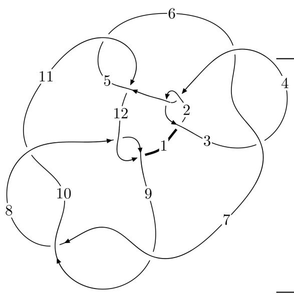
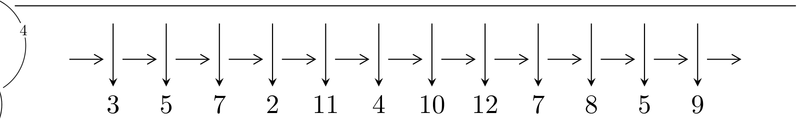
# $12n_{0136}$ ($K12n_{0136}$)




A knot diagram[1]

**Linearized knot diagam**




**Solving Sequence**

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

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

$$I_1^u = \langle -8.90997\times 10^{57}u^{44} - 6.51627\times 10^{58}u^{43} + \cdots + 1.48622\times 10^{59}b + 7.97191\times 10^{58},$$
$$1.29931\times 10^{59}u^{44} + 1.18228\times 10^{60}u^{43} + \cdots + 5.94490\times 10^{59}a - 4.97521\times 10^{60},\ u^{45} + 7u^{44} + \cdots + 12u -$$
$$I_2^u = \langle b,\ 3u^7 + 5u^6 - 7u^5 - 11u^4 + 5u^3 + 3u^2 + a + 7,\ u^8 + u^7 - 3u^6 - 2u^5 + 3u^4 + 2u - 1\rangle$$
$$I_3^u = \langle 5a^2u - 3a^2 + 12au + b - 7a + 3u - 1,\ a^3 - a^2u + a^2 + 3au + 6a + 3u + 5,\ u^2 + u - 1\rangle$$
$$I_4^u = \langle b + a - 2,\ a^2 - 3a + 1,\ u - 1\rangle$$

* 4 irreducible components of $\dim_{\mathbb{C}} = 0$, with total 61 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.** $\boldsymbol{I_1^u = \langle -8.91 \times 10^{57} u^{44} - 6.52 \times 10^{58} u^{43} + \cdots + 1.49 \times 10^{59} b + 7.97 \times 10^{58},\ 1.30 \times 10^{59} u^{44} + 1.18 \times 10^{60} u^{43} + \cdots + 5.94 \times 10^{59} a - 4.98 \times 10^{60},\ u^{45} + 7u^{44} + \cdots + 12u - 1 \rangle}$

**(i) Arc colorings**

$$a_7 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_8 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$
$$a_4 = \begin{pmatrix} -0.218558u^{44} - 1.98872u^{43} + \cdots - 84.8505u + 8.36887 \\ 0.0599504u^{44} + 0.438445u^{43} + \cdots - 0.981685u - 0.536386 \end{pmatrix}$$
$$a_{11} = \begin{pmatrix} -u \\ -u^3 + u \end{pmatrix}$$
$$a_3 = \begin{pmatrix} -0.158608u^{44} - 1.55028u^{43} + \cdots - 85.8322u + 7.83248 \\ 0.0599504u^{44} + 0.438445u^{43} + \cdots - 0.981685u - 0.536386 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} 0.441060u^{44} + 3.11339u^{43} + \cdots - 65.1681u + 7.22415 \\ 0.0840649u^{44} + 0.554982u^{43} + \cdots - 0.887359u - 0.303624 \end{pmatrix}$$
$$a_5 = \begin{pmatrix} 0.519991u^{44} + 3.59140u^{43} + \cdots - 64.5950u + 7.21939 \\ 0.0844612u^{44} + 0.574806u^{43} + \cdots - 0.487423u - 0.373377 \end{pmatrix}$$
$$a_{12} = \begin{pmatrix} -0.131038u^{44} - 0.902044u^{43} + \cdots + 25.2448u - 3.79525 \\ -0.0152230u^{44} - 0.0901999u^{43} + \cdots + 2.22280u + 0.131038 \end{pmatrix}$$
$$a_2 = \begin{pmatrix} -0.365995u^{44} - 2.97364u^{43} + \cdots - 44.5369u + 4.24425 \\ 0.0844612u^{44} + 0.574806u^{43} + \cdots - 0.487423u - 0.373377 \end{pmatrix}$$
$$a_1 = \begin{pmatrix} 0.0782668u^{44} + 0.573436u^{43} + \cdots - 25.1426u + 3.79639 \\ -0.0375483u^{44} - 0.238408u^{43} + \cdots - 2.12064u - 0.129900 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} u \\ u \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= 10.5915u^{44} + 78.5347u^{43} + \cdots - 186.556u + 9.63178$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $u^{45} + 10u^{44} + \cdots + 930u + 1$ |
| $c_2, c_4$ | $u^{45} - 12u^{44} + \cdots - 26u - 1$ |
| $c_3, c_6$ | $u^{45} - 4u^{44} + \cdots - 640u - 256$ |
| $c_5, c_{11}$ | $u^{45} - 3u^{44} + \cdots + 32u - 64$ |
| $c_7, c_9, c_{10}$ | $u^{45} - 7u^{44} + \cdots + 12u + 1$ |
| $c_8, c_{12}$ | $u^{45} + 5u^{44} + \cdots - 4u - 4$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $y^{45} + 62y^{44} + \cdots + 852778y - 1$ |
| $c_2, c_4$ | $y^{45} - 10y^{44} + \cdots + 930y - 1$ |
| $c_3, c_6$ | $y^{45} + 54y^{44} + \cdots + 4571136y - 65536$ |
| $c_5, c_{11}$ | $y^{45} + 33y^{44} + \cdots + 234496y - 4096$ |
| $c_7, c_9, c_{10}$ | $y^{45} - 31y^{44} + \cdots - 142y - 1$ |
| $c_8, c_{12}$ | $y^{45} + 3y^{44} + \cdots + 1256y - 16$ |

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

| Solutions to $I_1^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.989081$<br>$a = 5.39659$<br>$b = -0.601818$ | $-2.67208$ | $-212.850$ |
| $u = 0.952866 + 0.134525I$<br>$a = -4.15928 - 0.51646I$<br>$b = -0.377187 + 0.281972I$ | $-2.91440 - 0.52040I$ | $-28.2057 - 17.3785I$ |
| $u = 0.952866 - 0.134525I$<br>$a = -4.15928 + 0.51646I$<br>$b = -0.377187 - 0.281972I$ | $-2.91440 + 0.52040I$ | $-28.2057 + 17.3785I$ |
| $u = -1.04539$<br>$a = 0.313771$<br>$b = 1.54859$ | $-10.6185$ | $-59.2780$ |
| $u = -0.367366 + 0.850305I$<br>$a = -0.393666 + 0.059604I$<br>$b = 1.16026 + 0.81675I$ | $4.19700 - 1.34910I$ | $-7.72837 + 1.14036I$ |
| $u = -0.367366 - 0.850305I$<br>$a = -0.393666 - 0.059604I$<br>$b = 1.16026 - 0.81675I$ | $4.19700 + 1.34910I$ | $-7.72837 - 1.14036I$ |
| $u = -0.626112 + 0.680342I$<br>$a = 1.12492 + 1.02026I$<br>$b = 0.00967 - 1.90333I$ | $5.86522 - 1.45260I$ | $-9.17004 + 0.17720I$ |
| $u = -0.626112 - 0.680342I$<br>$a = 1.12492 - 1.02026I$<br>$b = 0.00967 + 1.90333I$ | $5.86522 + 1.45260I$ | $-9.17004 - 0.17720I$ |
| $u = -0.952838 + 0.522259I$<br>$a = 0.132474 + 0.580825I$<br>$b = -0.51946 - 1.36700I$ | $-0.90351 + 3.78658I$ | $-12.00000 - 4.56976I$ |
| $u = -0.952838 - 0.522259I$<br>$a = 0.132474 - 0.580825I$<br>$b = -0.51946 + 1.36700I$ | $-0.90351 - 3.78658I$ | $-12.00000 + 4.56976I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.007870 + 0.493819I$<br>$a = 0.985859 - 0.555848I$<br>$b = 0.560995 + 0.542777I$ | $-0.360727 - 0.771902I$ | $-12.00000 + 0.I$ |
| $u = 1.007870 - 0.493819I$<br>$a = 0.985859 + 0.555848I$<br>$b = 0.560995 - 0.542777I$ | $-0.360727 + 0.771902I$ | $-12.00000 + 0.I$ |
| $u = -0.973372 + 0.572106I$<br>$a = -1.06022 - 0.96272I$<br>$b = -0.62624 + 1.82528I$ | $4.81861 + 6.30906I$ | $-12.00000 - 5.34980I$ |
| $u = -0.973372 - 0.572106I$<br>$a = -1.06022 + 0.96272I$<br>$b = -0.62624 - 1.82528I$ | $4.81861 - 6.30906I$ | $-12.00000 + 5.34980I$ |
| $u = -0.668847 + 0.501935I$<br>$a = -1.094700 - 0.761183I$<br>$b = -1.200670 + 0.692757I$ | $-0.018874 + 0.450301I$ | $-9.70033 - 2.11767I$ |
| $u = -0.668847 - 0.501935I$<br>$a = -1.094700 + 0.761183I$<br>$b = -1.200670 - 0.692757I$ | $-0.018874 - 0.450301I$ | $-9.70033 + 2.11767I$ |
| $u = 0.781094 + 0.070241I$<br>$a = -0.13334 + 3.27365I$<br>$b = -0.197314 - 1.345870I$ | $1.89233 - 2.90725I$ | $-43.5907 + 10.5695I$ |
| $u = 0.781094 - 0.070241I$<br>$a = -0.13334 - 3.27365I$<br>$b = -0.197314 + 1.345870I$ | $1.89233 + 2.90725I$ | $-43.5907 - 10.5695I$ |
| $u = 0.068357 + 1.251150I$<br>$a = -0.00386 - 1.50825I$<br>$b = 0.59331 + 1.89133I$ | $12.3107 - 8.8025I$ | 0 |
| $u = 0.068357 - 1.251150I$<br>$a = -0.00386 + 1.50825I$<br>$b = 0.59331 - 1.89133I$ | $12.3107 + 8.8025I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.139719 + 1.259590I$<br>$a = 0.22206 + 1.51967I$<br>$b = 0.04895 - 2.08421I$ | $13.18790 - 0.68473I$ | $0$ |
| $u = -0.139719 - 1.259590I$<br>$a = 0.22206 - 1.51967I$<br>$b = 0.04895 + 2.08421I$ | $13.18790 + 0.68473I$ | $0$ |
| $u = 0.306575 + 0.653371I$<br>$a = 0.163852 + 0.671962I$<br>$b = -0.009810 - 0.890868I$ | $1.38833 - 3.58772I$ | $-7.79003 + 7.62926I$ |
| $u = 0.306575 - 0.653371I$<br>$a = 0.163852 - 0.671962I$<br>$b = -0.009810 + 0.890868I$ | $1.38833 + 3.58772I$ | $-7.79003 - 7.62926I$ |
| $u = -1.141470 + 0.620472I$<br>$a = 0.459135 + 0.678243I$<br>$b = 1.58964 - 0.23048I$ | $1.89448 + 6.79376I$ | $0$ |
| $u = -1.141470 - 0.620472I$<br>$a = 0.459135 - 0.678243I$<br>$b = 1.58964 + 0.23048I$ | $1.89448 - 6.79376I$ | $0$ |
| $u = 1.300200 + 0.172788I$<br>$a = 0.174045 - 0.780639I$<br>$b = 0.189316 - 0.701955I$ | $-1.23770 - 1.72442I$ | $0$ |
| $u = 1.300200 - 0.172788I$<br>$a = 0.174045 + 0.780639I$<br>$b = 0.189316 + 0.701955I$ | $-1.23770 + 1.72442I$ | $0$ |
| $u = -1.353400 + 0.275389I$<br>$a = -0.297373 + 0.170909I$<br>$b = -0.179271 + 0.620523I$ | $-3.67456 + 6.89597I$ | $0$ |
| $u = -1.353400 - 0.275389I$<br>$a = -0.297373 - 0.170909I$<br>$b = -0.179271 - 0.620523I$ | $-3.67456 - 6.89597I$ | $0$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.532389$<br>$a = 10.6740$<br>$b = 0.157357$ | $-2.53079$ | $-190.200$ |
| $u = -1.52798 + 0.15122I$<br>$a = 0.328835 + 0.021672I$<br>$b = -0.203375 - 1.016320I$ | $-6.72932 + 1.63796I$ | 0 |
| $u = -1.52798 - 0.15122I$<br>$a = 0.328835 - 0.021672I$<br>$b = -0.203375 + 1.016320I$ | $-6.72932 - 1.63796I$ | 0 |
| $u = -1.36799 + 0.70186I$<br>$a = -0.945282 - 0.712027I$<br>$b = -0.35731 + 1.99808I$ | $9.42541 + 7.53688I$ | 0 |
| $u = -1.36799 - 0.70186I$<br>$a = -0.945282 + 0.712027I$<br>$b = -0.35731 - 1.99808I$ | $9.42541 - 7.53688I$ | 0 |
| $u = -1.45214 + 0.59473I$<br>$a = 1.17477 + 0.82015I$<br>$b = 0.78255 - 1.69623I$ | $7.5666 + 15.2974I$ | 0 |
| $u = -1.45214 - 0.59473I$<br>$a = 1.17477 - 0.82015I$<br>$b = 0.78255 + 1.69623I$ | $7.5666 - 15.2974I$ | 0 |
| $u = 0.409223$<br>$a = 1.48110$<br>$b = -0.181306$ | $-0.821501$ | $-11.8740$ |
| $u = 1.43589 + 0.72409I$<br>$a = -0.688447 + 0.406430I$<br>$b = 0.24206 - 1.91261I$ | $8.18611 + 1.85592I$ | 0 |
| $u = 1.43589 - 0.72409I$<br>$a = -0.688447 - 0.406430I$<br>$b = 0.24206 + 1.91261I$ | $8.18611 - 1.85592I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-1.60934$<br>$a=2.38137$<br>$b=0.531548$ | $-10.0523$ | $0$ |
| $u=1.54148+0.58637I$<br>$a=1.031150-0.470774I$<br>$b=0.40058+1.86705I$ | $7.92332-5.93163I$ | $0$ |
| $u=1.54148-0.58637I$<br>$a=1.031150+0.470774I$<br>$b=0.40058-1.86705I$ | $7.92332+5.93163I$ | $0$ |
| $u=0.0389335+0.0746678I$<br>$a=5.35565-7.42873I$<br>$b=-0.633876+0.017196I$ | $-0.943845+0.013085I$ | $-9.49805+0.60913I$ |
| $u=0.0389335-0.0746678I$<br>$a=5.35565+7.42873I$<br>$b=-0.633876-0.017196I$ | $-0.943845-0.013085I$ | $-9.49805-0.60913I$ |

**II.** $\boldsymbol{I_2^u =}$
$\boldsymbol{\langle b,\ 3u^7+5u^6-7u^5-11u^4+5u^3+3u^2+a+7,\ u^8+u^7-3u^6-2u^5+3u^4+2u-1\rangle}$

**(i) Arc colorings**

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

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

**(iii) Cusp Shapes** $= 21u^7+30u^6-48u^5-61u^4+31u^3+11u^2+11u+30$

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

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

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_2, c_4$ | $(y-1)^8$ |
| $c_3, c_6$ | $y^8$ |
| $c_5, c_{11}$ | $y^8+5y^7+11y^6+6y^5-17y^4-34y^3-22y^2-4y+1$ |
| $c_7, c_9, c_{10}$ | $y^8-7y^7+19y^6-22y^5+3y^4+14y^3-6y^2-4y+1$ |
| $c_8, c_{12}$ | $y^8-3y^7+7y^6-10y^5+11y^4-10y^3+6y^2-4y+1$ |

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

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.180120 + 0.268597I$<br>$a = 1.194470 + 0.635084I$<br>$b = 0$ | $-2.68559 - 1.13123I$ | $-14.0862 + 1.5750I$ |
| $u = 1.180120 - 0.268597I$<br>$a = 1.194470 - 0.635084I$<br>$b = 0$ | $-2.68559 + 1.13123I$ | $-14.0862 - 1.5750I$ |
| $u = 0.108090 + 0.747508I$<br>$a = 0.637416 + 0.344390I$<br>$b = 0$ | $0.51448 - 2.57849I$ | $-10.94521 + 2.41352I$ |
| $u = 0.108090 - 0.747508I$<br>$a = 0.637416 - 0.344390I$<br>$b = 0$ | $0.51448 + 2.57849I$ | $-10.94521 - 2.41352I$ |
| $u = -1.37100$<br>$a = -0.687555$<br>$b = 0$ | $-8.14766$ | $-19.2760$ |
| $u = -1.334530 + 0.318930I$<br>$a = 0.286111 - 0.344558I$<br>$b = 0$ | $-4.02461 + 6.44354I$ | $-18.3815 - 0.5907I$ |
| $u = -1.334530 - 0.318930I$<br>$a = 0.286111 + 0.344558I$<br>$b = 0$ | $-4.02461 - 6.44354I$ | $-18.3815 + 0.5907I$ |
| $u = 0.463640$<br>$a = -7.54843$<br>$b = 0$ | $-2.48997$ | $37.1020$ |

**III.** $\boldsymbol{I^u_3 =}$
$\boldsymbol{\langle 5a^2u-3a^2+12au+b-7a+3u-1,\ a^3-a^2u+a^2+3au+6a+3u+5,\ u^2+u-1\rangle}$

**(i) Arc colorings**

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

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

**(iii) Cusp Shapes** $= 7a^2u-7a^2+32au-22a+5u-22$

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

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

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_3, c_6$ | $(y^3+3y^2+2y-1)^2$ |
| $c_2, c_4$ | $(y^3-y^2+2y-1)^2$ |
| $c_5, c_{11}$ | $y^6$ |
| $c_7, c_8, c_9$<br>$c_{10}, c_{12}$ | $(y^2-3y+1)^3$ |

### (vi) Complex Volumes and Cusp Shapes

| Solutions to $I_3^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.618034$<br>$a = -0.832857$<br>$b = -0.569840$ | $-2.10041$ | $-18.9130$ |
| $u = 0.618034$<br>$a = 0.22545 + 2.85986I$<br>$b = -0.215080 - 1.307140I$ | $2.03717 - 2.82812I$ | $2.32130 - 9.80499I$ |
| $u = 0.618034$<br>$a = 0.22545 - 2.85986I$<br>$b = -0.215080 + 1.307140I$ | $2.03717 + 2.82812I$ | $2.32130 + 9.80499I$ |
| $u = -1.61803$<br>$a = -0.255488 + 0.062996I$<br>$b = -0.215080 + 1.307140I$ | $-5.85852 + 2.82812I$ | $-12.36452 - 4.05775I$ |
| $u = -1.61803$<br>$a = -0.255488 - 0.062996I$<br>$b = -0.215080 - 1.307140I$ | $-5.85852 - 2.82812I$ | $-12.36452 + 4.05775I$ |
| $u = -1.61803$<br>$a = -2.10706$<br>$b = -0.569840$ | $-9.99610$ | $44.0000$ |

### IV. $I_4^u = \langle b + a - 2,\ a^2 - 3a + 1,\ u - 1 \rangle$

**(i) Arc colorings**

$$a_7 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

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

$$a_8 = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} a \\ -a + 2 \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} -1 \\ 0 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} 2 \\ -a + 2 \end{pmatrix}$$

$$a_6 = \begin{pmatrix} a \\ a - 3 \end{pmatrix}$$

$$a_5 = \begin{pmatrix} 2a - 3 \\ a - 3 \end{pmatrix}$$

$$a_{12} = \begin{pmatrix} 3a - 8 \\ 3a - 8 \end{pmatrix}$$

$$a_2 = \begin{pmatrix} a - 2 \\ a - 3 \end{pmatrix}$$

$$a_1 = \begin{pmatrix} 3a - 8 \\ 3a - 8 \end{pmatrix}$$

$$a_9 = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= 29$

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

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

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

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

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

| Solutions to $I_4^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.00000$<br>$a = 0.381966$<br>$b = 1.61803$ | $-10.5276$ | 29.0000 |
| $u = 1.00000$<br>$a = 2.61803$<br>$b = -0.618034$ | $-2.63189$ | 29.0000 |

**V. u-Polynomials**

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $((u-1)^8)(u^2-3u+1)(u^3-u^2+2u-1)^2(u^{45}+10u^{44}+\cdots+930u+1)$ |
| $c_2$ | $((u-1)^8)(u^2+u-1)(u^3+u^2-1)^2(u^{45}-12u^{44}+\cdots-26u-1)$ |
| $c_3$ | $u^8(u^2+u-1)(u^3-u^2+2u-1)^2(u^{45}-4u^{44}+\cdots-640u-256)$ |
| $c_4$ | $((u+1)^8)(u^2-u-1)(u^3-u^2+1)^2(u^{45}-12u^{44}+\cdots-26u-1)$ |
| $c_5$ | $u^6(u^2+3u+1)(u^8-3u^7+\cdots-4u+1)$ $\cdot(u^{45}-3u^{44}+\cdots+32u-64)$ |
| $c_6$ | $u^8(u^2-u-1)(u^3+u^2+2u+1)^2(u^{45}-4u^{44}+\cdots-640u-256)$ |
| $c_7$ | $(u-1)^2(u^2+u-1)^3(u^8+u^7-3u^6-2u^5+3u^4+2u-1)$ $\cdot(u^{45}-7u^{44}+\cdots+12u+1)$ |
| $c_8$ | $u^2(u^2+u-1)^3(u^8-u^7-u^6+2u^5+u^4-2u^3+2u-1)$ $\cdot(u^{45}+5u^{44}+\cdots-4u-4)$ |
| $c_9, c_{10}$ | $(u+1)^2(u^2-u-1)^3(u^8-u^7-3u^6+2u^5+3u^4-2u-1)$ $\cdot(u^{45}-7u^{44}+\cdots+12u+1)$ |
| $c_{11}$ | $u^6(u^2-3u+1)(u^8+3u^7+\cdots+4u+1)$ $\cdot(u^{45}-3u^{44}+\cdots+32u-64)$ |
| $c_{12}$ | $u^2(u^2-u-1)^3(u^8+u^7-u^6-2u^5+u^4+2u^3-2u-1)$ $\cdot(u^{45}+5u^{44}+\cdots-4u-4)$ |

## VI. Riley Polynomials

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $(y-1)^8(y^2-7y+1)(y^3+3y^2+2y-1)^2$ $\cdot(y^{45}+62y^{44}+\cdots+852778y-1)$ |
| $c_2, c_4$ | $((y-1)^8)(y^2-3y+1)(y^3-y^2+2y-1)^2(y^{45}-10y^{44}+\cdots+930y-1)$ |
| $c_3, c_6$ | $y^8(y^2-3y+1)(y^3+3y^2+2y-1)^2$ $\cdot(y^{45}+54y^{44}+\cdots+4571136y-65536)$ |
| $c_5, c_{11}$ | $y^6(y^2-7y+1)(y^8+5y^7+\cdots-4y+1)$ $\cdot(y^{45}+33y^{44}+\cdots+234496y-4096)$ |
| $c_7, c_9, c_{10}$ | $(y-1)^2(y^2-3y+1)^3$ $\cdot(y^8-7y^7+19y^6-22y^5+3y^4+14y^3-6y^2-4y+1)$ $\cdot(y^{45}-31y^{44}+\cdots-142y-1)$ |
| $c_8, c_{12}$ | $y^2(y^2-3y+1)^3(y^8-3y^7+\cdots-4y+1)$ $\cdot(y^{45}+3y^{44}+\cdots+1256y-16)$ |