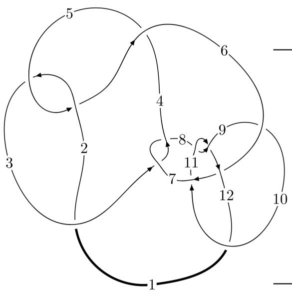
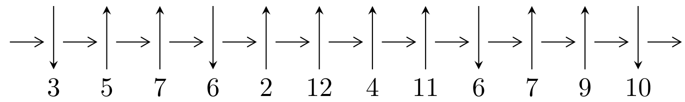
# $12n_{0231}$ ($K12n_{0231}$)




A knot diagram[1]

**Linearized knot diagam**




**Solving Sequence**

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

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

$$\begin{aligned}
I_1^u &= \langle -3.18774 \times 10^{22} u^{33} - 2.14694 \times 10^{23} u^{32} + \cdots + 1.21101 \times 10^{23} b - 1.90029 \times 10^{23}, \\
&\quad - 3.45182 \times 10^{23} u^{33} - 2.34305 \times 10^{24} u^{32} + \cdots + 2.42202 \times 10^{23} a - 4.10630 \times 10^{23}, \\
&\quad u^{34} + 7u^{33} + \cdots - 74u^2 + 1 \rangle \\
I_2^u &= \langle u^4 + u^3 + u^2 + b + 1,\ -u^8 - u^7 - 2u^6 - u^5 - 2u^4 + a + u,\ u^9 + u^8 + 2u^7 + u^6 + 3u^5 + u^4 + 2u^3 + u - 1 \rangle \\
I_3^u &= \langle 85a^4u + 42a^4 + 387a^3u + 199a^3 + 170a^2u + 84a^2 - 1331au + 661b + 641a - 639u + 563, \\
&\quad a^5 - a^4u + 6a^4 - 3a^3u + 7a^3 - 4a^2u - 2a^2 - 4au - 3a - 3u + 2,\ u^2 - u + 1 \rangle
\end{aligned}$$

* 3 irreducible components of $\dim_{\mathbb{C}} = 0$, with total 53 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.** $\boldsymbol{I_1^u = \langle -3.19\times 10^{22}u^{33} - 2.15\times 10^{23}u^{32} + \cdots + 1.21\times 10^{23}b - 1.90\times 10^{23},\ -3.45\times 10^{23}u^{33} - 2.34\times 10^{24}u^{32} + \cdots + 2.42\times 10^{23}a - 4.11\times 10^{23},\ u^{34} + 7u^{33} + \cdots - 74u^2 + 1\rangle}$

**(i) Arc colorings**

$$a_2 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_6 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_5 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} u \\ u^3 + u \end{pmatrix}$$
$$a_1 = \begin{pmatrix} u^3 \\ u^5 + u^3 + u \end{pmatrix}$$
$$a_4 = \begin{pmatrix} u^2 + 1 \\ u^2 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} 1.42518u^{33} + 9.67395u^{32} + \cdots - 42.6225u + 1.69541 \\ 0.263230u^{33} + 1.77285u^{32} + \cdots + 0.525882u + 1.56918 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} 1.68841u^{33} + 11.4468u^{32} + \cdots - 42.0967u + 3.26459 \\ 0.263230u^{33} + 1.77285u^{32} + \cdots + 0.525882u + 1.56918 \end{pmatrix}$$
$$a_{12} = \begin{pmatrix} 0.659832u^{33} + 4.48364u^{32} + \cdots - 8.51786u + 6.27891 \\ 0.167487u^{33} + 1.14300u^{32} + \cdots - 7.71333u + 0.854394 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} -1.00469u^{33} - 6.82609u^{32} + \cdots + 27.7668u - 2.41301 \\ -0.206738u^{33} - 1.42931u^{32} + \cdots + 2.41301u - 1.00469 \end{pmatrix}$$
$$a_8 = \begin{pmatrix} -1.16508u^{33} - 7.90987u^{32} + \cdots + 29.5857u - 3.25804 \\ -0.163277u^{33} - 1.11534u^{32} + \cdots + 2.61686u - 1.03391 \end{pmatrix}$$
$$a_{11} = \begin{pmatrix} 1.21680u^{33} + 8.24852u^{32} + \cdots - 28.4228u + 3.63665 \\ 0.229994u^{33} + 1.53559u^{32} + \cdots - 1.41536u + 1.36080 \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= -\frac{2386646232651966738207 57}{242201601551334258096944}u^{33} - \frac{192207794961190758657281}{30275200193916782262118}u^{32} + \cdots + \frac{308196095485435919843914 1}{242201601551334258096944}u - \frac{108096673891086962943351}{30275200193916782262118}$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1, c_4$ | $u^{34} + 23u^{33} + \cdots - 148u + 1$ |
| $c_2, c_5$ | $u^{34} + 7u^{33} + \cdots - 74u^2 + 1$ |
| $c_3, c_7$ | $u^{34} + 2u^{33} + \cdots - 3072u + 1024$ |
| $c_6$ | $u^{34} + 4u^{33} + \cdots - 3u - 1$ |
| $c_8, c_{11}$ | $u^{34} + 12u^{33} + \cdots - 11u - 1$ |
| $c_9$ | $u^{34} + 2u^{33} + \cdots - 10595u + 25489$ |
| $c_{10}$ | $u^{34} - 4u^{33} + \cdots - 666199u + 339173$ |
| $c_{12}$ | $u^{34} - 3u^{33} + \cdots - 5632u + 512$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_4$ | $y^{34} - 17y^{33} + \cdots - 14096y + 1$ |
| $c_2, c_5$ | $y^{34} + 23y^{33} + \cdots - 148y + 1$ |
| $c_3, c_7$ | $y^{34} + 50y^{33} + \cdots + 1048576y + 1048576$ |
| $c_6$ | $y^{34} - 4y^{33} + \cdots - 19y + 1$ |
| $c_8, c_{11}$ | $y^{34} - 4y^{33} + \cdots + 65y + 1$ |
| $c_9$ | $y^{34} - 36y^{33} + \cdots + 7287355609y + 649689121$ |
| $c_{10}$ | $y^{34} + 60y^{33} + \cdots - 783443850999y + 115038323929$ |
| $c_{12}$ | $y^{34} - 51y^{33} + \cdots - 3407872y + 262144$ |

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

| Solutions to $I_1^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.544020 + 0.828457I$<br>$a = -5.20844 + 3.26657I$<br>$b = -1.33192 + 0.57161I$ | $2.15188 + 2.20308I$ | $-18.1536 + 5.4483I$ |
| $u = 0.544020 - 0.828457I$<br>$a = -5.20844 - 3.26657I$<br>$b = -1.33192 - 0.57161I$ | $2.15188 - 2.20308I$ | $-18.1536 - 5.4483I$ |
| $u = 0.257238 + 0.890862I$<br>$a = -0.124907 + 0.904670I$<br>$b = 0.369797 + 0.819998I$ | $1.56878 + 0.34703I$ | $8.40786 - 0.51532I$ |
| $u = 0.257238 - 0.890862I$<br>$a = -0.124907 - 0.904670I$<br>$b = 0.369797 - 0.819998I$ | $1.56878 - 0.34703I$ | $8.40786 + 0.51532I$ |
| $u = -0.691884 + 0.838034I$<br>$a = 0.811010 + 0.201841I$<br>$b = 0.622736 - 0.920702I$ | $6.54075 + 2.05806I$ | $13.8961 - 2.8397I$ |
| $u = -0.691884 - 0.838034I$<br>$a = 0.811010 - 0.201841I$<br>$b = 0.622736 + 0.920702I$ | $6.54075 - 2.05806I$ | $13.8961 + 2.8397I$ |
| $u = 0.487947 + 1.003910I$<br>$a = -2.08476 + 1.15239I$<br>$b = 0.05782 - 1.46259I$ | $0.72250 + 2.82980I$ | $10.05148 - 3.22591I$ |
| $u = 0.487947 - 1.003910I$<br>$a = -2.08476 - 1.15239I$<br>$b = 0.05782 + 1.46259I$ | $0.72250 - 2.82980I$ | $10.05148 + 3.22591I$ |
| $u = 0.657459 + 0.922088I$<br>$a = -0.764190 + 0.647851I$<br>$b = -0.691749 - 0.367275I$ | $0.62542 + 2.57137I$ | $3.17282 - 2.86214I$ |
| $u = 0.657459 - 0.922088I$<br>$a = -0.764190 - 0.647851I$<br>$b = -0.691749 + 0.367275I$ | $0.62542 - 2.57137I$ | $3.17282 + 2.86214I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.175415 + 0.847114I$<br>$a = 0.046460 - 1.237630I$<br>$b = -0.115474 + 0.349761I$ | $-1.59132 + 1.76956I$ | $-2.73476 - 4.21364I$ |
| $u = 0.175415 - 0.847114I$<br>$a = 0.046460 + 1.237630I$<br>$b = -0.115474 - 0.349761I$ | $-1.59132 - 1.76956I$ | $-2.73476 + 4.21364I$ |
| $u = -1.132310 + 0.183127I$<br>$a = 0.002681 - 0.231147I$<br>$b = 1.39864 - 0.29584I$ | $-7.72558 + 0.90268I$ | $5.49060 + 0.21802I$ |
| $u = -1.132310 - 0.183127I$<br>$a = 0.002681 + 0.231147I$<br>$b = 1.39864 + 0.29584I$ | $-7.72558 - 0.90268I$ | $5.49060 - 0.21802I$ |
| $u = -0.623744 + 0.978086I$<br>$a = -0.574996 + 0.242105I$<br>$b = 0.236214 + 0.979802I$ | $6.07730 - 7.11588I$ | $12.1179 + 9.6630I$ |
| $u = -0.623744 - 0.978086I$<br>$a = -0.574996 - 0.242105I$<br>$b = 0.236214 - 0.979802I$ | $6.07730 + 7.11588I$ | $12.1179 - 9.6630I$ |
| $u = -1.215360 + 0.226914I$<br>$a = -0.352940 + 0.538182I$<br>$b = -2.06341 + 1.43354I$ | $-7.46169 + 8.00267I$ | $5.84717 - 3.91358I$ |
| $u = -1.215360 - 0.226914I$<br>$a = -0.352940 - 0.538182I$<br>$b = -2.06341 - 1.43354I$ | $-7.46169 - 8.00267I$ | $5.84717 + 3.91358I$ |
| $u = -0.021777 + 1.291760I$<br>$a = 1.45710 + 0.36632I$<br>$b = -0.94260 - 1.15777I$ | $-2.99715 - 2.34695I$ | $2.86038 + 3.07511I$ |
| $u = -0.021777 - 1.291760I$<br>$a = 1.45710 - 0.36632I$<br>$b = -0.94260 + 1.15777I$ | $-2.99715 + 2.34695I$ | $2.86038 - 3.07511I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.649185$<br>$a = -0.175240$<br>$b = 0.825508$ | $1.38631$ | $7.11490$ |
| $u = 0.15024 + 1.45013I$<br>$a = -1.66300 - 0.69317I$<br>$b = 2.33781 + 0.73216I$ | $-3.63061 + 2.77360I$ | $0$ |
| $u = 0.15024 - 1.45013I$<br>$a = -1.66300 + 0.69317I$<br>$b = 2.33781 - 0.73216I$ | $-3.63061 - 2.77360I$ | $0$ |
| $u = -0.65730 + 1.31359I$<br>$a = -1.22670 + 0.80696I$<br>$b = 1.26804 + 0.74707I$ | $-11.18750 - 7.23815I$ | $0$ |
| $u = -0.65730 - 1.31359I$<br>$a = -1.22670 - 0.80696I$<br>$b = 1.26804 - 0.74707I$ | $-11.18750 + 7.23815I$ | $0$ |
| $u = -0.69399 + 1.33382I$<br>$a = 1.80696 - 0.87095I$<br>$b = -1.73482 - 1.78350I$ | $-10.8926 - 14.7212I$ | $0$ |
| $u = -0.69399 - 1.33382I$<br>$a = 1.80696 + 0.87095I$<br>$b = -1.73482 + 1.78350I$ | $-10.8926 + 14.7212I$ | $0$ |
| $u = -0.46062 + 1.48862I$<br>$a = -1.34753 + 0.57888I$<br>$b = 1.88206 + 0.20245I$ | $-13.09350 - 4.80207I$ | $0$ |
| $u = -0.46062 - 1.48862I$<br>$a = -1.34753 - 0.57888I$<br>$b = 1.88206 - 0.20245I$ | $-13.09350 + 4.80207I$ | $0$ |
| $u = -0.43913 + 1.57970I$<br>$a = 1.14509 - 1.20205I$<br>$b = -2.89525 + 1.03267I$ | $-13.37580 + 1.94532I$ | $0$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-0.43913-1.57970I$<br>$a=\quad 1.14509+1.20205I$<br>$b=-2.89525-1.03267I$ | $-13.37580-1.94532I$ | 0 |
| $u=-0.207141+0.051709I$<br>$a=-1.65437+3.73289I$<br>$b=-0.331665+0.940404I$ | $0.61291+1.48611I$ | $4.79533-4.74523I$ |
| $u=-0.207141-0.051709I$<br>$a=-1.65437-3.73289I$<br>$b=-0.331665-0.940404I$ | $0.61291-1.48611I$ | $4.79533+4.74523I$ |
| $u=\quad 0.0926838$<br>$a=-6.35971$<br>$b=\quad 1.04203$ | 2.29528 | 1.25710 |

**II.** $I_2^u = \langle u^4 + u^3 + u^2 + b + 1,\ -u^8 - u^7 - 2u^6 - u^5 - 2u^4 + a + u,\ u^9 + u^8 + 2u^7 + u^6 + 3u^5 + u^4 + 2u^3 + u - 1\rangle$

**(i) Arc colorings**

$$a_2 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_6 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_5 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} u \\ u^3 + u \end{pmatrix}$$
$$a_1 = \begin{pmatrix} u^3 \\ u^5 + u^3 + u \end{pmatrix}$$
$$a_4 = \begin{pmatrix} u^2 + 1 \\ u^2 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} u^8 + u^7 + 2u^6 + u^5 + 2u^4 - u \\ -u^4 - u^3 - u^2 - 1 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} u^8 + u^7 + 2u^6 + u^5 + u^4 - u^3 - u^2 - u - 1 \\ -u^4 - u^3 - u^2 - 1 \end{pmatrix}$$
$$a_{12} = \begin{pmatrix} u^3 \\ u^5 + u^3 + u \end{pmatrix}$$
$$a_7 = \begin{pmatrix} -u^8 - u^6 - u^4 + 1 \\ -u^8 - u^7 - u^6 - 2u^5 - u^4 - 2u^3 - 2u + 1 \end{pmatrix}$$
$$a_8 = \begin{pmatrix} -u^3 \\ -u^5 - u^3 - u \end{pmatrix}$$
$$a_{11} = \begin{pmatrix} u^8 + u^7 + 2u^6 + u^5 + u^4 - u^2 - u - 1 \\ u^5 - u^4 - u^2 + u - 1 \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= 3u^8 + 9u^7 + 12u^6 + 13u^5 + 15u^4 + 15u^3 + 8u^2 + 5u + 9$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1, c_4$ | $u^9 - 3u^8 + 8u^7 - 13u^6 + 17u^5 - 17u^4 + 12u^3 - 6u^2 + u + 1$ |
| $c_2$ | $u^9 - u^8 + 2u^7 - u^6 + 3u^5 - u^4 + 2u^3 + u + 1$ |
| $c_3$ | $u^9 - u^8 - 2u^7 + 3u^6 + u^5 - 3u^4 + 2u^3 - u + 1$ |
| $c_5$ | $u^9 + u^8 + 2u^7 + u^6 + 3u^5 + u^4 + 2u^3 + u - 1$ |
| $c_6$ | $u^9 - 5u^8 + 12u^7 - 15u^6 + 9u^5 + u^4 - 4u^3 + 2u^2 + u - 1$ |
| $c_7$ | $u^9 + u^8 - 2u^7 - 3u^6 + u^5 + 3u^4 + 2u^3 - u - 1$ |
| $c_8$ | $(u + 1)^9$ |
| $c_9, c_{10}$ | $u^9 - u^8 - 2u^7 + 4u^6 - u^5 - 9u^4 + 15u^3 - 12u^2 + 5u - 1$ |
| $c_{11}$ | $(u - 1)^9$ |
| $c_{12}$ | $u^9$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_4$ | $y^9 + 7y^8 + 20y^7 + 25y^6 + 5y^5 - 15y^4 + 22y^2 + 13y - 1$ |
| $c_2, c_5$ | $y^9 + 3y^8 + 8y^7 + 13y^6 + 17y^5 + 17y^4 + 12y^3 + 6y^2 + y - 1$ |
| $c_3, c_7$ | $y^9 - 5y^8 + 12y^7 - 15y^6 + 9y^5 + y^4 - 4y^3 + 2y^2 + y - 1$ |
| $c_6$ | $y^9 - y^8 + 12y^7 - 7y^6 + 37y^5 + y^4 - 10y^2 + 5y - 1$ |
| $c_8, c_{11}$ | $(y-1)^9$ |
| $c_9, c_{10}$ | $y^9 - 5y^8 + 10y^7 - y^5 - 37y^4 + 7y^3 - 12y^2 + y - 1$ |
| $c_{12}$ | $y^9$ |

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

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.140343 + 0.966856I$<br>$a = 0.463951 - 1.179170I$<br>$b = -0.457852 + 1.072010I$ | $-0.13850 + 2.09337I$ | $3.38047 - 2.85927I$ |
| $u = 0.140343 - 0.966856I$<br>$a = 0.463951 + 1.179170I$<br>$b = -0.457852 - 1.072010I$ | $-0.13850 - 2.09337I$ | $3.38047 + 2.85927I$ |
| $u = 0.628449 + 0.875112I$<br>$a = 1.92263 - 3.37970I$<br>$b = 1.63880 - 0.65075I$ | $2.26187 + 2.45442I$ | $6.9022 - 12.4598I$ |
| $u = 0.628449 - 0.875112I$<br>$a = 1.92263 + 3.37970I$<br>$b = 1.63880 + 0.65075I$ | $2.26187 - 2.45442I$ | $6.9022 + 12.4598I$ |
| $u = -0.796005 + 0.733148I$<br>$a = -0.502055 + 0.200019I$<br>$b = -0.522253 + 0.392004I$ | $6.01628 + 1.33617I$ | $6.48878 + 2.15019I$ |
| $u = -0.796005 - 0.733148I$<br>$a = -0.502055 - 0.200019I$<br>$b = -0.522253 - 0.392004I$ | $6.01628 - 1.33617I$ | $6.48878 - 2.15019I$ |
| $u = -0.728966 + 0.986295I$<br>$a = 0.259988 - 0.648365I$<br>$b = -0.425734 - 0.444312I$ | $5.24306 - 7.08493I$ | $2.48514 + 6.49599I$ |
| $u = -0.728966 - 0.986295I$<br>$a = 0.259988 + 0.648365I$<br>$b = -0.425734 + 0.444312I$ | $5.24306 + 7.08493I$ | $2.48514 - 6.49599I$ |
| $u = 0.512358$<br>$a = -0.289029$<br>$b = -1.46592$ | 2.84338 | 17.4870 |

**III.**

$\boldsymbol{I_3^u = \langle 85a^4u+387a^3u+\cdots+641a+563,\ -a^4u-3a^3u+\cdots-3a+2,\ u^2-u+1\rangle}$

**(i) Arc colorings**

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

$$a_6 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

$$a_5 = \begin{pmatrix} 1 \\ u-1 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} u \\ u-1 \end{pmatrix}$$

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

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

$$a_{10} = \begin{pmatrix} a \\ -0.128593a^4u - 0.585477a^3u + \cdots - 0.969743a - 0.851740 \end{pmatrix}$$

$$a_9 = \begin{pmatrix} -0.128593a^4u - 0.585477a^3u + \cdots + 0.0302572a - 0.851740 \\ -0.128593a^4u - 0.585477a^3u + \cdots - 0.969743a - 0.851740 \end{pmatrix}$$

$$a_{12} = \begin{pmatrix} -0.00605144a^4u + 0.0665658a^3u + \cdots - 0.527988a - 0.487141 \\ 0.337368a^4u + 1.28896a^3u + \cdots + 0.685325a - 0.341906 \end{pmatrix}$$

$$a_7 = \begin{pmatrix} 0.0862330a^4u + 0.0514372a^3u + \cdots - 2.72617a + 1.44175 \\ 0.611195a^4u + 2.27685a^3u + \cdots + 1.32678a + 1.20121 \end{pmatrix}$$

$$a_8 = \begin{pmatrix} 0.0862330a^4u + 0.0514372a^3u + \cdots - 2.72617a + 1.44175 \\ 0.611195a^4u + 2.27685a^3u + \cdots + 1.32678a + 1.20121 \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} 0.0226929a^4u - 0.249622a^3u + \cdots - 2.77005a + 1.32678 \\ 0.611195a^4u + 2.27685a^3u + \cdots + 1.32678a + 1.20121 \end{pmatrix}$$

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

**(iii) Cusp Shapes**

$= \frac{1623}{661}a^4u + \frac{522}{661}a^4 + \frac{5282}{661}a^3u + \frac{4173}{661}a^3 - \frac{2703}{661}a^2u + \frac{3688}{661}a^2 - \frac{9177}{661}au + \frac{2301}{661}a - \frac{2465}{661}u + \frac{6714}{661}$

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

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

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

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

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

| Solutions to $I_3^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.500000 + 0.866025I$<br>$a = 0.953786 + 0.485650I$<br>$b = -0.455697 + 1.200150I$ | $5.87256 + 6.43072I$ | $6.63163 - 0.01393I$ |
| $u = 0.500000 + 0.866025I$<br>$a = -1.124940 + 0.303641I$<br>$b = -0.455697 - 1.200150I$ | $5.87256 - 2.37095I$ | $3.55752 + 5.27247I$ |
| $u = 0.500000 + 0.866025I$<br>$a = -1.42401 - 0.21550I$<br>$b = 0.339110 - 0.822375I$ | $0.32910 + 3.56046I$ | $3.07628 - 9.77765I$ |
| $u = 0.500000 + 0.866025I$<br>$a = 0.000387 - 0.371855I$<br>$b = 0.339110 + 0.822375I$ | $0.329100 + 0.499304I$ | $3.01153 - 0.88894I$ |
| $u = 0.500000 + 0.866025I$<br>$a = -3.90523 + 0.66409I$<br>$b = -0.766826$ | $2.40108 + 2.02988I$ | $9.72304 + 3.67600I$ |
| $u = 0.500000 - 0.866025I$<br>$a = 0.953786 - 0.485650I$<br>$b = -0.455697 - 1.200150I$ | $5.87256 - 6.43072I$ | $6.63163 + 0.01393I$ |
| $u = 0.500000 - 0.866025I$<br>$a = -1.124940 - 0.303641I$<br>$b = -0.455697 + 1.200150I$ | $5.87256 + 2.37095I$ | $3.55752 - 5.27247I$ |
| $u = 0.500000 - 0.866025I$<br>$a = -1.42401 + 0.21550I$<br>$b = 0.339110 + 0.822375I$ | $0.32910 - 3.56046I$ | $3.07628 + 9.77765I$ |
| $u = 0.500000 - 0.866025I$<br>$a = 0.000387 + 0.371855I$<br>$b = 0.339110 - 0.822375I$ | $0.329100 - 0.499304I$ | $3.01153 + 0.88894I$ |
| $u = 0.500000 - 0.866025I$<br>$a = -3.90523 - 0.66409I$<br>$b = -0.766826$ | $2.40108 - 2.02988I$ | $9.72304 - 3.67600I$ |

## IV. u-Polynomials

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1, c_4$ | $(u^2-u+1)^5$ <br> $\cdot(u^9-3u^8+8u^7-13u^6+17u^5-17u^4+12u^3-6u^2+u+1)$ <br> $\cdot(u^{34}+23u^{33}+\cdots-148u+1)$ |
| $c_2$ | $(u^2+u+1)^5(u^9-u^8+2u^7-u^6+3u^5-u^4+2u^3+u+1)$ <br> $\cdot(u^{34}+7u^{33}+\cdots-74u^2+1)$ |
| $c_3$ | $u^{10}(u^9-u^8-2u^7+3u^6+u^5-3u^4+2u^3-u+1)$ <br> $\cdot(u^{34}+2u^{33}+\cdots-3072u+1024)$ |
| $c_5$ | $(u^2-u+1)^5(u^9+u^8+2u^7+u^6+3u^5+u^4+2u^3+u-1)$ <br> $\cdot(u^{34}+7u^{33}+\cdots-74u^2+1)$ |
| $c_6$ | $(u^5+3u^4+4u^3+u^2-u-1)^2$ <br> $\cdot(u^9-5u^8+12u^7-15u^6+9u^5+u^4-4u^3+2u^2+u-1)$ <br> $\cdot(u^{34}+4u^{33}+\cdots-3u-1)$ |
| $c_7$ | $u^{10}(u^9+u^8-2u^7-3u^6+u^5+3u^4+2u^3-u-1)$ <br> $\cdot(u^{34}+2u^{33}+\cdots-3072u+1024)$ |
| $c_8$ | $((u+1)^9)(u^5-u^4+\cdots+u+1)^2(u^{34}+12u^{33}+\cdots-11u-1)$ |
| $c_9$ | $(u^5-u^4+2u^3-u^2+u-1)^2$ <br> $\cdot(u^9-u^8-2u^7+4u^6-u^5-9u^4+15u^3-12u^2+5u-1)$ <br> $\cdot(u^{34}+2u^{33}+\cdots-10595u+25489)$ |
| $c_{10}$ | $(u^5+u^4-2u^3-u^2+u-1)^2$ <br> $\cdot(u^9-u^8-2u^7+4u^6-u^5-9u^4+15u^3-12u^2+5u-1)$ <br> $\cdot(u^{34}-4u^{33}+\cdots-666199u+339173)$ |
| $c_{11}$ | $((u-1)^9)(u^5+u^4+\cdots+u-1)^2(u^{34}+12u^{33}+\cdots-11u-1)$ |
| $c_{12}$ | $u^9(u^5-u^4+\cdots+u-1)^2(u^{34}-3u^{33}+\cdots-5632u+512)$ |

## V. Riley Polynomials

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_4$ | $((y^2+y+1)^5)(y^9+7y^8+\cdots+13y-1)$ <br> $\cdot(y^{34}-17y^{33}+\cdots-14096y+1)$ |
| $c_2, c_5$ | $(y^2+y+1)^5$ <br> $\cdot(y^9+3y^8+8y^7+13y^6+17y^5+17y^4+12y^3+6y^2+y-1)$ <br> $\cdot(y^{34}+23y^{33}+\cdots-148y+1)$ |
| $c_3, c_7$ | $y^{10}(y^9-5y^8+12y^7-15y^6+9y^5+y^4-4y^3+2y^2+y-1)$ <br> $\cdot(y^{34}+50y^{33}+\cdots+1048576y+1048576)$ |
| $c_6$ | $(y^5-y^4+8y^3-3y^2+3y-1)^2$ <br> $\cdot(y^9-y^8+12y^7-7y^6+37y^5+y^4-10y^2+5y-1)$ <br> $\cdot(y^{34}-4y^{33}+\cdots-19y+1)$ |
| $c_8, c_{11}$ | $((y-1)^9)(y^5-5y^4+\cdots-y-1)^2(y^{34}-4y^{33}+\cdots+65y+1)$ |
| $c_9$ | $(y^5+3y^4+4y^3+y^2-y-1)^2$ <br> $\cdot(y^9-5y^8+10y^7-y^5-37y^4+7y^3-12y^2+y-1)$ <br> $\cdot(y^{34}-36y^{33}+\cdots+7287355609y+649689121)$ |
| $c_{10}$ | $(y^5-5y^4+8y^3-3y^2-y-1)^2$ <br> $\cdot(y^9-5y^8+10y^7-y^5-37y^4+7y^3-12y^2+y-1)$ <br> $\cdot(y^{34}+60y^{33}+\cdots-783443850999y+115038323929)$ |
| $c_{12}$ | $y^9(y^5+3y^4+4y^3+y^2-y-1)^2$ <br> $\cdot(y^{34}-51y^{33}+\cdots-3407872y+262144)$ |