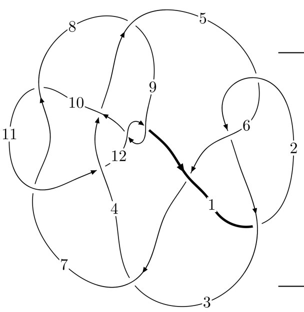
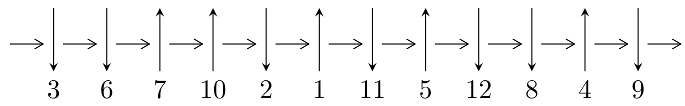
# $12a_{0245}$ $(K12a_{0245})$




A knot diagram[1]

**Linearized knot diagam**




**Solving Sequence**

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

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

$$\begin{aligned}
I_1^u = \langle & -1.30829 \times 10^{182} u^{45} + 3.21690 \times 10^{182} u^{44} + \cdots + 2.91664 \times 10^{185} b + 1.81261 \times 10^{186}, \\
& 2.74927 \times 10^{182} u^{45} - 1.01973 \times 10^{183} u^{44} + \cdots + 5.83327 \times 10^{185} a - 1.27181 \times 10^{187}, \\
& u^{46} - 3u^{45} + \cdots - 30720u + 8192 \rangle \\
I_2^u = \langle & -u^{31} - u^{30} + \cdots - a - 2,\ 2u^{31} + u^{30} + \cdots + a^2 + 3,\ u^{32} + u^{31} + \cdots + 2u + 1 \rangle \\
I_3^u = \langle & u^2 a - u^3 - u^2 + b - a,\ a^2 - au - u,\ u^4 + u^3 + 1 \rangle \\
I_4^u = \langle & b + 1,\ a^2 - a + 2,\ u - 1 \rangle \\
I_5^u = \langle & b - u - 1,\ a - 1,\ u^2 + 1 \rangle
\end{aligned}$$

$$I_1^v = \langle a,\ v^5 + 2v^4 - 16v^2 + 64b - 16v + 32,\ v^6 + 2v^5 - 16v^3 - 16v^2 + 32v + 64 \rangle$$

* 6 irreducible components of $\dim_{\mathbb{C}} = 0$, with total 128 representations.

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[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.** $I_1^u = \langle -1.31 \times 10^{182} u^{45} + 3.22 \times 10^{182} u^{44} + \cdots + 2.92 \times 10^{185} b + 1.81 \times 10^{186},\ 2.75 \times 10^{182} u^{45} - 1.02 \times 10^{183} u^{44} + \cdots + 5.83 \times 10^{185} a - 1.27 \times 10^{187},\ u^{46} - 3u^{45} + \cdots - 30720u + 8192 \rangle$

**(i) Arc colorings**

$$a_4 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

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

$$a_5 = \begin{pmatrix} 1 \\ -u^2 \end{pmatrix}$$

$$a_{12} = \begin{pmatrix} -0.000471309u^{45} + 0.00174813u^{44} + \cdots - 24.9228u + 21.8026 \\ 0.000448560u^{45} - 0.00110295u^{44} + \cdots + 13.9436u - 6.21474 \end{pmatrix}$$

$$a_9 = \begin{pmatrix} 0.000919870u^{45} - 0.00285108u^{44} + \cdots + 38.8664u - 28.0174 \\ 0.000859527u^{45} - 0.00194940u^{44} + \cdots + 24.2892u - 6.96411 \end{pmatrix}$$

$$a_1 = \begin{pmatrix} -0.000531652u^{45} + 0.00264982u^{44} + \cdots - 40.4999u + 42.8559 \\ 0.000478275u^{45} - 0.00119240u^{44} + \cdots + 14.5999u - 7.27524 \end{pmatrix}$$

$$a_8 = \begin{pmatrix} 0.000471309u^{45} - 0.00174813u^{44} + \cdots + 24.9228u - 21.8026 \\ 0.000991814u^{45} - 0.00227861u^{44} + \cdots + 28.0713u - 8.95256 \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} -0.000919870u^{45} + 0.00285108u^{44} + \cdots - 38.8664u + 28.0174 \\ 0.000448560u^{45} - 0.00110295u^{44} + \cdots + 13.9436u - 6.21474 \end{pmatrix}$$

$$a_7 = \begin{pmatrix} 0.000531652u^{45} - 0.00264982u^{44} + \cdots + 40.4999u - 42.8559 \\ 0.00185134u^{45} - 0.00422801u^{44} + \cdots + 51.3606u - 15.9167 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} 0.00115169u^{45} - 0.00185933u^{44} + \cdots + 29.6103u + 9.69006 \\ 0.00179201u^{45} - 0.00442512u^{44} + \cdots + 55.3750u - 28.2489 \end{pmatrix}$$

$$a_2 = \begin{pmatrix} -0.000177162u^{45} + 0.00141815u^{44} + \cdots - 33.1849u + 22.5187 \\ 0.000323331u^{45} - 0.00109532u^{44} + \cdots + 8.96510u - 11.5651 \end{pmatrix}$$

$$a_6 = \begin{pmatrix} 0.00269326u^{45} - 0.00782283u^{44} + \cdots + 106.019u - 66.8639 \\ -0.00167414u^{45} + 0.00452784u^{44} + \cdots - 49.4479u + 36.0030 \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= 0.000526625u^{45} - 0.00139921u^{44} + \cdots + 30.9656u + 16.8615$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $u^{46} + 22u^{45} + \cdots + 65u + 16$ |
| $c_2, c_5$ | $u^{46} + 2u^{45} + \cdots + 15u + 4$ |
| $c_3$ | $u^{46} + 2u^{45} + \cdots + 419884u + 136336$ |
| $c_4$ | $u^{46} + 3u^{45} + \cdots + 30720u + 8192$ |
| $c_6$ | $u^{46} + 2u^{44} + \cdots + 2032u + 448$ |
| $c_7, c_9, c_{10}$<br>$c_{12}$ | $u^{46} + 6u^{45} + \cdots - 6u + 1$ |
| $c_8, c_{11}$ | $64(64u^{46} - 96u^{45} + \cdots - 8u^2 + 2)$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $y^{46} + 6y^{45} + \cdots + 3391y + 256$ |
| $c_2, c_5$ | $y^{46} - 22y^{45} + \cdots - 65y + 16$ |
| $c_3$ | $y^{46} - 30y^{45} + \cdots - 205613722768y + 18587504896$ |
| $c_4$ | $y^{46} - 11y^{45} + \cdots - 1572864000y + 67108864$ |
| $c_6$ | $y^{46} + 4y^{45} + \cdots + 910080y + 200704$ |
| $c_7, c_9, c_{10}$ $c_{12}$ | $y^{46} + 26y^{45} + \cdots - 12y + 1$ |
| $c_8, c_{11}$ | $4096(4096y^{46} - 93184y^{45} + \cdots - 32y + 4)$ |

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

| Solutions to $I_1^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.401792 + 0.789673I$<br>$a = 1.034950 + 0.489117I$<br>$b = -0.098777 + 0.739250I$ | $-3.37451 + 5.47103I$ | $-6.94202 - 5.47084I$ |
| $u = -0.401792 - 0.789673I$<br>$a = 1.034950 - 0.489117I$<br>$b = -0.098777 - 0.739250I$ | $-3.37451 - 5.47103I$ | $-6.94202 + 5.47084I$ |
| $u = 0.239618 + 0.727911I$<br>$a = -0.877973 + 0.679500I$<br>$b = 0.064614 + 0.618606I$ | $-1.23789 - 1.34787I$ | $-5.39091 + 2.19254I$ |
| $u = 0.239618 - 0.727911I$<br>$a = -0.877973 - 0.679500I$<br>$b = 0.064614 - 0.618606I$ | $-1.23789 + 1.34787I$ | $-5.39091 - 2.19254I$ |
| $u = -0.078679 + 0.719346I$<br>$a = -0.451493 + 0.580682I$<br>$b = -0.063814 + 0.526016I$ | $-0.697121 - 1.212220I$ | $-4.01044 + 6.14816I$ |
| $u = -0.078679 - 0.719346I$<br>$a = -0.451493 - 0.580682I$<br>$b = -0.063814 - 0.526016I$ | $-0.697121 + 1.212220I$ | $-4.01044 - 6.14816I$ |
| $u = -0.433643 + 0.566016I$<br>$a = 1.33364 + 0.69018I$<br>$b = -0.273046 + 0.628978I$ | $-4.26962 - 1.33304I$ | $-9.23410 + 6.58879I$ |
| $u = -0.433643 - 0.566016I$<br>$a = 1.33364 - 0.69018I$<br>$b = -0.273046 - 0.628978I$ | $-4.26962 + 1.33304I$ | $-9.23410 - 6.58879I$ |
| $u = 0.672328 + 0.122077I$<br>$a = -2.03352 + 0.16905I$<br>$b = 0.811410 + 0.208117I$ | $-1.01846 + 6.05975I$ | $5.32943 - 7.91016I$ |
| $u = 0.672328 - 0.122077I$<br>$a = -2.03352 - 0.16905I$<br>$b = 0.811410 - 0.208117I$ | $-1.01846 - 6.05975I$ | $5.32943 + 7.91016I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-0.645073+0.070271I$ <br> $a=\ \ 2.10420+0.11324I$ <br> $b=-0.777175+0.116055I$ | $0.827180-1.119400I$ | $9.81417+2.37316I$ |
| $u=-0.645073-0.070271I$ <br> $a=\ \ 2.10420-0.11324I$ <br> $b=-0.777175-0.116055I$ | $0.827180+1.119400I$ | $9.81417-2.37316I$ |
| $u=\ \ 0.520537+0.295551I$ <br> $a=\ \ 0.413738+0.318781I$ <br> $b=\ \ 0.371984+0.476647I$ | $-1.97267-1.37276I$ | $-2.57483+1.51766I$ |
| $u=\ \ 0.520537-0.295551I$ <br> $a=\ \ 0.413738-0.318781I$ <br> $b=\ \ 0.371984-0.476647I$ | $-1.97267+1.37276I$ | $-2.57483-1.51766I$ |
| $u=\ \ 0.502594+0.228503I$ <br> $a=-2.11877+0.56848I$ <br> $b=\ \ 0.525503+0.309703I$ | $-3.39297-0.50689I$ | $1.54331-8.55618I$ |
| $u=\ \ 0.502594-0.228503I$ <br> $a=-2.11877-0.56848I$ <br> $b=\ \ 0.525503-0.309703I$ | $-3.39297+0.50689I$ | $1.54331+8.55618I$ |
| $u=\ \ 0.532699+0.084051I$ <br> $a=\ \ 0.573143+0.199439I$ <br> $b=\ \ 0.707726+0.345489I$ | $-0.46138+5.41462I$ | $2.43162-4.62417I$ |
| $u=\ \ 0.532699-0.084051I$ <br> $a=\ \ 0.573143-0.199439I$ <br> $b=\ \ 0.707726-0.345489I$ | $-0.46138-5.41462I$ | $2.43162+4.62417I$ |
| $u=-0.478597+0.061203I$ <br> $a=-0.523519+0.112067I$ <br> $b=-0.641497+0.184230I$ | $1.49547-0.77471I$ | $6.52139+0.61017I$ |
| $u=-0.478597-0.061203I$ <br> $a=-0.523519-0.112067I$ <br> $b=-0.641497-0.184230I$ | $1.49547+0.77471I$ | $6.52139-0.61017I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.32298 + 1.00419I$<br>$a = -0.244934 - 0.868893I$<br>$b = -1.59181 - 1.00368I$ | $7.9562 + 18.9510I$ | 0 |
| $u = 1.32298 - 1.00419I$<br>$a = -0.244934 + 0.868893I$<br>$b = -1.59181 + 1.00368I$ | $7.9562 - 18.9510I$ | 0 |
| $u = 1.36201 + 0.97857I$<br>$a = -0.221655 - 0.833836I$<br>$b = -1.46345 - 0.96268I$ | $4.87739 + 11.08340I$ | 0 |
| $u = 1.36201 - 0.97857I$<br>$a = -0.221655 + 0.833836I$<br>$b = -1.46345 + 0.96268I$ | $4.87739 - 11.08340I$ | 0 |
| $u = -1.33866 + 1.01035I$<br>$a = 0.250581 - 0.854142I$<br>$b = 1.57565 - 0.95478I$ | $10.1320 - 13.6218I$ | 0 |
| $u = -1.33866 - 1.01035I$<br>$a = 0.250581 + 0.854142I$<br>$b = 1.57565 + 0.95478I$ | $10.1320 + 13.6218I$ | 0 |
| $u = -1.38555 + 1.03866I$<br>$a = 0.272974 - 0.808895I$<br>$b = 1.53500 - 0.79923I$ | $11.2953 - 10.4811I$ | 0 |
| $u = -1.38555 - 1.03866I$<br>$a = 0.272974 + 0.808895I$<br>$b = 1.53500 + 0.79923I$ | $11.2953 + 10.4811I$ | 0 |
| $u = -1.57230 + 0.77246I$<br>$a = 0.085159 - 0.690200I$<br>$b = 0.913569 - 0.867748I$ | $0.59144 - 10.81880I$ | 0 |
| $u = -1.57230 - 0.77246I$<br>$a = 0.085159 + 0.690200I$<br>$b = 0.913569 + 0.867748I$ | $0.59144 + 10.81880I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.41374 + 1.05421I$<br>$a = -0.282174 - 0.781521I$<br>$b = -1.49805 - 0.71794I$ | $10.12260 + 5.12502I$ | 0 |
| $u = 1.41374 - 1.05421I$<br>$a = -0.282174 + 0.781521I$<br>$b = -1.49805 + 0.71794I$ | $10.12260 - 5.12502I$ | 0 |
| $u = 1.69696 + 0.85231I$<br>$a = -0.124053 - 0.627843I$<br>$b = -0.899624 - 0.686359I$ | $3.79825 + 6.24987I$ | 0 |
| $u = 1.69696 - 0.85231I$<br>$a = -0.124053 + 0.627843I$<br>$b = -0.899624 + 0.686359I$ | $3.79825 - 6.24987I$ | 0 |
| $u = -1.88174 + 0.67526I$<br>$a = 0.052037 - 0.556937I$<br>$b = 0.669760 - 0.655489I$ | $-0.19317 - 2.26026I$ | 0 |
| $u = -1.88174 - 0.67526I$<br>$a = 0.052037 + 0.556937I$<br>$b = 0.669760 + 0.655489I$ | $-0.19317 + 2.26026I$ | 0 |
| $u = 1.15493 + 1.84484I$<br>$a = -0.522503 - 0.223781I$<br>$b = -0.696453 + 0.457576I$ | $6.20944 - 9.54624I$ | 0 |
| $u = 1.15493 - 1.84484I$<br>$a = -0.522503 + 0.223781I$<br>$b = -0.696453 - 0.457576I$ | $6.20944 + 9.54624I$ | 0 |
| $u = 1.71157 + 1.45820I$<br>$a = -0.345297 - 0.457141I$<br>$b = -0.959259 - 0.047672I$ | $9.03151 + 5.36539I$ | 0 |
| $u = 1.71157 - 1.45820I$<br>$a = -0.345297 + 0.457141I$<br>$b = -0.959259 + 0.047672I$ | $9.03151 - 5.36539I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -1.29479 + 1.87645I$<br>$a = 0.478230 - 0.255335I$<br>$b = 0.724784 + 0.367690I$ | $8.41076 + 3.99047I$ | 0 |
| $u = -1.29479 - 1.87645I$<br>$a = 0.478230 + 0.255335I$<br>$b = 0.724784 - 0.367690I$ | $8.41076 - 3.99047I$ | 0 |
| $u = -1.65453 + 1.63052I$<br>$a = 0.382255 - 0.391673I$<br>$b = 0.882553 + 0.091874I$ | $9.95002 + 0.24033I$ | 0 |
| $u = -1.65453 - 1.63052I$<br>$a = 0.382255 + 0.391673I$<br>$b = 0.882553 - 0.091874I$ | $9.95002 - 0.24033I$ | 0 |
| $u = 1.53540 + 2.28777I$<br>$a = -0.360009 - 0.207800I$<br>$b = -0.569607 + 0.219649I$ | $2.65240 - 1.11142I$ | 0 |
| $u = 1.53540 - 2.28777I$<br>$a = -0.360009 + 0.207800I$<br>$b = -0.569607 - 0.219649I$ | $2.65240 + 1.11142I$ | 0 |

**II.**
$\boldsymbol{I_2^u = \langle -u^{31} - u^{30} + \cdots - a - 2,\ 2u^{31} + u^{30} + \cdots + a^2 + 3,\ u^{32} + u^{31} + \cdots + 2u + 1 \rangle}$

**(i) Arc colorings**

$$a_4 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_5 = \begin{pmatrix} 1 \\ -u^2 \end{pmatrix}$$
$$a_{12} = \begin{pmatrix} a \\ u^{31} + u^{30} + \cdots + a + 2 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} u^{31} + u^{30} + \cdots + u + 2 \\ u^{31} + u^{30} + \cdots - a + 2 \end{pmatrix}$$
$$a_1 = \begin{pmatrix} -u^5 - u \\ u^7 - u^5 + 2u^3 - u \end{pmatrix}$$
$$a_8 = \begin{pmatrix} a - u \\ u^{31} + u^{30} + \cdots - a + 2 \end{pmatrix}$$
$$a_{11} = \begin{pmatrix} -u^{31} - u^{30} + \cdots - u - 2 \\ u^{31} + u^{30} + \cdots + a + 2 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} u^5 + u \\ -u^5 + u^3 - u \end{pmatrix}$$
$$a_3 = \begin{pmatrix} -u^{10} + u^8 - 2u^6 + u^4 - u^2 + 1 \\ u^{10} - 2u^8 + 3u^6 - 2u^4 + u^2 \end{pmatrix}$$
$$a_2 = \begin{pmatrix} -u^{27} + 4u^{25} + \cdots + 10u^5 - 5u^3 \\ u^{27} - 5u^{25} + \cdots + 3u^3 - u \end{pmatrix}$$
$$a_6 = \begin{pmatrix} -u^{17} + 2u^{15} - 5u^{13} + 6u^{11} - 7u^9 + 6u^7 - 2u^5 + 2u^3 + u \\ u^{19} - 3u^{17} + 8u^{15} - 13u^{13} + 17u^{11} - 17u^9 + 12u^7 - 8u^5 + 3u^3 - u \end{pmatrix}$$

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

**(iii) Cusp Shapes**
$= -4u^{30} + 20u^{28} + 4u^{27} - 68u^{26} - 20u^{25} + 156u^{24} + 68u^{23} - 276u^{22} - 160u^{21} + 380u^{20} + 292u^{19} - 404u^{18} - 428u^{17} + 328u^{16} + 504u^{15} - 160u^{14} - 496u^{13} - 8u^{12} + 392u^{11} + 124u^{10} - 252u^9 - 156u^8 + 120u^7 + 116u^6 - 28u^5 - 64u^4 - 4u^3 + 16u^2 + 12u - 2$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $(u^{32}+15u^{31}+\cdots+2u+1)^2$ |
| $c_2, c_5$ | $(u^{32}+u^{31}+\cdots-u^2+1)^2$ |
| $c_3$ | $(u^{32}+4u^{31}+\cdots+28u+4)^2$ |
| $c_4$ | $(u^{32}-u^{31}+\cdots-2u+1)^2$ |
| $c_6$ | $(u^{32}+3u^{31}+\cdots+2u+3)^2$ |
| $c_7, c_9, c_{10}$ $c_{12}$ | $u^{64}-11u^{63}+\cdots+4u+1$ |
| $c_8, c_{11}$ | $u^{64}+u^{63}+\cdots-8574468u+1426351$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $(y^{32} + 5y^{31} + \cdots + 2y + 1)^2$ |
| $c_2, c_5$ | $(y^{32} - 15y^{31} + \cdots - 2y + 1)^2$ |
| $c_3$ | $(y^{32} - 20y^{31} + \cdots - 184y + 16)^2$ |
| $c_4$ | $(y^{32} - 11y^{31} + \cdots - 2y + 1)^2$ |
| $c_6$ | $(y^{32} + 5y^{31} + \cdots + 164y + 9)^2$ |
| $c_7, c_9, c_{10}$ $c_{12}$ | $y^{64} + 43y^{63} + \cdots - 58y + 1$ |
| $c_8, c_{11}$ | $y^{64} - 33y^{63} + \cdots - 47292589687204y + 2034477175201$ |

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

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.613006 + 0.792175I$<br>$a = -0.991143 + 0.568727I$<br>$b = -1.182060 + 0.538855I$ | $2.22015 + 7.30693I$ | $-2.17644 - 4.86883I$ |
| $u = -0.613006 + 0.792175I$<br>$a = 0.378138 + 0.223448I$<br>$b = 0.86730 + 1.43651I$ | $2.22015 + 7.30693I$ | $-2.17644 - 4.86883I$ |
| $u = -0.613006 - 0.792175I$<br>$a = -0.991143 - 0.568727I$<br>$b = -1.182060 - 0.538855I$ | $2.22015 - 7.30693I$ | $-2.17644 + 4.86883I$ |
| $u = -0.613006 - 0.792175I$<br>$a = 0.378138 - 0.223448I$<br>$b = 0.86730 - 1.43651I$ | $2.22015 - 7.30693I$ | $-2.17644 + 4.86883I$ |
| $u = -0.674958 + 0.742403I$<br>$a = -0.814727 + 0.619700I$<br>$b = -0.843215 + 0.599874I$ | $-0.345747 + 0.057794I$ | $-5.67435 + 0.61686I$ |
| $u = -0.674958 + 0.742403I$<br>$a = 0.139769 + 0.122703I$<br>$b = 0.700606 + 1.011950I$ | $-0.345747 + 0.057794I$ | $-5.67435 + 0.61686I$ |
| $u = -0.674958 - 0.742403I$<br>$a = -0.814727 - 0.619700I$<br>$b = -0.843215 - 0.599874I$ | $-0.345747 - 0.057794I$ | $-5.67435 - 0.61686I$ |
| $u = -0.674958 - 0.742403I$<br>$a = 0.139769 - 0.122703I$<br>$b = 0.700606 - 1.011950I$ | $-0.345747 - 0.057794I$ | $-5.67435 - 0.61686I$ |
| $u = 0.600521 + 0.762759I$<br>$a = 0.990953 + 0.630677I$<br>$b = 1.150690 + 0.671706I$ | $4.27947 - 2.26361I$ | $1.018945 + 0.670058I$ |
| $u = 0.600521 + 0.762759I$<br>$a = -0.390433 + 0.132083I$<br>$b = -0.99299 + 1.32833I$ | $4.27947 - 2.26361I$ | $1.018945 + 0.670058I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.600521 - 0.762759I$<br>$a = 0.990953 - 0.630677I$<br>$b = 1.150690 - 0.671706I$ | $4.27947 + 2.26361I$ | $1.018945 - 0.670058I$ |
| $u = 0.600521 - 0.762759I$<br>$a = -0.390433 - 0.132083I$<br>$b = -0.99299 - 1.32833I$ | $4.27947 + 2.26361I$ | $1.018945 - 0.670058I$ |
| $u = -0.849583 + 0.407230I$<br>$a = -0.257323 - 0.869065I$<br>$b = 1.44423 - 0.10517I$ | $3.39887 - 4.15286I$ | $2.01286 + 7.18864I$ |
| $u = -0.849583 + 0.407230I$<br>$a = -0.592259 + 1.276300I$<br>$b = -0.188985 + 0.615704I$ | $3.39887 - 4.15286I$ | $2.01286 + 7.18864I$ |
| $u = -0.849583 - 0.407230I$<br>$a = -0.257323 + 0.869065I$<br>$b = 1.44423 + 0.10517I$ | $3.39887 + 4.15286I$ | $2.01286 - 7.18864I$ |
| $u = -0.849583 - 0.407230I$<br>$a = -0.592259 - 1.276300I$<br>$b = -0.188985 - 0.615704I$ | $3.39887 + 4.15286I$ | $2.01286 - 7.18864I$ |
| $u = -1.093530 + 0.032199I$<br>$a = -0.548154 - 1.299260I$<br>$b = 1.111940 + 0.241357I$ | $10.01990 - 1.36697I$ | $7.90065 + 0.55023I$ |
| $u = -1.093530 + 0.032199I$<br>$a = -0.54538 + 1.33146I$<br>$b = 0.926137 - 0.270830I$ | $10.01990 - 1.36697I$ | $7.90065 + 0.55023I$ |
| $u = -1.093530 - 0.032199I$<br>$a = -0.548154 + 1.299260I$<br>$b = 1.111940 - 0.241357I$ | $10.01990 + 1.36697I$ | $7.90065 - 0.55023I$ |
| $u = -1.093530 - 0.032199I$<br>$a = -0.54538 - 1.33146I$<br>$b = 0.926137 + 0.270830I$ | $10.01990 + 1.36697I$ | $7.90065 - 0.55023I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.098860 + 0.059621I$<br>$a = 0.552832 - 1.283140I$<br>$b = -1.188240 + 0.238476I$ | $8.24887 + 6.50568I$ | $4.96918 - 5.51070I$ |
| $u = 1.098860 + 0.059621I$<br>$a = 0.54603 + 1.34276I$<br>$b = -0.842777 - 0.296157I$ | $8.24887 + 6.50568I$ | $4.96918 - 5.51070I$ |
| $u = 1.098860 - 0.059621I$<br>$a = 0.552832 + 1.283140I$<br>$b = -1.188240 - 0.238476I$ | $8.24887 - 6.50568I$ | $4.96918 + 5.51070I$ |
| $u = 1.098860 - 0.059621I$<br>$a = 0.54603 - 1.34276I$<br>$b = -0.842777 + 0.296157I$ | $8.24887 - 6.50568I$ | $4.96918 + 5.51070I$ |
| $u = -0.858258 + 0.694285I$<br>$a = -0.353853 + 0.953789I$<br>$b = -0.696175 + 0.858994I$ | $0.68161 - 2.66625I$ | $-1.77705 + 3.31297I$ |
| $u = -0.858258 + 0.694285I$<br>$a = -0.504405 - 0.259504I$<br>$b = 0.637544 - 0.224845I$ | $0.68161 - 2.66625I$ | $-1.77705 + 3.31297I$ |
| $u = -0.858258 - 0.694285I$<br>$a = -0.353853 - 0.953789I$<br>$b = -0.696175 - 0.858994I$ | $0.68161 + 2.66625I$ | $-1.77705 - 3.31297I$ |
| $u = -0.858258 - 0.694285I$<br>$a = -0.504405 + 0.259504I$<br>$b = 0.637544 + 0.224845I$ | $0.68161 + 2.66625I$ | $-1.77705 - 3.31297I$ |
| $u = 0.828553 + 0.741140I$<br>$a = 0.286437 + 0.827841I$<br>$b = 0.593381 + 0.962196I$ | $-2.41066 - 0.95663I$ | $-6.35494 + 0.97622I$ |
| $u = 0.828553 + 0.741140I$<br>$a = 0.542115 - 0.086700I$<br>$b = -0.309214 - 0.140871I$ | $-2.41066 - 0.95663I$ | $-6.35494 + 0.97622I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.828553 - 0.741140I$<br>$a = 0.286437 - 0.827841I$<br>$b = 0.593381 - 0.962196I$ | $-2.41066 + 0.95663I$ | $-6.35494 - 0.97622I$ |
| $u = 0.828553 - 0.741140I$<br>$a = 0.542115 + 0.086700I$<br>$b = -0.309214 + 0.140871I$ | $-2.41066 + 0.95663I$ | $-6.35494 - 0.97622I$ |
| $u = 0.891994 + 0.729689I$<br>$a = 0.253631 + 0.984227I$<br>$b = 0.796465 + 0.944428I$ | $-2.21840 + 6.53878I$ | $-5.61404 - 6.99151I$ |
| $u = 0.891994 + 0.729689I$<br>$a = 0.638363 - 0.254538I$<br>$b = -0.532638 - 0.469112I$ | $-2.21840 + 6.53878I$ | $-5.61404 - 6.99151I$ |
| $u = 0.891994 - 0.729689I$<br>$a = 0.253631 - 0.984227I$<br>$b = 0.796465 - 0.944428I$ | $-2.21840 - 6.53878I$ | $-5.61404 + 6.99151I$ |
| $u = 0.891994 - 0.729689I$<br>$a = 0.638363 + 0.254538I$<br>$b = -0.532638 + 0.469112I$ | $-2.21840 - 6.53878I$ | $-5.61404 + 6.99151I$ |
| $u = 1.022970 + 0.630121I$<br>$a = 0.702017 - 0.598737I$<br>$b = -1.234440 - 0.678426I$ | $6.32371 + 5.05352I$ | $4.11469 - 5.31459I$ |
| $u = 1.022970 + 0.630121I$<br>$a = 0.320956 + 1.228860I$<br>$b = 0.988094 + 0.453551I$ | $6.32371 + 5.05352I$ | $4.11469 - 5.31459I$ |
| $u = 1.022970 - 0.630121I$<br>$a = 0.702017 + 0.598737I$<br>$b = -1.234440 + 0.678426I$ | $6.32371 - 5.05352I$ | $4.11469 + 5.31459I$ |
| $u = 1.022970 - 0.630121I$<br>$a = 0.320956 - 1.228860I$<br>$b = 0.988094 - 0.453551I$ | $6.32371 - 5.05352I$ | $4.11469 + 5.31459I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.997643 + 0.681461I$<br>$a = -0.726980 - 0.495574I$<br>$b = \ \ 1.016280 - 0.754097I$ | $0.62565 - 5.49753I$ | $-3.62281 + 4.60034I$ |
| $u = -0.997643 + 0.681461I$<br>$a = -0.270663 + 1.177040I$<br>$b = -1.043920 + 0.650978I$ | $0.62565 - 5.49753I$ | $-3.62281 + 4.60034I$ |
| $u = -0.997643 - 0.681461I$<br>$a = -0.726980 + 0.495574I$<br>$b = \ \ 1.016280 + 0.754097I$ | $0.62565 + 5.49753I$ | $-3.62281 - 4.60034I$ |
| $u = -0.997643 - 0.681461I$<br>$a = -0.270663 - 1.177040I$<br>$b = -1.043920 - 0.650978I$ | $0.62565 + 5.49753I$ | $-3.62281 - 4.60034I$ |
| $u = -0.416995 + 0.648442I$<br>$a = \ \ 0.866981 - 0.198915I$<br>$b = \ \ 1.88993 + 1.31188I$ | $3.37910 - 4.79464I$ | $-1.29089 + 5.61871I$ |
| $u = -0.416995 + 0.648442I$<br>$a = -1.28398 + 0.84736I$<br>$b = -1.35726 + 1.45293I$ | $3.37910 - 4.79464I$ | $-1.29089 + 5.61871I$ |
| $u = -0.416995 - 0.648442I$<br>$a = \ \ 0.866981 + 0.198915I$<br>$b = \ \ 1.88993 - 1.31188I$ | $3.37910 + 4.79464I$ | $-1.29089 - 5.61871I$ |
| $u = -0.416995 - 0.648442I$<br>$a = -1.28398 - 0.84736I$<br>$b = -1.35726 - 1.45293I$ | $3.37910 + 4.79464I$ | $-1.29089 - 5.61871I$ |
| $u = \ \ 1.031610 + 0.673233I$<br>$a = \ \ 0.763322 - 0.549290I$<br>$b = -1.14586 - 0.83030I$ | $5.55363 + 7.72193I$ | $2.98438 - 5.32873I$ |
| $u = \ \ 1.031610 + 0.673233I$<br>$a = \ \ 0.268289 + 1.222520I$<br>$b = \ \ 1.122660 + 0.546584I$ | $5.55363 + 7.72193I$ | $2.98438 - 5.32873I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.031610 - 0.673233I$<br>$a = 0.763322 + 0.549290I$<br>$b = -1.14586 + 0.83030I$ | $5.55363 - 7.72193I$ | $2.98438 + 5.32873I$ |
| $u = 1.031610 - 0.673233I$<br>$a = 0.268289 - 1.222520I$<br>$b = 1.122660 - 0.546584I$ | $5.55363 - 7.72193I$ | $2.98438 + 5.32873I$ |
| $u = -1.036490 + 0.686644I$<br>$a = -0.786050 - 0.537663I$<br>$b = 1.12365 - 0.88821I$ | $3.48615 - 12.88870I$ | $-0.12323 + 9.41526I$ |
| $u = -1.036490 + 0.686644I$<br>$a = -0.250444 + 1.224310I$<br>$b = -1.171630 + 0.573964I$ | $3.48615 - 12.88870I$ | $-0.12323 + 9.41526I$ |
| $u = -1.036490 - 0.686644I$<br>$a = -0.786050 + 0.537663I$<br>$b = 1.12365 + 0.88821I$ | $3.48615 + 12.88870I$ | $-0.12323 - 9.41526I$ |
| $u = -1.036490 - 0.686644I$<br>$a = -0.250444 - 1.224310I$<br>$b = -1.171630 - 0.573964I$ | $3.48615 + 12.88870I$ | $-0.12323 - 9.41526I$ |
| $u = 0.730192 + 0.168194I$<br>$a = 0.156002 - 1.338560I$<br>$b = -1.55205 - 0.40149I$ | $4.45908 + 0.19319I$ | $5.20830 - 0.78328I$ |
| $u = 0.730192 + 0.168194I$<br>$a = 0.57419 + 1.50676I$<br>$b = -0.646114 + 0.904532I$ | $4.45908 + 0.19319I$ | $5.20830 - 0.78328I$ |
| $u = 0.730192 - 0.168194I$<br>$a = 0.156002 + 1.338560I$<br>$b = -1.55205 + 0.40149I$ | $4.45908 - 0.19319I$ | $5.20830 + 0.78328I$ |
| $u = 0.730192 - 0.168194I$<br>$a = 0.57419 - 1.50676I$<br>$b = -0.646114 - 0.904532I$ | $4.45908 - 0.19319I$ | $5.20830 + 0.78328I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.164238 + 0.469611I$<br>$a = 1.84018 - 0.39005I$<br>$b = 2.92010 + 1.71566I$ | $1.64661 + 1.19641I$ | $-5.57525 - 0.85209I$ |
| $u = -0.164238 + 0.469611I$<br>$a = -2.00442 + 0.85967I$<br>$b = -1.86144 + 2.61422I$ | $1.64661 + 1.19641I$ | $-5.57525 - 0.85209I$ |
| $u = -0.164238 - 0.469611I$<br>$a = 1.84018 + 0.39005I$<br>$b = 2.92010 - 1.71566I$ | $1.64661 - 1.19641I$ | $-5.57525 + 0.85209I$ |
| $u = -0.164238 - 0.469611I$<br>$a = -2.00442 - 0.85967I$<br>$b = -1.86144 - 2.61422I$ | $1.64661 - 1.19641I$ | $-5.57525 + 0.85209I$ |

### III. $I_3^u = \langle u^2a - u^3 - u^2 + b - a,\ a^2 - au - u,\ u^4 + u^3 + 1\rangle$

**(i) Arc colorings**

$$a_4 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

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

$$a_5 = \begin{pmatrix} 1 \\ -u^2 \end{pmatrix}$$

$$a_{12} = \begin{pmatrix} a \\ -u^2a + u^3 + u^2 + a \end{pmatrix}$$

$$a_9 = \begin{pmatrix} u^2a + u^2 \\ u^3a + u^2a + u^3 + u^2 + u + 1 \end{pmatrix}$$

$$a_1 = \begin{pmatrix} -u^3 - 1 \\ u^3 + u^2 - u \end{pmatrix}$$

$$a_8 = \begin{pmatrix} a - u \\ u^3 + u^2 - a + u \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} u^2a - u^3 - u^2 \\ -u^2a + u^3 + u^2 + a \end{pmatrix}$$

$$a_7 = \begin{pmatrix} u^3 + 1 \\ -1 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} -u^3 \\ 1 \end{pmatrix}$$

$$a_2 = \begin{pmatrix} -u \\ u^3 - u \end{pmatrix}$$

$$a_6 = \begin{pmatrix} u^2 + 1 \\ u^3 + 1 \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= 2$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $(u^4+u^3+2u^2+1)^2$ |
| $c_2, c_5$ | $(u^4+u^3+1)^2$ |
| $c_3$ | $(u-1)^8$ |
| $c_4$ | $(u^4-u^3+1)^2$ |
| $c_6$ | $(u^4-u^2-2u+3)^2$ |
| $c_7, c_9, c_{10}$ $c_{12}$ | $u^8-u^7+3u^6-5u^5+4u^4-5u^3+3u^2+1$ |
| $c_8, c_{11}$ | $u^8-3u^6+14u^4+6u^3-18u^2-10u+19$ |

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

| Crossings | Riley Polynomials at each crossing |
| --- | --- |
| $c_1$ | $(y^4 + 3y^3 + 6y^2 + 4y + 1)^2$ |
| $c_2, c_4, c_5$ | $(y^4 - y^3 + 2y^2 + 1)^2$ |
| $c_3$ | $(y - 1)^8$ |
| $c_6$ | $(y^4 - 2y^3 + 7y^2 - 10y + 9)^2$ |
| $c_7, c_9, c_{10}$ $c_{12}$ | $y^8 + 5y^7 + 7y^6 - 5y^5 - 14y^4 + 5y^3 + 17y^2 + 6y + 1$ |
| $c_8, c_{11}$ | $y^8 - 6y^7 + 37y^6 - 120y^5 + 342y^4 - 654y^3 + 976y^2 - 784y + 361$ |

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

| Solutions to $I_3^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = \ \ 0.518913 + 0.666610I$<br>$a = \ \ 1.107930 + 0.828053I$<br>$b = \ \ 1.14766 + 1.14065I$ | 4.93480 | 2.00000 |
| $u = \ \ 0.518913 + 0.666610I$<br>$a = -0.589021 - 0.161444I$<br>$b = -1.53098 + 1.15189I$ | 4.93480 | 2.00000 |
| $u = \ \ 0.518913 - 0.666610I$<br>$a = \ \ 1.107930 - 0.828053I$<br>$b = \ \ 1.14766 - 1.14065I$ | 4.93480 | 2.00000 |
| $u = \ \ 0.518913 - 0.666610I$<br>$a = -0.589021 + 0.161444I$<br>$b = -1.53098 - 1.15189I$ | 4.93480 | 2.00000 |
| $u = -1.018910 + 0.602565I$<br>$a = -0.667444 - 0.634184I$<br>$b = \ \ 1.28901 - 0.59560I$ | 4.93480 | 2.00000 |
| $u = -1.018910 + 0.602565I$<br>$a = -0.351469 + 1.236750I$<br>$b = -0.905690 + 0.400260I$ | 4.93480 | 2.00000 |
| $u = -1.018910 - 0.602565I$<br>$a = -0.667444 + 0.634184I$<br>$b = \ \ 1.28901 + 0.59560I$ | 4.93480 | 2.00000 |
| $u = -1.018910 - 0.602565I$<br>$a = -0.351469 - 1.236750I$<br>$b = -0.905690 - 0.400260I$ | 4.93480 | 2.00000 |

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

**(i) Arc colorings**

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

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

**(iii) Cusp Shapes** $= 2$

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

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

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

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

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

| Solutions to $I_4^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.00000$<br>$a = 0.50000 + 1.32288I$<br>$b = -1.00000$ | 4.93480 | 2.00000 |
| $u = 1.00000$<br>$a = 0.50000 - 1.32288I$<br>$b = -1.00000$ | 4.93480 | 2.00000 |

## V. $I_5^u = \langle b - u - 1,\ a - 1,\ u^2 + 1 \rangle$

**(i) Arc colorings**

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

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

**(iii) Cusp Shapes** $= 0$

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

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

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

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

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

| Solutions to $I_5^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.000000I$<br>$a = 1.00000$<br>$b = 1.00000 + 1.00000I$ | 1.64493 | 0 |
| $u = -1.000000I$<br>$a = 1.00000$<br>$b = 1.00000 - 1.00000I$ | 1.64493 | 0 |

**VI.**

$$\boldsymbol{I_1^v = \langle a,\ v^5+2v^4-16v^2+64b-16v+32,\ v^6+2v^5-16v^3-16v^2+32v+64\rangle}$$

**(i) Arc colorings**

$$a_4 = \begin{pmatrix}1\\0\end{pmatrix}$$
$$a_{10} = \begin{pmatrix}v\\0\end{pmatrix}$$
$$a_5 = \begin{pmatrix}1\\0\end{pmatrix}$$
$$a_{12} = \begin{pmatrix}0\\-\frac{1}{64}v^5-\frac{1}{32}v^4+\cdots+\frac{1}{4}v-\frac{1}{2}\end{pmatrix}$$
$$a_9 = \begin{pmatrix}v\\\frac{1}{64}v^5+\frac{1}{32}v^4+\cdots-\frac{1}{4}v+\frac{1}{2}\end{pmatrix}$$
$$a_1 = \begin{pmatrix}-v\\-\frac{1}{32}v^5-\frac{1}{16}v^4+\cdots+\frac{1}{2}v-1\end{pmatrix}$$
$$a_8 = \begin{pmatrix}-\frac{1}{64}v^5-\frac{1}{32}v^4+\cdots+\frac{5}{4}v-\frac{1}{2}\\\frac{1}{64}v^5+\frac{1}{32}v^4+\cdots-\frac{1}{4}v+\frac{1}{2}\end{pmatrix}$$
$$a_{11} = \begin{pmatrix}\frac{1}{64}v^5+\frac{1}{32}v^4+\cdots-\frac{1}{4}v+\frac{1}{2}\\-\frac{1}{64}v^5-\frac{1}{32}v^4+\cdots+\frac{1}{4}v-\frac{1}{2}\end{pmatrix}$$
$$a_7 = \begin{pmatrix}-\frac{1}{32}v^5-\frac{1}{16}v^4+\cdots+\frac{3}{2}v-1\\\frac{1}{32}v^5+\frac{1}{16}v^4+\cdots-\frac{1}{2}v+1\end{pmatrix}$$
$$a_3 = \begin{pmatrix}-\frac{1}{32}v^5+\frac{1}{8}v^3+\cdots-\frac{1}{2}v-3\\\frac{1}{32}v^5-\frac{1}{8}v^3-\frac{1}{2}v^2+\frac{1}{2}v+2\end{pmatrix}$$
$$a_2 = \begin{pmatrix}-\frac{1}{16}v^4+\frac{1}{8}v^3+\frac{1}{4}v^2-2\\-\frac{1}{8}v^3+1\end{pmatrix}$$
$$a_6 = \begin{pmatrix}\frac{1}{32}v^5+\frac{1}{16}v^4+\cdots+\frac{1}{2}v+1\\-\frac{1}{32}v^5+\frac{1}{4}v^2-\frac{1}{2}v\end{pmatrix}$$

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

**(iii) Cusp Shapes** $= -\frac{17}{128}v^5+\frac{1}{32}v^3+\frac{9}{8}v^2-\frac{1}{8}v-\frac{13}{2}$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1, c_6$ | $u^6 - 3u^5 + 5u^4 - 4u^3 + 2u^2 - u + 1$ |
| $c_2$ | $u^6 + u^5 - u^4 - 2u^3 + u + 1$ |
| $c_3, c_5$ | $u^6 - u^5 - u^4 + 2u^3 - u + 1$ |
| $c_4$ | $u^6$ |
| $c_7, c_9$ | $(u-1)^6$ |
| $c_8$ | $64(64u^6 + 32u^5 - 16u^4 - 16u^3 + 2u + 1)$ |
| $c_{10}, c_{12}$ | $(u+1)^6$ |
| $c_{11}$ | $64(64u^6 - 32u^5 - 16u^4 + 16u^3 - 2u + 1)$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_6$ | $y^6 + y^5 + 5y^4 + 6y^2 + 3y + 1$ |
| $c_2, c_3, c_5$ | $y^6 - 3y^5 + 5y^4 - 4y^3 + 2y^2 - y + 1$ |
| $c_4$ | $y^6$ |
| $c_7, c_9, c_{10}$ $c_{12}$ | $(y-1)^6$ |
| $c_8, c_{11}$ | $4096(4096y^6 - 3072y^5 + 1280y^4 - 256y^3 + 32y^2 - 4y + 1)$ |

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

| Solutions to $I_1^v$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $v = -1.46557 + 0.76250I$<br>$a = 0$<br>$b = -0.536975 - 0.279376I$ | $-1.64493 + 5.69302I$ | $-5.77678 - 3.57560I$ |
| $v = -1.46557 - 0.76250I$<br>$a = 0$<br>$b = -0.536975 + 0.279376I$ | $-1.64493 - 5.69302I$ | $-5.77678 + 3.57560I$ |
| $v = 1.83596 + 0.54142I$<br>$a = 0$<br>$b = 0.501096 - 0.147771I$ | $0.245672 - 0.924305I$ | $-3.59017 - 1.04572I$ |
| $v = 1.83596 - 0.54142I$<br>$a = 0$<br>$b = 0.501096 + 0.147771I$ | $0.245672 + 0.924305I$ | $-3.59017 + 1.04572I$ |
| $v = -1.37039 + 2.12652I$<br>$a = 0$<br>$b = -0.214122 - 0.332266I$ | $-3.53554 - 0.92430I$ | $-5.00805 + 6.48027I$ |
| $v = -1.37039 - 2.12652I$<br>$a = 0$<br>$b = -0.214122 + 0.332266I$ | $-3.53554 + 0.92430I$ | $-5.00805 - 6.48027I$ |

## VII. u-Polynomials

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $(u-1)^2(u+1)^2(u^4+u^3+2u^2+1)^2$ $\cdot(u^6-3u^5+5u^4-4u^3+2u^2-u+1)(u^{32}+15u^{31}+\cdots+2u+1)^2$ $\cdot(u^{46}+22u^{45}+\cdots+65u+16)$ |
| $c_2$ | $(u-1)^4(u^4+u^3+1)^2(u^6+u^5-u^4-2u^3+u+1)$ $\cdot((u^{32}+u^{31}+\cdots-u^2+1)^2)(u^{46}+2u^{45}+\cdots+15u+4)$ |
| $c_3$ | $((u-1)^{12})(u^6-u^5+\cdots-u+1)(u^{32}+4u^{31}+\cdots+28u+4)^2$ $\cdot(u^{46}+2u^{45}+\cdots+419884u+136336)$ |
| $c_4$ | $u^6(u+1)^2(u^2+1)(u^4-u^3+1)^2(u^{32}-u^{31}+\cdots-2u+1)^2$ $\cdot(u^{46}+3u^{45}+\cdots+30720u+8192)$ |
| $c_5$ | $(u-1)^2(u+1)^2(u^4+u^3+1)^2(u^6-u^5-u^4+2u^3-u+1)$ $\cdot((u^{32}+u^{31}+\cdots-u^2+1)^2)(u^{46}+2u^{45}+\cdots+15u+4)$ |
| $c_6$ | $u^4(u^4-u^2-2u+3)^2(u^6-3u^5+5u^4-4u^3+2u^2-u+1)$ $\cdot((u^{32}+3u^{31}+\cdots+2u+3)^2)(u^{46}+2u^{44}+\cdots+2032u+448)$ |
| $c_7, c_9$ | $((u-1)^6)(u^2+1)(u^2-u+2)(u^8-u^7+\cdots+3u^2+1)$ $\cdot(u^{46}+6u^{45}+\cdots-6u+1)(u^{64}-11u^{63}+\cdots+4u+1)$ |
| $c_8$ | $4096(u-1)^2(u^2-2u+2)(64u^6+32u^5-16u^4-16u^3+2u+1)$ $\cdot(u^8-3u^6+14u^4+6u^3-18u^2-10u+19)$ $\cdot(64u^{46}-96u^{45}+\cdots-8u^2+2)$ $\cdot(u^{64}+u^{63}+\cdots-8574468u+1426351)$ |
| $c_{10}, c_{12}$ | $((u+1)^6)(u^2+1)(u^2-u+2)(u^8-u^7+\cdots+3u^2+1)$ $\cdot(u^{46}+6u^{45}+\cdots-6u+1)(u^{64}-11u^{63}+\cdots+4u+1)$ |
| $c_{11}$ | $4096(u-1)^2(u^2+2u+2)(64u^6-32u^5-16u^4+16u^3-2u+1)$ $\cdot(u^8-3u^6+14u^4+6u^3-18u^2-10u+19)$ $\cdot(64u^{46}-96u^{45}+\cdots-8u^2+2)$ $\cdot(u^{64}+u^{63}+\cdots-8574468u+1426351)$ |

## VIII. Riley Polynomials

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $(y-1)^4(y^4+3y^3+6y^2+4y+1)^2(y^6+y^5+5y^4+6y^2+3y+1)$ <br> $\cdot((y^{32}+5y^{31}+\cdots+2y+1)^2)(y^{46}+6y^{45}+\cdots+3391y+256)$ |
| $c_2, c_5$ | $(y-1)^4(y^4-y^3+2y^2+1)^2(y^6-3y^5+5y^4-4y^3+2y^2-y+1)$ <br> $\cdot((y^{32}-15y^{31}+\cdots-2y+1)^2)(y^{46}-22y^{45}+\cdots-65y+16)$ |
| $c_3$ | $(y-1)^{12}(y^6-3y^5+5y^4-4y^3+2y^2-y+1)$ <br> $\cdot(y^{32}-20y^{31}+\cdots-184y+16)^2$ <br> $\cdot(y^{46}-30y^{45}+\cdots-205613722768y+18587504896)$ |
| $c_4$ | $y^6(y-1)^2(y+1)^2(y^4-y^3+2y^2+1)^2(y^{32}-11y^{31}+\cdots-2y+1)^2$ <br> $\cdot(y^{46}-11y^{45}+\cdots-1572864000y+67108864)$ |
| $c_6$ | $y^4(y^4-2y^3+7y^2-10y+9)^2(y^6+y^5+5y^4+6y^2+3y+1)$ <br> $\cdot(y^{32}+5y^{31}+\cdots+164y+9)^2$ <br> $\cdot(y^{46}+4y^{45}+\cdots+910080y+200704)$ |
| $c_7, c_9, c_{10}$ <br> $c_{12}$ | $(y-1)^6(y+1)^2(y^2+3y+4)$ <br> $\cdot(y^8+5y^7+7y^6-5y^5-14y^4+5y^3+17y^2+6y+1)$ <br> $\cdot(y^{46}+26y^{45}+\cdots-12y+1)(y^{64}+43y^{63}+\cdots-58y+1)$ |
| $c_8, c_{11}$ | $16777216(y-1)^2(y^2+4)$ <br> $\cdot(4096y^6-3072y^5+1280y^4-256y^3+32y^2-4y+1)$ <br> $\cdot(y^8-6y^7+37y^6-120y^5+342y^4-654y^3+976y^2-784y+361)$ <br> $\cdot(4096y^{46}-93184y^{45}+\cdots-32y+4)$ <br> $\cdot(y^{64}-33y^{63}+\cdots-47292589687204y+2034477175201)$ |