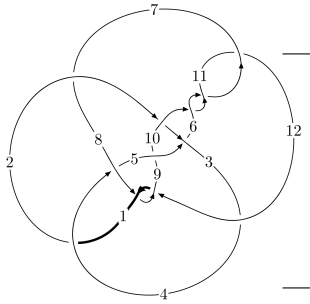
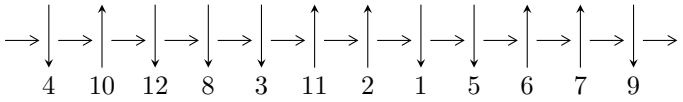
# $12a_{1197}$ $(K12a_{1197})$




A knot diagram[1]

**Linearized knot diagam**




**Solving Sequence**

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

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

$$I_1^u = \langle -1.93169 \times 10^{465} u^{150} + 6.15703 \times 10^{464} u^{149} + \cdots + 1.03741 \times 10^{462} b - 1.46910 \times 10^{465},$$
$$2.56491 \times 10^{465} u^{150} - 8.12627 \times 10^{464} u^{149} + \cdots + 1.03741 \times 10^{462} a + 2.03425 \times 10^{465},\ u^{151} + u^{150} + \cdots + 3$$
$$I_2^u = \langle -7692162316330 u^{29} + 11057540047927 u^{28} + \cdots + 19577401712437 b - 8087783676063,$$
$$46327339192051 u^{29} - 8910173226523 u^{28} + \cdots + 19577401712437 a + 35928041395928,$$
$$u^{30} - u^{29} + \cdots + 3u^2 + 1\rangle$$
$$I_3^u = \langle b + 1,\ a^3 - 2a^2 + a + 1,\ u + 1\rangle$$

* 3 irreducible components of $\dim_{\mathbb{C}} = 0$, with total 184 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.** $\boldsymbol{I_1^u = \langle -1.93 \times 10^{465} u^{150} + 6.16 \times 10^{464} u^{149} + \cdots + 1.04 \times 10^{462} b - 1.47 \times 10^{465},\ 2.56 \times 10^{465} u^{150} - 8.13 \times 10^{464} u^{149} + \cdots + 1.04 \times 10^{462} a + 2.03 \times 10^{465},\ u^{151} + u^{150} + \cdots + 32u + 1 \rangle}$

**(i) Arc colorings**

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

$$a_{11} = \begin{pmatrix} 0 \\ u \end{pmatrix}$$

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

$$a_3 = \begin{pmatrix} -2472.41u^{150} + 783.321u^{149} + \cdots - 60019.0u - 1960.89 \\ 1862.03u^{150} - 593.499u^{149} + \cdots + 44184.5u + 1416.12 \end{pmatrix}$$

$$a_{12} = \begin{pmatrix} u \\ -u^3 + u \end{pmatrix}$$

$$a_4 = \begin{pmatrix} -2525.32u^{150} + 798.167u^{149} + \cdots - 61301.5u - 2002.14 \\ 1896.33u^{150} - 603.365u^{149} + \cdots + 45017.4u + 1442.63 \end{pmatrix}$$

$$a_5 = \begin{pmatrix} -1243.19u^{150} + 402.943u^{149} + \cdots - 28715.3u - 917.733 \\ 1474.28u^{150} - 472.125u^{149} + \cdots + 34978.6u + 1121.68 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} -u \\ u \end{pmatrix}$$

$$a_2 = \begin{pmatrix} -1414.94u^{150} + 443.487u^{149} + \cdots - 35022.8u - 1160.69 \\ 804.555u^{150} - 253.665u^{149} + \cdots + 19188.2u + 615.911 \end{pmatrix}$$

$$a_8 = \begin{pmatrix} 1246.81u^{150} - 395.426u^{149} + \cdots + 29898.5u + 949.873 \\ -1586.95u^{150} + 506.441u^{149} + \cdots - 37478.5u - 1197.23 \end{pmatrix}$$

$$a_1 = \begin{pmatrix} 1468.40u^{150} - 478.505u^{149} + \cdots + 33223.5u + 1016.63 \\ -1479.74u^{150} + 476.894u^{149} + \cdots - 34849.1u - 1112.88 \end{pmatrix}$$

$$a_9 = \begin{pmatrix} 410.152u^{150} - 117.692u^{149} + \cdots + 11541.2u + 398.278 \\ 30.8075u^{150} - 12.2755u^{149} + \cdots + 664.532u + 22.0427 \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= -1069.34u^{150} + 329.332u^{149} + \cdots - 25627.6u - 819.257$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $u^{151} + 10u^{150} + \cdots - 31u + 23$ |
| $c_2$ | $u^{151} + 3u^{150} + \cdots + 17222u + 2203$ |
| $c_3$ | $u^{151} - 3u^{150} + \cdots - 514125u + 116356$ |
| $c_4$ | $u^{151} - u^{150} + \cdots + 64u + 16$ |
| $c_5$ | $u^{151} + 9u^{150} + \cdots - 6313u + 9724$ |
| $c_6, c_{10}, c_{11}$ | $u^{151} + u^{150} + \cdots + 32u + 1$ |
| $c_7$ | $u^{151} - 4u^{150} + \cdots - 2579090u + 234743$ |
| $c_8, c_{12}$ | $u^{151} - 2u^{150} + \cdots + 4057u + 1279$ |
| $c_9$ | $u^{151} - 2u^{150} + \cdots + 492840u + 167911$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $y^{151} + 18y^{150} + \cdots - 28249y - 529$ |
| $c_2$ | $y^{151} - 13y^{150} + \cdots + 173229284y - 4853209$ |
| $c_3$ | $y^{151} - 21y^{150} + \cdots - 752670674231y - 13538718736$ |
| $c_4$ | $y^{151} + y^{150} + \cdots - 11136y - 256$ |
| $c_5$ | $y^{151} + 21y^{150} + \cdots - 6011235647y - 94556176$ |
| $c_6, c_{10}, c_{11}$ | $y^{151} - 149y^{150} + \cdots + 246y - 1$ |
| $c_7$ | $y^{151} + 46y^{150} + \cdots - 7705800129308y - 55104276049$ |
| $c_8, c_{12}$ | $y^{151} + 94y^{150} + \cdots - 113123915y - 1635841$ |
| $c_9$ | $y^{151} - 56y^{150} + \cdots + 725298561134y - 28194103921$ |

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

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.472050 + 0.884004I$<br>$a = -0.066559 - 0.608220I$<br>$b = -0.865778 + 0.742016I$ | $-1.71499 + 3.44862I$ | 0 |
| $u = 0.472050 - 0.884004I$<br>$a = -0.066559 + 0.608220I$<br>$b = -0.865778 - 0.742016I$ | $-1.71499 - 3.44862I$ | 0 |
| $u = 0.504245 + 0.856993I$<br>$a = 0.408980 + 0.667727I$<br>$b = 0.95994 - 1.03916I$ | $0.0365 + 15.6382I$ | 0 |
| $u = 0.504245 - 0.856993I$<br>$a = 0.408980 - 0.667727I$<br>$b = 0.95994 + 1.03916I$ | $0.0365 - 15.6382I$ | 0 |
| $u = 0.912866 + 0.388375I$<br>$a = 1.180150 - 0.056109I$<br>$b = -0.704000 - 0.782081I$ | $1.12038 - 2.21817I$ | 0 |
| $u = 0.912866 - 0.388375I$<br>$a = 1.180150 + 0.056109I$<br>$b = -0.704000 + 0.782081I$ | $1.12038 + 2.21817I$ | 0 |
| $u = -0.611081 + 0.775672I$<br>$a = -0.266528 + 1.168600I$<br>$b = -0.938329 - 1.024730I$ | $-1.20004 - 5.85292I$ | 0 |
| $u = -0.611081 - 0.775672I$<br>$a = -0.266528 - 1.168600I$<br>$b = -0.938329 + 1.024730I$ | $-1.20004 + 5.85292I$ | 0 |
| $u = -0.503327 + 0.841973I$<br>$a = 0.405727 - 0.542238I$<br>$b = 0.940020 + 0.870651I$ | $-3.87850 - 9.51725I$ | 0 |
| $u = -0.503327 - 0.841973I$<br>$a = 0.405727 + 0.542238I$<br>$b = 0.940020 - 0.870651I$ | $-3.87850 + 9.51725I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-1.006270+0.228464I$<br>$a=\ \ 1.216270+0.711644I$<br>$b=-0.847046+0.388872I$ | $-0.037294+1.011850I$ | 0 |
| $u=-1.006270-0.228464I$<br>$a=\ \ 1.216270-0.711644I$<br>$b=-0.847046-0.388872I$ | $-0.037294-1.011850I$ | 0 |
| $u=\ \ 0.307987+1.007600I$<br>$a=\ \ 0.0145948-0.0417020I$<br>$b=-0.243767+0.424475I$ | $-0.97150+2.88010I$ | 0 |
| $u=\ \ 0.307987-1.007600I$<br>$a=\ \ 0.0145948+0.0417020I$<br>$b=-0.243767-0.424475I$ | $-0.97150-2.88010I$ | 0 |
| $u=\ \ 0.451480+0.831454I$<br>$a=\ \ 0.679184+0.277402I$<br>$b=\ \ 0.551251-0.635164I$ | $2.01542+3.29869I$ | 0 |
| $u=\ \ 0.451480-0.831454I$<br>$a=\ \ 0.679184-0.277402I$<br>$b=\ \ 0.551251+0.635164I$ | $2.01542-3.29869I$ | 0 |
| $u=\ \ 0.662919+0.657611I$<br>$a=-0.019360-0.205176I$<br>$b=-0.041555+0.763269I$ | $2.82346+1.75052I$ | 0 |
| $u=\ \ 0.662919-0.657611I$<br>$a=-0.019360+0.205176I$<br>$b=-0.041555-0.763269I$ | $2.82346-1.75052I$ | 0 |
| $u=-0.289908+0.878176I$<br>$a=-0.403446+0.003942I$<br>$b=-0.111239-1.043220I$ | $4.09674-6.13896I$ | 0 |
| $u=-0.289908-0.878176I$<br>$a=-0.403446-0.003942I$<br>$b=-0.111239+1.043220I$ | $4.09674+6.13896I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-0.680650+0.853136I$<br>$a=-0.404161-0.241544I$<br>$b=\ 0.556428-0.537921I$ | $-3.44023+3.92803I$ | 0 |
| $u=-0.680650-0.853136I$<br>$a=-0.404161+0.241544I$<br>$b=\ 0.556428+0.537921I$ | $-3.44023-3.92803I$ | 0 |
| $u=\ 0.692681+0.848382I$<br>$a=-0.601898+0.126360I$<br>$b=\ 0.661284+0.730649I$ | $0.52013-9.98699I$ | 0 |
| $u=\ 0.692681-0.848382I$<br>$a=-0.601898-0.126360I$<br>$b=\ 0.661284-0.730649I$ | $0.52013+9.98699I$ | 0 |
| $u=-0.719832+0.492448I$<br>$a=\ 1.399660-0.089298I$<br>$b=-0.547746+0.373026I$ | $1.12644-1.02234I$ | 0 |
| $u=-0.719832-0.492448I$<br>$a=\ 1.399660+0.089298I$<br>$b=-0.547746-0.373026I$ | $1.12644+1.02234I$ | 0 |
| $u=\ 1.16581$<br>$a=\ 0.625214$<br>$b=\ 0.958492$ | $-0.203933$ | 0 |
| $u=-0.088671+0.819822I$<br>$a=\ 0.178460-0.665085I$<br>$b=\ 0.501925-0.506145I$ | $1.03243+3.95432I$ | 0 |
| $u=-0.088671-0.819822I$<br>$a=\ 0.178460+0.665085I$<br>$b=\ 0.501925+0.506145I$ | $1.03243-3.95432I$ | 0 |
| $u=\ 0.294379+0.769396I$<br>$a=-0.566559-0.276220I$<br>$b=-0.89715+1.15300I$ | $-0.74749+6.51000I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.294379 - 0.769396I$<br>$a = -0.566559 + 0.276220I$<br>$b = -0.89715 - 1.15300I$ | $-0.74749 - 6.51000I$ | 0 |
| $u = 1.18028$<br>$a = 0.639260$<br>$b = 0.954322$ | $-0.203875$ | 0 |
| $u = 0.767722 + 0.269242I$<br>$a = -0.94336 - 2.30227I$<br>$b = -0.251496 + 1.103530I$ | $2.38552 + 6.45222I$ | 0 |
| $u = 0.767722 - 0.269242I$<br>$a = -0.94336 + 2.30227I$<br>$b = -0.251496 - 1.103530I$ | $2.38552 - 6.45222I$ | 0 |
| $u = 1.194630 + 0.039800I$<br>$a = -0.30353 - 2.67611I$<br>$b = 0.00986 + 1.76611I$ | $2.58122 + 6.21762I$ | 0 |
| $u = 1.194630 - 0.039800I$<br>$a = -0.30353 + 2.67611I$<br>$b = 0.00986 - 1.76611I$ | $2.58122 - 6.21762I$ | 0 |
| $u = -0.666938 + 0.432809I$<br>$a = 0.857628 - 0.684938I$<br>$b = 0.333070 + 1.027970I$ | $5.90452 + 1.69142I$ | 0 |
| $u = -0.666938 - 0.432809I$<br>$a = 0.857628 + 0.684938I$<br>$b = 0.333070 - 1.027970I$ | $5.90452 - 1.69142I$ | 0 |
| $u = 0.466756 + 0.642700I$<br>$a = 0.316550 + 0.923918I$<br>$b = 0.512069 - 0.068322I$ | $0.36618 + 2.92618I$ | 0 |
| $u = 0.466756 - 0.642700I$<br>$a = 0.316550 - 0.923918I$<br>$b = 0.512069 + 0.068322I$ | $0.36618 - 2.92618I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.576637 + 0.541410I$<br>$a = 0.469384 + 0.295539I$<br>$b = 0.830869 - 0.401613I$ | $0.83324 + 1.17258I$ | 0 |
| $u = 0.576637 - 0.541410I$<br>$a = 0.469384 - 0.295539I$<br>$b = 0.830869 + 0.401613I$ | $0.83324 - 1.17258I$ | 0 |
| $u = 0.726822 + 0.968082I$<br>$a = 0.357375 + 0.005289I$<br>$b = -0.485392 - 0.257705I$ | $-1.11296 + 2.52087I$ | 0 |
| $u = 0.726822 - 0.968082I$<br>$a = 0.357375 - 0.005289I$<br>$b = -0.485392 + 0.257705I$ | $-1.11296 - 2.52087I$ | 0 |
| $u = 0.771651 + 0.143074I$<br>$a = 1.348220 - 0.330576I$<br>$b = -0.659980 + 0.317289I$ | $1.47481 + 1.99247I$ | 0 |
| $u = 0.771651 - 0.143074I$<br>$a = 1.348220 + 0.330576I$<br>$b = -0.659980 - 0.317289I$ | $1.47481 - 1.99247I$ | 0 |
| $u = 1.251800 + 0.039923I$<br>$a = 1.47364 - 0.18892I$<br>$b = -1.56675 + 0.30763I$ | $1.83875 + 1.81155I$ | 0 |
| $u = 1.251800 - 0.039923I$<br>$a = 1.47364 + 0.18892I$<br>$b = -1.56675 - 0.30763I$ | $1.83875 - 1.81155I$ | 0 |
| $u = -0.606001 + 0.422787I$<br>$a = 0.297448 - 0.682730I$<br>$b = 1.12975 + 0.89007I$ | $2.97652 - 7.77376I$ | 0 |
| $u = -0.606001 - 0.422787I$<br>$a = 0.297448 + 0.682730I$<br>$b = 1.12975 - 0.89007I$ | $2.97652 + 7.77376I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-1.266550+0.008705I$<br>$a=\ \ 0.556477-0.495290I$<br>$b=\ \ 1.000120+0.422333I$ | $3.57413-6.67964I$ | 0 |
| $u=-1.266550-0.008705I$<br>$a=\ \ 0.556477+0.495290I$<br>$b=\ \ 1.000120-0.422333I$ | $3.57413+6.67964I$ | 0 |
| $u=-0.099423+0.717248I$<br>$a=\ \ 0.088176+0.562484I$<br>$b=-0.847484-1.026340I$ | $-0.81884-2.99177I$ | 0 |
| $u=-0.099423-0.717248I$<br>$a=\ \ 0.088176-0.562484I$<br>$b=-0.847484+1.026340I$ | $-0.81884+2.99177I$ | 0 |
| $u=-1.275840+0.028854I$<br>$a=\ \ 1.51296+0.05179I$<br>$b=-1.90289+0.18009I$ | $1.19324-0.84761I$ | 0 |
| $u=-1.275840-0.028854I$<br>$a=\ \ 1.51296-0.05179I$<br>$b=-1.90289-0.18009I$ | $1.19324+0.84761I$ | 0 |
| $u=-0.374955+0.586656I$<br>$a=\ \ 0.328445+0.196934I$<br>$b=-0.796211+0.663794I$ | $-1.92772+0.99887I$ | 0 |
| $u=-0.374955-0.586656I$<br>$a=\ \ 0.328445-0.196934I$<br>$b=-0.796211-0.663794I$ | $-1.92772-0.99887I$ | 0 |
| $u=-1.285530+0.224675I$<br>$a=\ \ 0.600454-0.994227I$<br>$b=\ \ 0.236056+1.049820I$ | $6.60594+2.14914I$ | 0 |
| $u=-1.285530-0.224675I$<br>$a=\ \ 0.600454+0.994227I$<br>$b=\ \ 0.236056-1.049820I$ | $6.60594-2.14914I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-0.314366+0.611307I$<br>$a=-1.076990+0.329028I$<br>$b=-0.955686-0.827991I$ | $-2.01575-4.12490I$ | 0 |
| $u=-0.314366-0.611307I$<br>$a=-1.076990-0.329028I$<br>$b=-0.955686+0.827991I$ | $-2.01575+4.12490I$ | 0 |
| $u=1.314370+0.054225I$<br>$a=0.63928-1.81129I$<br>$b=-0.221124+0.619361I$ | $2.21104+1.53029I$ | 0 |
| $u=1.314370-0.054225I$<br>$a=0.63928+1.81129I$<br>$b=-0.221124-0.619361I$ | $2.21104-1.53029I$ | 0 |
| $u=-0.226306+0.644285I$<br>$a=0.193572+0.017568I$<br>$b=-0.901110+0.749271I$ | $-1.97131+0.98981I$ | 0 |
| $u=-0.226306-0.644285I$<br>$a=0.193572-0.017568I$<br>$b=-0.901110-0.749271I$ | $-1.97131-0.98981I$ | 0 |
| $u=-1.319580+0.000470I$<br>$a=0.15449+2.89765I$<br>$b=-0.41715-2.16203I$ | $0.74888-2.07009I$ | 0 |
| $u=-1.319580-0.000470I$<br>$a=0.15449-2.89765I$<br>$b=-0.41715+2.16203I$ | $0.74888+2.07009I$ | 0 |
| $u=-1.325950+0.072576I$<br>$a=-0.22273-2.02390I$<br>$b=0.006077+0.210149I$ | $0.33089-3.72354I$ | 0 |
| $u=-1.325950-0.072576I$<br>$a=-0.22273+2.02390I$<br>$b=0.006077-0.210149I$ | $0.33089+3.72354I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.501132 + 0.424261I$<br>$a = 0.774921 + 0.176630I$<br>$b = 0.392521 - 0.225566I$ | $1.02977 + 1.08869I$ | 0 |
| $u = 0.501132 - 0.424261I$<br>$a = 0.774921 - 0.176630I$<br>$b = 0.392521 + 0.225566I$ | $1.02977 - 1.08869I$ | 0 |
| $u = 1.359840 + 0.106565I$<br>$a = 0.38150 - 2.26011I$<br>$b = -0.407501 + 1.332490I$ | $2.43991 + 2.33188I$ | 0 |
| $u = 1.359840 - 0.106565I$<br>$a = 0.38150 + 2.26011I$<br>$b = -0.407501 - 1.332490I$ | $2.43991 - 2.33188I$ | 0 |
| $u = -1.372460 + 0.115018I$<br>$a = -2.07479 + 0.74394I$<br>$b = 2.31167 - 0.86468I$ | $4.50244 - 9.81798I$ | 0 |
| $u = -1.372460 - 0.115018I$<br>$a = -2.07479 - 0.74394I$<br>$b = 2.31167 + 0.86468I$ | $4.50244 + 9.81798I$ | 0 |
| $u = -1.376410 + 0.053949I$<br>$a = 0.439738 - 0.430662I$<br>$b = -1.45268 + 0.38145I$ | $2.51893 - 0.80202I$ | 0 |
| $u = -1.376410 - 0.053949I$<br>$a = 0.439738 + 0.430662I$<br>$b = -1.45268 - 0.38145I$ | $2.51893 + 0.80202I$ | 0 |
| $u = 1.392990 + 0.092555I$<br>$a = -1.03769 + 2.11407I$<br>$b = 0.103443 - 0.346460I$ | $5.20516 + 9.30317I$ | 0 |
| $u = 1.392990 - 0.092555I$<br>$a = -1.03769 - 2.11407I$<br>$b = 0.103443 + 0.346460I$ | $5.20516 - 9.30317I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-1.393310+0.092532I$<br>$a=\ \ 0.35300+2.65057I$<br>$b=-0.64454-1.55997I$ | $3.56985-4.53824I$ | 0 |
| $u=-1.393310-0.092532I$<br>$a=\ \ 0.35300-2.65057I$<br>$b=-0.64454+1.55997I$ | $3.56985+4.53824I$ | 0 |
| $u=\ \ 1.395620+0.092828I$<br>$a=-1.49502-1.58215I$<br>$b=\ \ 1.73103+1.54682I$ | $2.26519+4.19440I$ | 0 |
| $u=\ \ 1.395620-0.092828I$<br>$a=-1.49502+1.58215I$<br>$b=\ \ 1.73103-1.54682I$ | $2.26519-4.19440I$ | 0 |
| $u=\ \ 1.41149+0.12685I$<br>$a=-0.040753-1.036190I$<br>$b=-1.186810+0.482059I$ | $3.47980+5.91274I$ | 0 |
| $u=\ \ 1.41149-0.12685I$<br>$a=-0.040753+1.036190I$<br>$b=-1.186810-0.482059I$ | $3.47980-5.91274I$ | 0 |
| $u=\ \ 1.41753+0.01543I$<br>$a=-0.26012+1.98695I$<br>$b=-0.700504-1.140990I$ | $8.08358-2.80885I$ | 0 |
| $u=\ \ 1.41753-0.01543I$<br>$a=-0.26012-1.98695I$<br>$b=-0.700504+1.140990I$ | $8.08358+2.80885I$ | 0 |
| $u=\ \ 1.41337+0.32587I$<br>$a=\ \ 0.391511+0.900541I$<br>$b=\ \ 0.210075-0.759023I$ | $2.96910+1.89636I$ | 0 |
| $u=\ \ 1.41337-0.32587I$<br>$a=\ \ 0.391511-0.900541I$<br>$b=\ \ 0.210075+0.759023I$ | $2.96910-1.89636I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-1.45986+0.04354I$<br>$a=\ 0.408620+0.933157I$<br>$b=\ 0.379155-0.667460I$ | $8.29942-2.47433I$ | 0 |
| $u=-1.45986-0.04354I$<br>$a=\ 0.408620-0.933157I$<br>$b=\ 0.379155+0.667460I$ | $8.29942+2.47433I$ | 0 |
| $u=\ 1.44853+0.23223I$<br>$a=\ 0.03102-1.82557I$<br>$b=-1.08265+1.19970I$ | $3.72729+7.23890I$ | 0 |
| $u=\ 1.44853-0.23223I$<br>$a=\ 0.03102+1.82557I$<br>$b=-1.08265-1.19970I$ | $3.72729-7.23890I$ | 0 |
| $u=-1.44057+0.29049I$<br>$a=-0.08711+1.97285I$<br>$b=-0.99032-1.49431I$ | $4.83658-10.34260I$ | 0 |
| $u=-1.44057-0.29049I$<br>$a=-0.08711-1.97285I$<br>$b=-0.99032+1.49431I$ | $4.83658+10.34260I$ | 0 |
| $u=-0.273659+0.438926I$<br>$a=-2.06869+0.18529I$<br>$b=-0.818659-0.523077I$ | $-1.90487-3.92884I$ | $-7.58573+9.42654I$ |
| $u=-0.273659-0.438926I$<br>$a=-2.06869-0.18529I$<br>$b=-0.818659+0.523077I$ | $-1.90487+3.92884I$ | $-7.58573-9.42654I$ |
| $u=-1.48690+0.16147I$<br>$a=-0.079299-0.792708I$<br>$b=\ 0.854653+0.548893I$ | $7.49359-3.32401I$ | 0 |
| $u=-1.48690-0.16147I$<br>$a=-0.079299+0.792708I$<br>$b=\ 0.854653-0.548893I$ | $7.49359+3.32401I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = \quad 1.47731 + 0.34713I$<br>$a = -0.54860 - 1.36092I$<br>$b = -0.383801 + 1.301650I$ | $9.8269 + 10.6093I$ | 0 |
| $u = \quad 1.47731 - 0.34713I$<br>$a = -0.54860 + 1.36092I$<br>$b = -0.383801 - 1.301650I$ | $9.8269 - 10.6093I$ | 0 |
| $u = \quad 1.50967 + 0.15793I$<br>$a = -0.65385 + 2.02993I$<br>$b = \quad 1.32504 - 1.60173I$ | $9.83570 + 9.99284I$ | 0 |
| $u = \quad 1.50967 - 0.15793I$<br>$a = -0.65385 - 2.02993I$<br>$b = \quad 1.32504 + 1.60173I$ | $9.83570 - 9.99284I$ | 0 |
| $u = -1.50985 + 0.16956I$<br>$a = -0.45650 - 1.40877I$<br>$b = \quad 1.19697 + 1.06000I$ | $7.65948 - 3.70739I$ | 0 |
| $u = -1.50985 - 0.16956I$<br>$a = -0.45650 + 1.40877I$<br>$b = \quad 1.19697 - 1.06000I$ | $7.65948 + 3.70739I$ | 0 |
| $u = \quad 1.51617 + 0.14598I$<br>$a = \quad 0.17637 + 1.74282I$<br>$b = \quad 0.66376 - 1.32871I$ | $12.95790 + 0.46142I$ | 0 |
| $u = \quad 1.51617 - 0.14598I$<br>$a = \quad 0.17637 - 1.74282I$<br>$b = \quad 0.66376 + 1.32871I$ | $12.95790 - 0.46142I$ | 0 |
| $u = -1.50184 + 0.32781I$<br>$a = \quad 0.055125 + 1.190220I$<br>$b = -0.699659 - 0.996740I$ | $5.09694 - 7.49634I$ | 0 |
| $u = -1.50184 - 0.32781I$<br>$a = \quad 0.055125 - 1.190220I$<br>$b = -0.699659 + 0.996740I$ | $5.09694 + 7.49634I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-1.50712+0.31536I$<br>$a=\ \ 0.21669+1.69567I$<br>$b=-0.91742-1.22593I$ | $4.64251-7.77080I$ | 0 |
| $u=-1.50712-0.31536I$<br>$a=\ \ 0.21669-1.69567I$<br>$b=-0.91742+1.22593I$ | $4.64251+7.77080I$ | 0 |
| $u=\ \ 0.005081+0.459151I$<br>$a=\ \ 2.07821+2.22192I$<br>$b=\ \ 0.566295+0.122067I$ | $-3.70803+2.01148I$ | $-16.7299-3.2259I$ |
| $u=\ \ 0.005081-0.459151I$<br>$a=\ \ 2.07821-2.22192I$<br>$b=\ \ 0.566295-0.122067I$ | $-3.70803-2.01148I$ | $-16.7299+3.2259I$ |
| $u=\ \ 0.122429+0.441064I$<br>$a=\ \ 0.307074-0.852221I$<br>$b=\ \ 1.29383+1.07539I$ | $-0.25921+7.91248I$ | $-8.42843-10.86566I$ |
| $u=\ \ 0.122429-0.441064I$<br>$a=\ \ 0.307074+0.852221I$<br>$b=\ \ 1.29383-1.07539I$ | $-0.25921-7.91248I$ | $-8.42843+10.86566I$ |
| $u=-1.51485+0.29555I$<br>$a=\ \ 0.159193-1.316970I$<br>$b=\ \ 0.869395+0.890203I$ | $8.41929-7.39030I$ | 0 |
| $u=-1.51485-0.29555I$<br>$a=\ \ 0.159193+1.316970I$<br>$b=\ \ 0.869395-0.890203I$ | $8.41929+7.39030I$ | 0 |
| $u=\ \ 1.54114+0.15243I$<br>$a=\ \ 0.808180+0.527962I$<br>$b=\ \ 0.169963-0.381806I$ | $8.54425+3.33001I$ | 0 |
| $u=\ \ 1.54114-0.15243I$<br>$a=\ \ 0.808180-0.527962I$<br>$b=\ \ 0.169963+0.381806I$ | $8.54425-3.33001I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-1.54334+0.13218I$<br>$a=-0.46547+1.94357I$<br>$b=-0.508408-0.949189I$ | $9.86209-8.16989I$ | 0 |
| $u=-1.54334-0.13218I$<br>$a=-0.46547-1.94357I$<br>$b=-0.508408+0.949189I$ | $9.86209+8.16989I$ | 0 |
| $u=-1.54020+0.18959I$<br>$a=-0.11473+1.51017I$<br>$b=-0.213702-1.283790I$ | $10.07000-4.73975I$ | 0 |
| $u=-1.54020-0.18959I$<br>$a=-0.11473-1.51017I$<br>$b=-0.213702+1.283790I$ | $10.07000+4.73975I$ | 0 |
| $u=1.52597+0.30174I$<br>$a=-0.13264+1.69925I$<br>$b=1.09969-1.20329I$ | $2.69365+13.68460I$ | 0 |
| $u=1.52597-0.30174I$<br>$a=-0.13264-1.69925I$<br>$b=1.09969+1.20329I$ | $2.69365-13.68460I$ | 0 |
| $u=-1.53001+0.30855I$<br>$a=-0.07200-1.89106I$<br>$b=1.06195+1.35725I$ | $6.6245-19.8877I$ | 0 |
| $u=-1.53001-0.30855I$<br>$a=-0.07200+1.89106I$<br>$b=1.06195-1.35725I$ | $6.6245+19.8877I$ | 0 |
| $u=-1.54951+0.24361I$<br>$a=0.185424-1.192490I$<br>$b=0.339633+0.619390I$ | $7.13558-6.16028I$ | 0 |
| $u=-1.54951-0.24361I$<br>$a=0.185424+1.192490I$<br>$b=0.339633-0.619390I$ | $7.13558+6.16028I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.55092 + 0.28578I$<br>$a = 0.13231 - 2.05785I$<br>$b = -0.87798 + 1.37827I$ | $5.81788 + 9.83437I$ | 0 |
| $u = 1.55092 - 0.28578I$<br>$a = 0.13231 + 2.05785I$<br>$b = -0.87798 - 1.37827I$ | $5.81788 - 9.83437I$ | 0 |
| $u = -0.108555 + 0.402624I$<br>$a = -0.76794 + 1.54963I$<br>$b = -1.030070 - 0.682662I$ | $-2.21467 - 0.54177I$ | $-9.73235 - 2.83144I$ |
| $u = -0.108555 - 0.402624I$<br>$a = -0.76794 - 1.54963I$<br>$b = -1.030070 + 0.682662I$ | $-2.21467 + 0.54177I$ | $-9.73235 + 2.83144I$ |
| $u = 1.59611 + 0.08699I$<br>$a = 0.212658 - 0.852395I$<br>$b = -0.496177 + 0.758175I$ | $5.16526 - 0.31579I$ | 0 |
| $u = 1.59611 - 0.08699I$<br>$a = 0.212658 + 0.852395I$<br>$b = -0.496177 - 0.758175I$ | $5.16526 + 0.31579I$ | 0 |
| $u = 0.105740 + 0.346172I$<br>$a = -1.84978 - 1.14288I$<br>$b = -0.99826 + 1.06299I$ | $-1.33844 + 3.06291I$ | $-5.43431 - 6.81720I$ |
| $u = 0.105740 - 0.346172I$<br>$a = -1.84978 + 1.14288I$<br>$b = -0.99826 - 1.06299I$ | $-1.33844 - 3.06291I$ | $-5.43431 + 6.81720I$ |
| $u = -0.119394 + 0.340455I$<br>$a = 1.35948 - 4.85501I$<br>$b = 0.625960 + 0.177729I$ | $0.27433 - 7.82240I$ | $-9.2796 + 15.5181I$ |
| $u = -0.119394 - 0.340455I$<br>$a = 1.35948 + 4.85501I$<br>$b = 0.625960 - 0.177729I$ | $0.27433 + 7.82240I$ | $-9.2796 - 15.5181I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = \quad 1.60673 + 0.41665I$<br>$a = -0.087156 - 0.362531I$<br>$b = -0.323899 + 0.499991I$ | $6.13843 + 1.53567I$ | 0 |
| $u = \quad 1.60673 - 0.41665I$<br>$a = -0.087156 + 0.362531I$<br>$b = -0.323899 - 0.499991I$ | $6.13843 - 1.53567I$ | 0 |
| $u = -0.159193 + 0.296546I$<br>$a = \quad 0.882742 + 1.039190I$<br>$b = \quad 0.73428 - 1.42709I$ | $-2.79569 - 2.77242I$ | $-9.9283 + 14.3820I$ |
| $u = -0.159193 - 0.296546I$<br>$a = \quad 0.882742 - 1.039190I$<br>$b = \quad 0.73428 + 1.42709I$ | $-2.79569 + 2.77242I$ | $-9.9283 - 14.3820I$ |
| $u = -1.67574 + 0.12556I$<br>$a = -0.320567 + 0.727525I$<br>$b = -0.036115 - 0.656702I$ | $8.93364 + 6.05785I$ | 0 |
| $u = -1.67574 - 0.12556I$<br>$a = -0.320567 - 0.727525I$<br>$b = -0.036115 + 0.656702I$ | $8.93364 - 6.05785I$ | 0 |
| $u = -0.022916 + 0.308042I$<br>$a = -1.15172 + 2.90897I$<br>$b = -0.840214 - 0.292102I$ | $-1.91966 - 0.20692I$ | $-9.60004 + 1.25661I$ |
| $u = -0.022916 - 0.308042I$<br>$a = -1.15172 - 2.90897I$<br>$b = -0.840214 + 0.292102I$ | $-1.91966 + 0.20692I$ | $-9.60004 - 1.25661I$ |
| $u = -0.232926$<br>$a = \quad 2.86222$<br>$b = -0.993517$ | $-1.47689$ | $-7.48490$ |
| $u = -0.0764654 + 0.0179802I$<br>$a = -10.9547 - 12.0482I$<br>$b = -0.306428 + 0.900968I$ | $2.97613 + 2.97620I$ | $6.05883 - 2.35222I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-0.0764654-0.0179802I$ | | |
| $a=-10.9547+12.0482I$ | $2.97613-2.97620I$ | $6.05883+2.35222I$ |
| $b=-0.306428-0.900968I$ | | |

**II.**

$\boldsymbol{I_2^u = \langle -7.69\times 10^{12}u^{29}+1.11\times 10^{13}u^{28}+\cdots+1.96\times 10^{13}b-8.09\times 10^{12},\ 4.63\times 10^{13}u^{29}-8.91\times 10^{12}u^{28}+\cdots+1.96\times 10^{13}a+3.59\times 10^{13},\ u^{30}-u^{29}+\cdots+3u^2+1\rangle}$

**(i) Arc colorings**

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

$$a_{11} = \begin{pmatrix} 0 \\ u \end{pmatrix}$$

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

$$a_3 = \begin{pmatrix} -2.36637u^{29} + 0.455125u^{28} + \cdots + 2.85213u - 1.83518 \\ 0.392910u^{29} - 0.564811u^{28} + \cdots - 1.81298u + 0.413118 \end{pmatrix}$$

$$a_{12} = \begin{pmatrix} u \\ -u^3 + u \end{pmatrix}$$

$$a_4 = \begin{pmatrix} -0.223320u^{29} + 1.48376u^{28} + \cdots + 1.84450u - 3.66965 \\ -1.34937u^{29} - 1.47784u^{28} + \cdots - 0.677567u + 1.75032 \end{pmatrix}$$

$$a_5 = \begin{pmatrix} 1.64840u^{29} + 2.33207u^{28} + \cdots - 4.80812u + 0.368280 \\ -1.76478u^{29} - 2.03766u^{28} + \cdots + 1.69144u + 2.10802 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} -u \\ u \end{pmatrix}$$

$$a_2 = \begin{pmatrix} 0.517277u^{29} + 1.09914u^{28} + \cdots + 0.878677u - 3.91832 \\ -2.49074u^{29} - 1.20883u^{28} + \cdots + 0.160474u + 2.49626 \end{pmatrix}$$

$$a_8 = \begin{pmatrix} -1.34852u^{29} - 2.17782u^{28} + \cdots - 1.08366u + 3.95248 \\ 0.670939u^{29} + 1.65264u^{28} + \cdots + 0.818071u - 0.279740 \end{pmatrix}$$

$$a_1 = \begin{pmatrix} 0.432407u^{29} - 0.373574u^{28} + \cdots - 3.76950u - 0.401863 \\ -0.861302u^{29} + 0.788713u^{28} + \cdots + 1.29292u - 0.249427 \end{pmatrix}$$

$$a_9 = \begin{pmatrix} -2.21167u^{29} - 1.98166u^{28} + \cdots + 5.04257u + 1.02655 \\ 1.82204u^{29} + 2.28955u^{28} + \cdots + 0.868974u - 1.26941 \end{pmatrix}$$

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

**(iii) Cusp Shapes**

$$= -\frac{75435520361360}{19577401712437}u^{29} - \frac{37163103293925}{19577401712437}u^{28} + \cdots - \frac{152854444455780}{19577401712437}u + \frac{4516608067627}{19577401712437}$$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $u^{30} - 12u^{29} + \cdots - 2u + 1$ |
| $c_2$ | $u^{30} + u^{29} + \cdots + 3u + 1$ |
| $c_3$ | $u^{30} - 5u^{29} + \cdots - 5u + 1$ |
| $c_4$ | $u^{30} + 2u^{29} + \cdots + 46u + 31$ |
| $c_5$ | $u^{30} + 9u^{29} + \cdots + 5u + 1$ |
| $c_6$ | $u^{30} - u^{29} + \cdots + 3u^2 + 1$ |
| $c_7$ | $u^{30} + 9u^{28} + \cdots - 3u + 1$ |
| $c_8$ | $u^{30} + 2u^{29} + \cdots + 4u + 1$ |
| $c_9$ | $u^{30} + u^{29} + \cdots - 4u + 1$ |
| $c_{10}, c_{11}$ | $u^{30} + u^{29} + \cdots + 3u^2 + 1$ |
| $c_{12}$ | $u^{30} - 2u^{29} + \cdots - 4u + 1$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $y^{30}+6y^{29}+\cdots+28y^2+1$ |
| $c_2$ | $y^{30}+7y^{29}+\cdots-13y+1$ |
| $c_3$ | $y^{30}-3y^{29}+\cdots+9y+1$ |
| $c_4$ | $y^{30}-8y^{29}+\cdots-9370y+961$ |
| $c_5$ | $y^{30}+3y^{29}+\cdots-5y+1$ |
| $c_6, c_{10}, c_{11}$ | $y^{30}-31y^{29}+\cdots+6y+1$ |
| $c_7$ | $y^{30}+18y^{29}+\cdots+7y+1$ |
| $c_8, c_{12}$ | $y^{30}+22y^{29}+\cdots+6y+1$ |
| $c_9$ | $y^{30}-19y^{29}+\cdots-20y+1$ |

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

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.989846 + 0.188369I$<br>$a = 1.206130 - 0.321311I$<br>$b = -0.887327 - 0.705380I$ | $0.24373 - 1.95711I$ | $-4.33244 + 5.88609I$ |
| $u = 0.989846 - 0.188369I$<br>$a = 1.206130 + 0.321311I$<br>$b = -0.887327 + 0.705380I$ | $0.24373 + 1.95711I$ | $-4.33244 - 5.88609I$ |
| $u = 0.442016 + 0.721148I$<br>$a = -0.538270 - 0.853835I$<br>$b = -0.934934 + 1.028010I$ | $-0.92209 + 5.23366I$ | $-1.60069 - 4.30342I$ |
| $u = 0.442016 - 0.721148I$<br>$a = -0.538270 + 0.853835I$<br>$b = -0.934934 - 1.028010I$ | $-0.92209 - 5.23366I$ | $-1.60069 + 4.30342I$ |
| $u = -0.283871 + 0.773743I$<br>$a = -0.884357 + 0.015524I$<br>$b = -0.445890 - 0.620166I$ | $1.73260 - 3.73548I$ | $2.68923 + 12.02592I$ |
| $u = -0.283871 - 0.773743I$<br>$a = -0.884357 - 0.015524I$<br>$b = -0.445890 + 0.620166I$ | $1.73260 + 3.73548I$ | $2.68923 - 12.02592I$ |
| $u = -0.620941 + 1.010250I$<br>$a = 0.341585 + 0.062165I$<br>$b = -0.269172 + 0.195766I$ | $-0.90090 - 2.51387I$ | $15.5859 - 3.9325I$ |
| $u = -0.620941 - 1.010250I$<br>$a = 0.341585 - 0.062165I$<br>$b = -0.269172 - 0.195766I$ | $-0.90090 + 2.51387I$ | $15.5859 + 3.9325I$ |
| $u = -1.268630 + 0.005990I$<br>$a = 0.943554 - 0.415590I$<br>$b = -1.42106 + 0.23943I$ | $0.924843 - 0.028493I$ | $-4.88122 - 0.36452I$ |
| $u = -1.268630 - 0.005990I$<br>$a = 0.943554 + 0.415590I$<br>$b = -1.42106 - 0.23943I$ | $0.924843 + 0.028493I$ | $-4.88122 + 0.36452I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.306870 + 0.096410I$<br>$a = 0.47285 - 2.07622I$<br>$b = -0.96983 + 1.16956I$ | $2.09646 + 4.09367I$ | $-3.20107 - 5.19591I$ |
| $u = 1.306870 - 0.096410I$<br>$a = 0.47285 + 2.07622I$<br>$b = -0.96983 - 1.16956I$ | $2.09646 - 4.09367I$ | $-3.20107 + 5.19591I$ |
| $u = -1.363160 + 0.072970I$<br>$a = -0.217801 + 1.330540I$<br>$b = 1.089230 - 0.490818I$ | $4.75322 - 8.38730I$ | $0.41943 + 5.10587I$ |
| $u = -1.363160 - 0.072970I$<br>$a = -0.217801 - 1.330540I$<br>$b = 1.089230 + 0.490818I$ | $4.75322 + 8.38730I$ | $0.41943 - 5.10587I$ |
| $u = 1.367220 + 0.065004I$<br>$a = -0.22762 - 2.55840I$<br>$b = 0.33368 + 1.66288I$ | $1.52351 + 3.24753I$ | $-2.94159 - 3.47206I$ |
| $u = 1.367220 - 0.065004I$<br>$a = -0.22762 + 2.55840I$<br>$b = 0.33368 - 1.66288I$ | $1.52351 - 3.24753I$ | $-2.94159 + 3.47206I$ |
| $u = -0.060763 + 0.618506I$<br>$a = -0.232594 + 0.319629I$<br>$b = -0.993911 - 0.639264I$ | $-1.81239 - 1.85320I$ | $-8.10054 + 3.95646I$ |
| $u = -0.060763 - 0.618506I$<br>$a = -0.232594 - 0.319629I$<br>$b = -0.993911 + 0.639264I$ | $-1.81239 + 1.85320I$ | $-8.10054 - 3.95646I$ |
| $u = -1.48783 + 0.29054I$<br>$a = 0.09984 + 1.99043I$<br>$b = -0.93099 - 1.42571I$ | $5.30854 - 9.04232I$ | $1.09446 + 5.67771I$ |
| $u = -1.48783 - 0.29054I$<br>$a = 0.09984 - 1.99043I$<br>$b = -0.93099 + 1.42571I$ | $5.30854 + 9.04232I$ | $1.09446 - 5.67771I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.49822 + 0.26471I$<br>$a = -0.28122 - 1.47445I$<br>$b = -0.719679 + 0.897739I$ | $7.73993 + 7.39536I$ | $0. - 8.76922I$ |
| $u = 1.49822 - 0.26471I$<br>$a = -0.28122 + 1.47445I$<br>$b = -0.719679 - 0.897739I$ | $7.73993 - 7.39536I$ | $0. + 8.76922I$ |
| $u = -1.60068 + 0.32668I$<br>$a = 0.086838 - 0.294584I$<br>$b = 0.365998 + 0.404602I$ | $6.09798 - 1.37001I$ | $0. - 16.1282I$ |
| $u = -1.60068 - 0.32668I$<br>$a = 0.086838 + 0.294584I$<br>$b = 0.365998 - 0.404602I$ | $6.09798 + 1.37001I$ | $0. + 16.1282I$ |
| $u = 1.63421 + 0.10685I$<br>$a = -0.123406 + 0.947575I$<br>$b = 0.411524 - 0.500133I$ | $8.15025 + 6.77665I$ | $0. - 9.54891I$ |
| $u = 1.63421 - 0.10685I$<br>$a = -0.123406 - 0.947575I$<br>$b = 0.411524 + 0.500133I$ | $8.15025 - 6.77665I$ | $0. + 9.54891I$ |
| $u = 0.177898 + 0.264606I$<br>$a = -2.16718 - 0.22962I$<br>$b = 0.142634 - 0.903384I$ | $-2.70877 - 2.24454I$ | $-6.85300 + 0.37420I$ |
| $u = 0.177898 - 0.264606I$<br>$a = -2.16718 + 0.22962I$<br>$b = 0.142634 + 0.903384I$ | $-2.70877 + 2.24454I$ | $-6.85300 - 0.37420I$ |
| $u = -0.230410 + 0.216371I$<br>$a = -3.97835 + 0.36788I$<br>$b = 0.729736 + 0.182828I$ | $0.67176 + 7.39207I$ | $1.02242 - 4.31377I$ |
| $u = -0.230410 - 0.216371I$<br>$a = -3.97835 - 0.36788I$<br>$b = 0.729736 - 0.182828I$ | $0.67176 - 7.39207I$ | $1.02242 + 4.31377I$ |

**III. $I_3^u = \langle b+1,\ a^3-2a^2+a+1,\ u+1\rangle$**

**(i) Arc colorings**

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

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

**(iii) Cusp Shapes** $= 9a^2-18a+9$

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

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

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

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

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

| Solutions to $I_3^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-1.00000$<br>$a=\ \ 1.23279+0.79255I$<br>$b=-1.00000$ | 0 | $-5.16555+3.32090I$ |
| $u=-1.00000$<br>$a=\ \ 1.23279-0.79255I$<br>$b=-1.00000$ | 0 | $-5.16555-3.32090I$ |
| $u=-1.00000$<br>$a=-0.465571$<br>$b=-1.00000$ | 0 | 19.3310 |

**IV. u-Polynomials**

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $(u^3-3u^2+4u-1)(u^{30}-12u^{29}+\cdots-2u+1)$ $\cdot(u^{151}+10u^{150}+\cdots-31u+23)$ |
| $c_2$ | $(u^3-u^2-1)(u^{30}+u^{29}+\cdots+3u+1)$ $\cdot(u^{151}+3u^{150}+\cdots+17222u+2203)$ |
| $c_3$ | $((u+1)^3)(u^{30}-5u^{29}+\cdots-5u+1)$ $\cdot(u^{151}-3u^{150}+\cdots-514125u+116356)$ |
| $c_4$ | $u^3(u^{30}+2u^{29}+\cdots+46u+31)(u^{151}-u^{150}+\cdots+64u+16)$ |
| $c_5$ | $((u+1)^3)(u^{30}+9u^{29}+\cdots+5u+1)(u^{151}+9u^{150}+\cdots-6313u+9724)$ |
| $c_6$ | $((u+1)^3)(u^{30}-u^{29}+\cdots+3u^2+1)(u^{151}+u^{150}+\cdots+32u+1)$ |
| $c_7$ | $(u^3+u^2+1)(u^{30}+9u^{28}+\cdots-3u+1)$ $\cdot(u^{151}-4u^{150}+\cdots-2579090u+234743)$ |
| $c_8$ | $(u^3+u^2+1)(u^{30}+2u^{29}+\cdots+4u+1)$ $\cdot(u^{151}-2u^{150}+\cdots+4057u+1279)$ |
| $c_9$ | $(u^3-2u^2+u+1)(u^{30}+u^{29}+\cdots-4u+1)$ $\cdot(u^{151}-2u^{150}+\cdots+492840u+167911)$ |
| $c_{10}, c_{11}$ | $((u-1)^3)(u^{30}+u^{29}+\cdots+3u^2+1)(u^{151}+u^{150}+\cdots+32u+1)$ |
| $c_{12}$ | $(u^3-u^2-1)(u^{30}-2u^{29}+\cdots-4u+1)$ $\cdot(u^{151}-2u^{150}+\cdots+4057u+1279)$ |

**V. Riley Polynomials**

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $(y^3-y^2+10y-1)(y^{30}+6y^{29}+\cdots+28y^2+1)$ $\cdot(y^{151}+18y^{150}+\cdots-28249y-529)$ |
| $c_2$ | $(y^3-y^2-2y-1)(y^{30}+7y^{29}+\cdots-13y+1)$ $\cdot(y^{151}-13y^{150}+\cdots+173229284y-4853209)$ |
| $c_3$ | $((y-1)^3)(y^{30}-3y^{29}+\cdots+9y+1)$ $\cdot(y^{151}-21y^{150}+\cdots-752670674231y-13538718736)$ |
| $c_4$ | $y^3(y^{30}-8y^{29}+\cdots-9370y+961)(y^{151}+y^{150}+\cdots-11136y-256)$ |
| $c_5$ | $((y-1)^3)(y^{30}+3y^{29}+\cdots-5y+1)$ $\cdot(y^{151}+21y^{150}+\cdots-6011235647y-94556176)$ |
| $c_6, c_{10}, c_{11}$ | $((y-1)^3)(y^{30}-31y^{29}+\cdots+6y+1)(y^{151}-149y^{150}+\cdots+246y-1)$ |
| $c_7$ | $(y^3-y^2-2y-1)(y^{30}+18y^{29}+\cdots+7y+1)$ $\cdot(y^{151}+46y^{150}+\cdots-7705800129308y-55104276049)$ |
| $c_8, c_{12}$ | $(y^3-y^2-2y-1)(y^{30}+22y^{29}+\cdots+6y+1)$ $\cdot(y^{151}+94y^{150}+\cdots-113123915y-1635841)$ |
| $c_9$ | $(y^3-2y^2+5y-1)(y^{30}-19y^{29}+\cdots-20y+1)$ $\cdot(y^{151}-56y^{150}+\cdots+725298561134y-28194103921)$ |