397216I$<br>$a = 1.51417 - 0.36850I$<br>$b = 0.879349 - 0.851081I$ | $1.096940 + 0.102856I$ | $7.06481 - 1.59045I$ |
| $u = 0.904796 + 0.829662I$<br>$a = 0.401041 - 0.496617I$<br>$b = 0.774885 - 0.116608I$ | $4.71470 - 3.09578I$ | $-3.27109 + 3.56536I$ |
| $u = 0.904796 - 0.829662I$<br>$a = 0.401041 + 0.496617I$<br>$b = 0.774885 + 0.116608I$ | $4.71470 + 3.09578I$ | $-3.27109 - 3.56536I$ |
| $u = -1.327590 + 0.030849I$<br>$a = -0.070884 + 0.549935I$<br>$b = 0.077139 - 0.732274I$ | $-17.1548 - 4.6029I$ | $-4.70163 + 2.09700I$ |
| $u = -1.327590 - 0.030849I$<br>$a = -0.070884 - 0.549935I$<br>$b = 0.077139 + 0.732274I$ | $-17.1548 + 4.6029I$ | $-4.70163 - 2.09700I$ |
| $u = 1.176180 + 0.678965I$<br>$a = 1.80081 - 0.07045I$<br>$b = 2.16591 + 1.13982I$ | $-12.7012 - 13.7507I$ | $-1.99835 + 6.85375I$ |
| $u = 1.176180 - 0.678965I$<br>$a = 1.80081 + 0.07045I$<br>$b = 2.16591 - 1.13982I$ | $-12.7012 + 13.7507I$ | $-1.99835 - 6.85375I$ |
| $u = 1.175240 + 0.726178I$<br>$a = -1.45480 + 0.41477I$<br>$b = -2.01093 - 0.56899I$ | $-11.89320 - 4.50624I$ | $-2.44659 + 2.53964I$ |
| $u = 1.175240 - 0.726178I$<br>$a = -1.45480 - 0.41477I$<br>$b = -2.01093 + 0.56899I$ | $-11.89320 + 4.50624I$ | $-2.44659 - 2.53964I$ |

| Solutions to $I_1^u$ | | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|---|
| $u =$ | 0.399649 | | |
| $a =$ | 1.81531 | 0.927006 | 12.2730 |
| $b =$ | 0.725488 | | |

**II.** $I_2^u = \langle -463u^5a^3 - 277u^5a^2 + \cdots - 1475a - 789,\ -u^5a^3 - 2u^5a^2 + \cdots - 2a + 6,\ u^6 + u^5 - u^4 - 2u^3 + u + 1\rangle$

**(i) Arc colorings**

$$a_2 = \begin{pmatrix}1\\0\end{pmatrix}$$
$$a_7 = \begin{pmatrix}0\\u\end{pmatrix}$$
$$a_3 = \begin{pmatrix}1\\u^2\end{pmatrix}$$
$$a_1 = \begin{pmatrix}-u^2+1\\-u^4\end{pmatrix}$$
$$a_6 = \begin{pmatrix}u\\u\end{pmatrix}$$
$$a_8 = \begin{pmatrix}-u^3\\-u^3+u\end{pmatrix}$$
$$a_{10} = \begin{pmatrix}a\\0.246670a^3u^5 + 0.147576a^2u^5 + \cdots + 0.785828a + 0.420352\end{pmatrix}$$
$$a_5 = \begin{pmatrix}-0.161961a^3u^5 - 0.461907a^2u^5 + \cdots - 0.777304a - 0.0340970\\-0.621204a^3u^5 - 1.02824a^2u^5 + \cdots + 0.604156a - 1.49920\end{pmatrix}$$
$$a_9 = \begin{pmatrix}-0.246670a^3u^5 - 0.147576a^2u^5 + \cdots + 0.214172a - 0.420352\\-0.0223761a^3u^5 - 0.728290a^2u^5 + \cdots + 1.28077a + 0.784763\end{pmatrix}$$
$$a_{12} = \begin{pmatrix}-0.247736a^3u^5 - 0.420352a^2u^5 + \cdots + 0.465637a + 0.474161\\-0.656367a^3u^5 - 0.0298348a^2u^5 + \cdots - 0.0974960a - 2.98029\end{pmatrix}$$
$$a_4 = \begin{pmatrix}0.134790a^3u^5 + 0.506127a^2u^5 + \cdots + 0.189664a + 1.34417\\1.31700a^3u^5 - 0.849227a^2u^5 + \cdots + 1.18913a + 5.38253\end{pmatrix}$$
$$a_{11} = \begin{pmatrix}-0.228556a^3u^5 - 0.510389a^2u^5 + \cdots - 0.0607352a + 0.372936\\-0.983484a^3u^5 - 0.771977a^2u^5 + \cdots + 0.102291a - 3.36494\end{pmatrix}$$

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

**(iii) Cusp Shapes** $= \frac{808}{1877}u^5a^3 + \frac{4132}{1877}u^5a^2 + \cdots - \frac{2988}{1877}a - \frac{6350}{1877}$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1, c_7$ | $(u^6 + 3u^5 + 5u^4 + 4u^3 + 2u^2 + u + 1)^4$ |
| $c_2, c_6$ | $(u^6 + u^5 - u^4 - 2u^3 + u + 1)^4$ |
| $c_3$ | $u^{24} - 3u^{23} + \cdots + 54u + 43$ |
| $c_4, c_5, c_9$<br>$c_{10}$ | $u^{24} - u^{23} + \cdots + 148u + 43$ |
| $c_8, c_{11}$ | $(u^2 + u + 1)^{12}$ |
| $c_{12}$ | $u^{24} + 9u^{23} + \cdots + 376u + 229$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_7$ | $(y^6 + y^5 + 5y^4 + 6y^2 + 3y + 1)^4$ |
| $c_2, c_6$ | $(y^6 - 3y^5 + 5y^4 - 4y^3 + 2y^2 - y + 1)^4$ |
| $c_3$ | $y^{24} - 33y^{23} + \cdots - 52280y + 1849$ |
| $c_4, c_5, c_9$ $c_{10}$ | $y^{24} + 27y^{23} + \cdots + 36576y + 1849$ |
| $c_8, c_{11}$ | $(y^2 + y + 1)^{12}$ |
| $c_{12}$ | $y^{24} + 27y^{23} + \cdots + 65640y + 52441$ |

### (vi) Complex Volumes and Cusp Shapes

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.002190 + 0.295542I$<br>$a = -1.050380 + 0.369608I$<br>$b = -1.20802 - 1.30034I$ | $-6.82541 - 2.95419I$ | $-5.71672 + 4.25833I$ |
| $u = 1.002190 + 0.295542I$<br>$a = -0.081771 + 0.727533I$<br>$b = 0.40776 + 1.96764I$ | $-6.82541 + 1.10558I$ | $-5.71672 - 2.66988I$ |
| $u = 1.002190 + 0.295542I$<br>$a = -1.46095 - 0.86667I$<br>$b = -1.161920 + 0.059986I$ | $-6.82541 - 2.95419I$ | $-5.71672 + 4.25833I$ |
| $u = 1.002190 + 0.295542I$<br>$a = 0.90697 + 1.69587I$<br>$b = -0.296966 + 0.704962I$ | $-6.82541 + 1.10558I$ | $-5.71672 - 2.66988I$ |
| $u = 1.002190 - 0.295542I$<br>$a = -1.050380 - 0.369608I$<br>$b = -1.20802 + 1.30034I$ | $-6.82541 + 2.95419I$ | $-5.71672 - 4.25833I$ |
| $u = 1.002190 - 0.295542I$<br>$a = -0.081771 - 0.727533I$<br>$b = 0.40776 - 1.96764I$ | $-6.82541 - 1.10558I$ | $-5.71672 + 2.66988I$ |
| $u = 1.002190 - 0.295542I$<br>$a = -1.46095 + 0.86667I$<br>$b = -1.161920 - 0.059986I$ | $-6.82541 + 2.95419I$ | $-5.71672 - 4.25833I$ |
| $u = 1.002190 - 0.295542I$<br>$a = 0.90697 - 1.69587I$<br>$b = -0.296966 - 0.704962I$ | $-6.82541 - 1.10558I$ | $-5.71672 + 2.66988I$ |
| $u = -0.428243 + 0.664531I$<br>$a = 0.820716 - 0.925536I$<br>$b = -0.50645 - 1.55897I$ | $-3.04420 - 2.95419I$ | $1.71672 + 4.25833I$ |
| $u = -0.428243 + 0.664531I$<br>$a = 0.481772 - 1.278420I$<br>$b = -1.056330 - 0.348684I$ | $-3.04420 + 1.10558I$ | $1.71672 - 2.66988I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.428243 + 0.664531I$<br>$a = 0.353054 + 1.362070I$<br>$b = 0.643235 + 0.867628I$ | $-3.04420 + 1.10558I$ | $1.71672 - 2.66988I$ |
| $u = -0.428243 + 0.664531I$<br>$a = -1.31057 + 1.60669I$<br>$b = 0.263581 + 0.941746I$ | $-3.04420 - 2.95419I$ | $1.71672 + 4.25833I$ |
| $u = -0.428243 - 0.664531I$<br>$a = 0.820716 + 0.925536I$<br>$b = -0.50645 + 1.55897I$ | $-3.04420 + 2.95419I$ | $1.71672 - 4.25833I$ |
| $u = -0.428243 - 0.664531I$<br>$a = 0.481772 + 1.278420I$<br>$b = -1.056330 + 0.348684I$ | $-3.04420 - 1.10558I$ | $1.71672 + 2.66988I$ |
| $u = -0.428243 - 0.664531I$<br>$a = 0.353054 - 1.362070I$<br>$b = 0.643235 - 0.867628I$ | $-3.04420 - 1.10558I$ | $1.71672 + 2.66988I$ |
| $u = -0.428243 - 0.664531I$<br>$a = -1.31057 - 1.60669I$<br>$b = 0.263581 - 0.941746I$ | $-3.04420 + 2.95419I$ | $1.71672 - 4.25833I$ |
| $u = -1.073950 + 0.558752I$<br>$a = -1.35473 - 0.44637I$<br>$b = -1.82694 + 0.82770I$ | $-4.93480 + 3.66314I$ | $-2.00000 - 2.04647I$ |
| $u = -1.073950 + 0.558752I$<br>$a = 1.65432 + 0.08999I$<br>$b = 1.70432 - 0.27758I$ | $-4.93480 + 3.66314I$ | $-2.00000 - 2.04647I$ |
| $u = -1.073950 + 0.558752I$<br>$a = 1.65472 - 0.61469I$<br>$b = 1.97136 - 1.75360I$ | $-4.93480 + 7.72290I$ | $-2.00000 - 8.97467I$ |
| $u = -1.073950 + 0.558752I$<br>$a = -2.11314 + 0.53343I$<br>$b = -1.43363 + 1.58473I$ | $-4.93480 + 7.72290I$ | $-2.00000 - 8.97467I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-1.073950-0.558752I$<br>$a=-1.35473+0.44637I$<br>$b=-1.82694-0.82770I$ | $-4.93480-3.66314I$ | $-2.00000+2.04647I$ |
| $u=-1.073950-0.558752I$<br>$a=\quad 1.65432-0.08999I$<br>$b=\quad 1.70432+0.27758I$ | $-4.93480-3.66314I$ | $-2.00000+2.04647I$ |
| $u=-1.073950-0.558752I$<br>$a=\quad 1.65472+0.61469I$<br>$b=\quad 1.97136+1.75360I$ | $-4.93480-7.72290I$ | $-2.00000+8.97467I$ |
| $u=-1.073950-0.558752I$<br>$a=-2.11314-0.53343I$<br>$b=-1.43363-1.58473I$ | $-4.93480-7.72290I$ | $-2.00000+8.97467I$ |

**III.**

$\boldsymbol{I_3^u = \langle -u^{11}+2u^9+\cdots+b+u,\ -u^{10}+2u^8+\cdots+a+1,\ u^{13}-u^{12}+\cdots+3u^2-1\rangle}$

**(i) Arc colorings**

$$a_2 = \begin{pmatrix}1\\0\end{pmatrix}$$

$$a_7 = \begin{pmatrix}0\\u\end{pmatrix}$$

$$a_3 = \begin{pmatrix}1\\u^2\end{pmatrix}$$

$$a_1 = \begin{pmatrix}-u^2+1\\-u^4\end{pmatrix}$$

$$a_6 = \begin{pmatrix}u\\u\end{pmatrix}$$

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

$$a_{10} = \begin{pmatrix}u^{10}-2u^8+u^7+5u^6-u^5-5u^4+2u^3+5u^2-u-1\\u^{11}-2u^9+u^8+5u^7-u^6-5u^5+2u^4+5u^3-u^2-u\end{pmatrix}$$

$$a_5 = \begin{pmatrix}-u^{12}-u^{11}+\cdots+4u-1\\-2u^{12}+5u^{10}-u^9-11u^8+2u^7+14u^6-3u^5-13u^4+3u^3+6u^2-1\end{pmatrix}$$

$$a_9 = \begin{pmatrix}u^{12}-u^{11}-u^{10}+3u^9+2u^8-5u^7+u^6+6u^5-2u^4-4u^3+5u^2-1\\u^{11}-2u^9+u^8+4u^7-u^6-4u^5+2u^4+3u^3-u^2\end{pmatrix}$$

$$a_{12} = \begin{pmatrix}u^{12}-3u^{10}+7u^8-10u^6+11u^4+u^3-7u^2+3\\u^{12}-u^{11}+\cdots+2u+1\end{pmatrix}$$

$$a_4 = \begin{pmatrix}-u^{11}+u^{10}+2u^9-4u^8-4u^7+7u^6+4u^5-10u^4-3u^3+8u^2+u-2\\-u^{12}+u^{11}+\cdots-2u-1\end{pmatrix}$$

$$a_{11} = \begin{pmatrix}u^{12}-3u^{10}+7u^8-11u^6+12u^4+u^3-8u^2+3\\u^{12}-u^{11}+\cdots+2u+2\end{pmatrix}$$

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

**(iii) Cusp Shapes**

$= -u^{12}-3u^{11}+4u^{10}+4u^9-9u^8-11u^7+15u^6+9u^5-18u^4-6u^3+13u^2-3u-5$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $u^{13} - 5u^{12} + \cdots + 6u - 1$ |
| $c_2$ | $u^{13} - u^{12} - 2u^{11} + 3u^{10} + 4u^9 - 6u^8 - 4u^7 + 8u^6 + 3u^5 - 7u^4 + 3u^2 - 1$ |
| $c_3$ | $u^{13} + 2u^{12} + \cdots + 9u + 3$ |
| $c_4, c_5, c_9$ | $u^{13} + 8u^{11} + \cdots + 5u + 1$ |
| $c_6$ | $u^{13} + u^{12} - 2u^{11} - 3u^{10} + 4u^9 + 6u^8 - 4u^7 - 8u^6 + 3u^5 + 7u^4 - 3u^2 + 1$ |
| $c_7$ | $u^{13} + 5u^{12} + \cdots + 6u + 1$ |
| $c_8$ | $u^{13} - 3u^{12} + \cdots - 3u + 1$ |
| $c_{10}$ | $u^{13} + 8u^{11} + \cdots + 5u - 1$ |
| $c_{11}$ | $u^{13} + 3u^{12} + \cdots - 3u - 1$ |
| $c_{12}$ | $u^{13} + 3u^{12} + \cdots - 3u - 1$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_7$ | $y^{13} + 11y^{12} + \cdots - 10y - 1$ |
| $c_2, c_6$ | $y^{13} - 5y^{12} + \cdots + 6y - 1$ |
| $c_3$ | $y^{13} - 6y^{12} + \cdots + 39y - 9$ |
| $c_4, c_5, c_9$<br>$c_{10}$ | $y^{13} + 16y^{12} + \cdots + 7y - 1$ |
| $c_8, c_{11}$ | $y^{13} - 7y^{12} + \cdots - 3y - 1$ |
| $c_{12}$ | $y^{13} + 3y^{12} + \cdots + 7y - 1$ |

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

| Solutions to $I_3^u$ | $\sqrt{-1}(\text{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-1.033900+0.364048I$<br>$a=\ 0.445935-0.499626I$<br>$b=-0.279166+0.678907I$ | $-6.67636+0.41487I$ | $-4.61704-2.68258I$ |
| $u=-1.033900-0.364048I$<br>$a=\ 0.445935+0.499626I$<br>$b=-0.279166-0.678907I$ | $-6.67636-0.41487I$ | $-4.61704+2.68258I$ |
| $u=\ 0.628298+0.593066I$<br>$a=\ 0.21176+2.10347I$<br>$b=-1.11445+1.44719I$ | $-4.07671+1.23383I$ | $-1.69190-0.17539I$ |
| $u=\ 0.628298-0.593066I$<br>$a=\ 0.21176-2.10347I$<br>$b=-1.11445-1.44719I$ | $-4.07671-1.23383I$ | $-1.69190+0.17539I$ |
| $u=\ 1.032670+0.557375I$<br>$a=-2.14778+0.03860I$<br>$b=-2.23946-1.15726I$ | $-5.39322-5.84865I$ | $-3.49346+5.41334I$ |
| $u=\ 1.032670-0.557375I$<br>$a=-2.14778-0.03860I$<br>$b=-2.23946+1.15726I$ | $-5.39322+5.84865I$ | $-3.49346-5.41334I$ |
| $u=\ 0.815001$<br>$a=\ 1.46736$<br>$b=\ 1.19590$ | $0.406093$ | $-5.99710$ |
| $u=-0.899575+0.799634I$<br>$a=-0.180212+0.063376I$<br>$b=\ 0.111437-0.201115I$ | $5.29164+3.00519I$ | $11.80568-1.98854I$ |
| $u=-0.899575-0.799634I$<br>$a=-0.180212-0.063376I$<br>$b=\ 0.111437+0.201115I$ | $5.29164-3.00519I$ | $11.80568+1.98854I$ |
| $u=\ 0.917844+0.874021I$<br>$a=\ 0.756497-0.845675I$<br>$b=\ 1.43348-0.11500I$ | $2.41795-3.23180I$ | $-1.51049+2.95825I$ |

| Solutions to $I_3^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.917844 - 0.874021I$<br>$a = 0.756497 + 0.845675I$<br>$b = 1.43348 + 0.11500I$ | $2.41795 + 3.23180I$ | $-1.51049 - 2.95825I$ |
| $u = -0.552837 + 0.348261I$<br>$a = 0.680116 - 1.051500I$<br>$b = -0.009797 + 0.818166I$ | $-4.92582 + 2.64511I$ | $0.50575 - 4.47671I$ |
| $u = -0.552837 - 0.348261I$<br>$a = 0.680116 + 1.051500I$<br>$b = -0.009797 - 0.818166I$ | $-4.92582 - 2.64511I$ | $0.50575 + 4.47671I$ |

## IV. u-Polynomials

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $((u^6+3u^5+5u^4+4u^3+2u^2+u+1)^4)(u^{13}-5u^{12}+\cdots+6u-1)$<br>$\cdot(u^{21}+8u^{20}+\cdots+188u+16)$ |
| $c_2$ | $(u^6+u^5-u^4-2u^3+u+1)^4$<br>$\cdot(u^{13}-u^{12}-2u^{11}+3u^{10}+4u^9-6u^8-4u^7+8u^6+3u^5-7u^4+3u^2-1)$<br>$\cdot(u^{21}-6u^{20}+\cdots+26u-4)$ |
| $c_3$ | $(u^{13}+2u^{12}+\cdots+9u+3)(u^{21}-2u^{20}+\cdots+5u-1)$<br>$\cdot(u^{24}-3u^{23}+\cdots+54u+43)$ |
| $c_4, c_5, c_9$ | $(u^{13}+8u^{11}+\cdots+5u+1)(u^{21}+13u^{19}+\cdots+u-1)$<br>$\cdot(u^{24}-u^{23}+\cdots+148u+43)$ |
| $c_6$ | $(u^6+u^5-u^4-2u^3+u+1)^4$<br>$\cdot(u^{13}+u^{12}-2u^{11}-3u^{10}+4u^9+6u^8-4u^7-8u^6+3u^5+7u^4-3u^2+1)$<br>$\cdot(u^{21}-6u^{20}+\cdots+26u-4)$ |
| $c_7$ | $((u^6+3u^5+5u^4+4u^3+2u^2+u+1)^4)(u^{13}+5u^{12}+\cdots+6u+1)$<br>$\cdot(u^{21}+8u^{20}+\cdots+188u+16)$ |
| $c_8$ | $((u^2+u+1)^{12})(u^{13}-3u^{12}+\cdots-3u+1)$<br>$\cdot(u^{21}-16u^{20}+\cdots+480u-64)$ |
| $c_{10}$ | $(u^{13}+8u^{11}+\cdots+5u-1)(u^{21}+13u^{19}+\cdots+u-1)$<br>$\cdot(u^{24}-u^{23}+\cdots+148u+43)$ |
| $c_{11}$ | $((u^2+u+1)^{12})(u^{13}+3u^{12}+\cdots-3u-1)$<br>$\cdot(u^{21}-16u^{20}+\cdots+480u-64)$ |
| $c_{12}$ | $(u^{13}+3u^{12}+\cdots-3u-1)(u^{21}-3u^{20}+\cdots-11u-1)$<br>$\cdot(u^{24}+9u^{23}+\cdots+376u+229)$ |

## V. Riley Polynomials

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_7$ | $((y^6 + y^5 + 5y^4 + 6y^2 + 3y + 1)^4)(y^{13} + 11y^{12} + \cdots - 10y - 1)$ $\cdot (y^{21} + 12y^{20} + \cdots + 9072y - 256)$ |
| $c_2, c_6$ | $((y^6 - 3y^5 + 5y^4 - 4y^3 + 2y^2 - y + 1)^4)(y^{13} - 5y^{12} + \cdots + 6y - 1)$ $\cdot (y^{21} - 8y^{20} + \cdots + 188y - 16)$ |
| $c_3$ | $(y^{13} - 6y^{12} + \cdots + 39y - 9)(y^{21} - 36y^{20} + \cdots + 47y - 1)$ $\cdot (y^{24} - 33y^{23} + \cdots - 52280y + 1849)$ |
| $c_4, c_5, c_9$ $c_{10}$ | $(y^{13} + 16y^{12} + \cdots + 7y - 1)(y^{21} + 26y^{20} + \cdots - y - 1)$ $\cdot (y^{24} + 27y^{23} + \cdots + 36576y + 1849)$ |
| $c_8, c_{11}$ | $((y^2 + y + 1)^{12})(y^{13} - 7y^{12} + \cdots - 3y - 1)$ $\cdot (y^{21} - 6y^{20} + \cdots - 7168y - 4096)$ |
| $c_{12}$ | $(y^{13} + 3y^{12} + \cdots + 7y - 1)(y^{21} + 33y^{20} + \cdots + 43y - 1)$ $\cdot (y^{24} + 27y^{23} + \cdots + 65640y + 52441)$ |