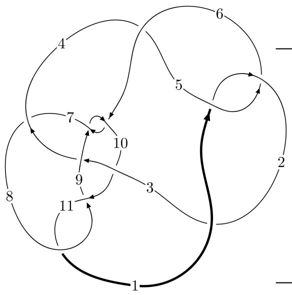
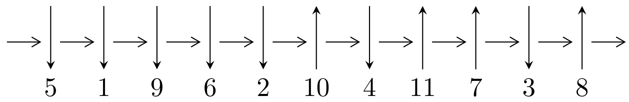
# $11a_{173}$ ($K11a_{173}$)




A knot diagram[1]

**Linearized knot diagam**




**Solving Sequence**

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

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

$$\begin{aligned}
I_1^u &= \langle -14767307395u^{27} + 20235323073u^{26} + \cdots + 983307713818b + 33355375098, \\
&\quad 32428293291u^{27} - 21218621420u^{26} + \cdots + 196661427636a + 204360671755, \\
&\quad u^{28} - 2u^{27} + \cdots - 3u - 4 \rangle \\
I_2^u &= \langle -u^4a - u^3a + 14u^4 - 2u^2a - 5u^3 - 4au - 10u^2 + 19b + 9a - u + 26, \\
&\quad 5u^4a - 2u^3a + 16u^4 - u^2a - 8u^3 + a^2 - au - 5u^2 + 9a - 3u + 30,\ u^5 - u^4 + 2u - 1 \rangle \\
I_3^u &= \langle 19u^{15}a + 23u^{15} + \cdots + 20a + 27,\ 2u^{15}a + 6u^{15} + \cdots + a^2 - 4, \\
&\quad u^{16} - u^{15} - 2u^{14} + 3u^{13} + 4u^{12} - 7u^{11} - 3u^{10} + 10u^9 - 9u^7 + 3u^6 + 5u^5 - 4u^4 + 2u^2 - 2u + 1 \rangle \\
I_4^u &= \langle b - 1,\ 2a - 2u + 1,\ u^3 + u^2 - 1 \rangle \\
I_5^u &= \langle b - a - 1,\ a^2 + a + 2,\ u + 1 \rangle \\
I_6^u &= \langle 2b - a + 1,\ a^2 - 2a + 5,\ u - 1 \rangle
\end{aligned}$$

* 6 irreducible components of $\dim_{\mathbb{C}} = 0$, with total 77 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.**

$\boldsymbol{I_1^u = \langle -1.48\times 10^{10}u^{27}+2.02\times 10^{10}u^{26}+\cdots+9.83\times 10^{10}b+3.34\times 10^{10},\ 3.24\times 10^{10}u^{27}-2.12\times 10^{10}u^{26}+\cdots+1.97\times 10^{11}a+2.04\times 10^{11},\ u^{28}-2u^{27}+\cdots-3u-4\rangle}$

**(i) Arc colorings**

$$a_1 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_5 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_2 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} -u^2+1 \\ u^2 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} -u \\ -u^3+u \end{pmatrix}$$
$$a_4 = \begin{pmatrix} u^3 \\ u^5-u^3+u \end{pmatrix}$$
$$a_8 = \begin{pmatrix} -0.164894u^{27}+0.107894u^{26}+\cdots-2.21519u-1.03915 \\ 0.150180u^{27}-0.205788u^{26}+\cdots+0.595130u-0.339216 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} -0.160609u^{27}+0.110297u^{26}+\cdots-2.13491u-1.03465 \\ 0.227707u^{27}-0.221295u^{26}+\cdots+0.789310u-0.0177292 \end{pmatrix}$$
$$a_{11} = \begin{pmatrix} 0.206489u^{27}-0.182794u^{26}+\cdots+1.38239u+1.44504 \\ -0.198851u^{27}+0.240301u^{26}+\cdots+0.0000310478u+0.278301 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} -0.312509u^{27}+0.216909u^{26}+\cdots-2.81796u-1.93782 \\ 0.373802u^{27}-0.449982u^{26}+\cdots+0.400981u-0.382402 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} 0.137090u^{27}-0.0589378u^{26}+\cdots+1.47329u+1.50912 \\ -0.199975u^{27}+0.238265u^{26}+\cdots-0.339747u+0.201391 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} 0.137090u^{27}-0.0589378u^{26}+\cdots+1.47329u+1.50912 \\ -0.199975u^{27}+0.238265u^{26}+\cdots-0.339747u+0.201391 \end{pmatrix}$$

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

**(iii) Cusp Shapes**
$= -\frac{138939169865}{196661427636}u^{27} - \frac{31573928977}{196661427636}u^{26} + \cdots - \frac{326662110881}{16388452303}u - \frac{420010681258}{49165356909}$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1, c_5$ | $u^{28} + 2u^{27} + \cdots + 3u - 4$ |
| $c_2, c_4$ | $u^{28} + 10u^{27} + \cdots + 97u + 16$ |
| $c_3$ | $u^{28} + 3u^{27} + \cdots + 736u + 128$ |
| $c_6, c_8, c_9$ $c_{11}$ | $u^{28} - 3u^{27} + \cdots - 5u - 1$ |
| $c_7, c_{10}$ | $8(8u^{28} - 12u^{27} + \cdots + 4u + 2)$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_5$ | $y^{28} - 10y^{27} + \cdots - 97y + 16$ |
| $c_2, c_4$ | $y^{28} + 18y^{27} + \cdots + 8543y + 256$ |
| $c_3$ | $y^{28} - 5y^{27} + \cdots - 238592y + 16384$ |
| $c_6, c_8, c_9$ $c_{11}$ | $y^{28} + 11y^{27} + \cdots - 51y + 1$ |
| $c_7, c_{10}$ | $64(64y^{28} + 176y^{27} + \cdots + 40y + 4)$ |

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

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.566116 + 0.813544I$<br>$a = 0.534639 - 0.137883I$<br>$b = -0.471357 + 0.915613I$ | $1.74883 - 2.81556I$ | $-1.14300 + 4.42775I$ |
| $u = -0.566116 - 0.813544I$<br>$a = 0.534639 + 0.137883I$<br>$b = -0.471357 - 0.915613I$ | $1.74883 + 2.81556I$ | $-1.14300 - 4.42775I$ |
| $u = 0.805429 + 0.748611I$<br>$a = 1.99187 + 0.34421I$<br>$b = -1.193820 + 0.462931I$ | $4.99503 - 1.79073I$ | $-1.05075 - 2.61493I$ |
| $u = 0.805429 - 0.748611I$<br>$a = 1.99187 - 0.34421I$<br>$b = -1.193820 - 0.462931I$ | $4.99503 + 1.79073I$ | $-1.05075 + 2.61493I$ |
| $u = 0.679059 + 0.893968I$<br>$a = -0.932511 - 0.786849I$<br>$b = 0.600465 + 1.265070I$ | $-0.89815 + 10.64770I$ | $-3.82752 - 5.52190I$ |
| $u = 0.679059 - 0.893968I$<br>$a = -0.932511 + 0.786849I$<br>$b = 0.600465 - 1.265070I$ | $-0.89815 - 10.64770I$ | $-3.82752 + 5.52190I$ |
| $u = 0.167815 + 0.852338I$<br>$a = -0.800362 + 0.593310I$<br>$b = 0.442426 - 1.154500I$ | $-3.88792 - 6.82425I$ | $-4.62158 + 6.71855I$ |
| $u = 0.167815 - 0.852338I$<br>$a = -0.800362 - 0.593310I$<br>$b = 0.442426 + 1.154500I$ | $-3.88792 + 6.82425I$ | $-4.62158 - 6.71855I$ |
| $u = -0.838400$<br>$a = -0.287249$<br>$b = -1.20069$ | $0.271501$ | $-23.7360$ |
| $u = -1.156720 + 0.209637I$<br>$a = -0.79174 + 1.21845I$<br>$b = 0.465804 + 1.280600I$ | $-8.43358 + 10.19260I$ | $-10.18832 - 7.63922I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -1.156720 - 0.209637I$<br>$a = -0.79174 - 1.21845I$<br>$b = 0.465804 - 1.280600I$ | $-8.43358 - 10.19260I$ | $-10.18832 + 7.63922I$ |
| $u = 0.928400 + 0.721425I$<br>$a = 1.19972 + 1.35918I$<br>$b = -1.278550 - 0.388894I$ | $4.61539 - 3.79849I$ | $-3.70384 + 8.50950I$ |
| $u = 0.928400 - 0.721425I$<br>$a = 1.19972 - 1.35918I$<br>$b = -1.278550 + 0.388894I$ | $4.61539 + 3.79849I$ | $-3.70384 - 8.50950I$ |
| $u = -0.878060 + 0.825409I$<br>$a = -0.366900 + 0.450231I$<br>$b = 0.338313 - 0.571686I$ | $3.34352 + 1.62496I$ | $-2.45048 + 1.41829I$ |
| $u = -0.878060 - 0.825409I$<br>$a = -0.366900 - 0.450231I$<br>$b = 0.338313 + 0.571686I$ | $3.34352 - 1.62496I$ | $-2.45048 - 1.41829I$ |
| $u = 1.214650 + 0.097151I$<br>$a = -0.222900 - 0.987308I$<br>$b = -0.155309 - 0.849372I$ | $-4.05629 + 0.93128I$ | $-2.23485 - 6.88947I$ |
| $u = 1.214650 - 0.097151I$<br>$a = -0.222900 + 0.987308I$<br>$b = -0.155309 + 0.849372I$ | $-4.05629 - 0.93128I$ | $-2.23485 + 6.88947I$ |
| $u = -0.903785 + 0.845201I$<br>$a = -1.078650 - 0.117582I$<br>$b = 0.379054 + 0.705257I$ | $3.28350 + 4.57627I$ | $-2.13594 - 7.47854I$ |
| $u = -0.903785 - 0.845201I$<br>$a = -1.078650 + 0.117582I$<br>$b = 0.379054 - 0.705257I$ | $3.28350 - 4.57627I$ | $-2.13594 + 7.47854I$ |
| $u = 1.168360 + 0.434244I$<br>$a = 0.627774 + 0.344147I$<br>$b = 0.309881 + 1.145950I$ | $-7.10420 + 2.17526I$ | $-9.93897 - 4.23335I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.168360 - 0.434244I$<br>$a = 0.627774 - 0.344147I$<br>$b = 0.309881 - 1.145950I$ | $-7.10420 - 2.17526I$ | $-9.93897 + 4.23335I$ |
| $u = -1.074080 + 0.691225I$<br>$a = 1.41798 - 0.69280I$<br>$b = -0.422318 - 1.038380I$ | $0.23866 + 8.48658I$ | $-4.72348 - 9.14479I$ |
| $u = -1.074080 - 0.691225I$<br>$a = 1.41798 + 0.69280I$<br>$b = -0.422318 + 1.038380I$ | $0.23866 - 8.48658I$ | $-4.72348 + 9.14479I$ |
| $u = 1.050060 + 0.753206I$<br>$a = -2.17570 - 0.35594I$<br>$b = 0.60850 - 1.30717I$ | $-2.0462 - 16.7456I$ | $-5.37386 + 9.80445I$ |
| $u = 1.050060 - 0.753206I$<br>$a = -2.17570 + 0.35594I$<br>$b = 0.60850 + 1.30717I$ | $-2.0462 + 16.7456I$ | $-5.37386 - 9.80445I$ |
| $u = 0.682847$<br>$a = -0.725706$<br>$b = 0.129567$ | $-0.926639$ | $-11.5880$ |
| $u = -0.357231 + 0.322552I$<br>$a = 0.478268 - 0.914294I$<br>$b = -0.587531 - 0.365743I$ | $1.12674 + 1.01957I$ | $4.42993 - 4.67672I$ |
| $u = -0.357231 - 0.322552I$<br>$a = 0.478268 + 0.914294I$<br>$b = -0.587531 + 0.365743I$ | $1.12674 - 1.01957I$ | $4.42993 + 4.67672I$ |

**II.**

$$\boldsymbol{I_2^u = \langle -u^4a+14u^4+\cdots+9a+26,\ 5u^4a+16u^4+\cdots+9a+30,\ u^5-u^4+2u-1\rangle}$$

**(i) Arc colorings**

$$a_1 = \begin{pmatrix}1\\0\end{pmatrix}$$
$$a_5 = \begin{pmatrix}0\\u\end{pmatrix}$$
$$a_2 = \begin{pmatrix}1\\u^2\end{pmatrix}$$
$$a_3 = \begin{pmatrix}-u^2+1\\u^2\end{pmatrix}$$
$$a_6 = \begin{pmatrix}-u\\-u^3+u\end{pmatrix}$$
$$a_4 = \begin{pmatrix}u^3\\u^4-u^3-u+1\end{pmatrix}$$
$$a_8 = \begin{pmatrix}a\\0.0526316au^4-0.736842u^4+\cdots-0.473684a-1.36842\end{pmatrix}$$
$$a_7 = \begin{pmatrix}0.368421au^4-0.157895u^4+\cdots+0.684211a+0.421053\\-u^4-au+u^2+u-2\end{pmatrix}$$
$$a_{11} = \begin{pmatrix}0.736842au^4+5.68421u^4+\cdots+1.36842a+10.8421\\0.210526au^4-0.947368u^4+\cdots+0.105263a-1.47368\end{pmatrix}$$
$$a_9 = \begin{pmatrix}u^4-u^3-u^2-u+2\\-u^4+u^2+u-1\end{pmatrix}$$
$$a_{10} = \begin{pmatrix}0.473684au^4+4.36842u^4+\cdots+0.736842a+7.68421\\-0.105263au^4-1.52632u^4+\cdots-0.0526316a-2.26316\end{pmatrix}$$
$$a_{10} = \begin{pmatrix}0.473684au^4+4.36842u^4+\cdots+0.736842a+7.68421\\-0.105263au^4-1.52632u^4+\cdots-0.0526316a-2.26316\end{pmatrix}$$

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

**(iii) Cusp Shapes** $= -4u^4+4u^3+4u^2-10$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1, c_5$ | $(u^5 + u^4 + 2u + 1)^2$ |
| $c_2, c_4$ | $(u^5 + u^4 + 4u^3 + 2u^2 + 4u + 1)^2$ |
| $c_3$ | $(u^5 - u^4 + 2u - 1)^2$ |
| $c_6, c_8, c_9$ $c_{11}$ | $u^{10} + u^9 + 2u^8 + 4u^7 + 4u^6 + 5u^5 + 3u^4 + u^3 + u^2 + 1$ |
| $c_7, c_{10}$ | $u^{10} + 4u^9 + 8u^8 + 6u^7 + 6u^6 + 7u^5 + 25u^4 + 43u^3 + 56u^2 + 36u + 8$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_3, c_5$ | $(y^5 - y^4 + 4y^3 - 2y^2 + 4y - 1)^2$ |
| $c_2, c_4$ | $(y^5 + 7y^4 + 20y^3 + 26y^2 + 12y - 1)^2$ |
| $c_6, c_8, c_9$<br>$c_{11}$ | $y^{10} + 3y^9 + 4y^8 - 4y^7 - 12y^6 - 3y^5 + 11y^4 + 13y^3 + 7y^2 + 2y + 1$ |
| $c_7, c_{10}$ | $y^{10} + 28y^8 + \cdots - 400y + 64$ |

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

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.760506 + 0.815892I$<br>$a = -0.686158 + 0.302307I$<br>$b = 0.386464 - 0.809421I$ | $3.01208 + 1.13825I$ | $0.09602 - 2.34058I$ |
| $u = -0.760506 + 0.815892I$<br>$a = 0.658201 - 0.065826I$<br>$b = -0.473774 - 0.431559I$ | $3.01208 + 1.13825I$ | $0.09602 - 2.34058I$ |
| $u = -0.760506 - 0.815892I$<br>$a = -0.686158 - 0.302307I$<br>$b = 0.386464 + 0.809421I$ | $3.01208 - 1.13825I$ | $0.09602 + 2.34058I$ |
| $u = -0.760506 - 0.815892I$<br>$a = 0.658201 + 0.065826I$<br>$b = -0.473774 + 0.431559I$ | $3.01208 - 1.13825I$ | $0.09602 + 2.34058I$ |
| $u = 1.001870 + 0.741764I$<br>$a = -1.06668 - 1.09068I$<br>$b = 1.129990 + 0.183434I$ | $1.49357 - 10.61130I$ | $-2.76481 + 7.85454I$ |
| $u = 1.001870 + 0.741764I$<br>$a = 2.24279 + 0.22903I$<br>$b = -0.67647 + 1.30286I$ | $1.49357 - 10.61130I$ | $-2.76481 + 7.85454I$ |
| $u = 1.001870 - 0.741764I$<br>$a = -1.06668 + 1.09068I$<br>$b = 1.129990 - 0.183434I$ | $1.49357 + 10.61130I$ | $-2.76481 - 7.85454I$ |
| $u = 1.001870 - 0.741764I$<br>$a = 2.24279 - 0.22903I$<br>$b = -0.67647 - 1.30286I$ | $1.49357 + 10.61130I$ | $-2.76481 - 7.85454I$ |
| $u = 0.517281$<br>$a = -4.14815 + 3.15299I$<br>$b = 0.133790 - 1.026500I$ | $-4.07650$ | $-8.66240$ |
| $u = 0.517281$<br>$a = -4.14815 - 3.15299I$<br>$b = 0.133790 + 1.026500I$ | $-4.07650$ | $-8.66240$ |

**III.** $\boldsymbol{I^u_3 =}$
$\boldsymbol{\langle 19u^{15}a+23u^{15}+\cdots+20a+27,\ 2u^{15}a+6u^{15}+\cdots+a^2-4,\ u^{16}-u^{15}+\cdots-2u+1\rangle}$

**(i) Arc colorings**

$$a_1 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_5 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_2 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} -u^2+1 \\ u^2 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} -u \\ -u^3+u \end{pmatrix}$$
$$a_4 = \begin{pmatrix} u^3 \\ u^5-u^3+u \end{pmatrix}$$
$$a_8 = \begin{pmatrix} a \\ -0.358491au^{15}-0.433962u^{15}+\cdots-0.377358a-0.509434 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} 0.943396au^{15}+0.773585u^{15}+\cdots+0.150943a-1.39623 \\ -0.811321au^{15}-1.24528u^{15}+\cdots-0.169811a+0.320755 \end{pmatrix}$$
$$a_{11} = \begin{pmatrix} 0.433962au^{15}+2.73585u^{15}+\cdots+0.509434a+1.03774 \\ -0.339623au^{15}-0.358491u^{15}+\cdots-0.0943396a-1.37736 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} 2u^{14}+u^{13}+\cdots-u+2 \\ u^{15}-2u^{14}+\cdots+2u-2 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} -0.377358au^{15}+1.49057u^{15}+\cdots+1.33962a+0.358491 \\ 0.509434au^{15}-0.962264u^{15}+\cdots-0.358491a-0.433962 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} -0.377358au^{15}+1.49057u^{15}+\cdots+1.33962a+0.358491 \\ 0.509434au^{15}-0.962264u^{15}+\cdots-0.358491a-0.433962 \end{pmatrix}$$


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

**(iii) Cusp Shapes** $= 4u^{12}-8u^{10}+16u^8-4u^7-16u^6+8u^5+12u^4-8u^3-4u^2+4u-6$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1, c_5$ | $(u^{16} + u^{15} + \cdots + 2u + 1)^2$ |
| $c_2, c_4$ | $(u^{16} + 5u^{15} + \cdots - 4u^2 + 1)^2$ |
| $c_3$ | $(u^{16} - u^{15} + \cdots - 2u + 1)^2$ |
| $c_6, c_8, c_9$<br>$c_{11}$ | $u^{32} + 5u^{31} + \cdots + 8u + 1$ |
| $c_7, c_{10}$ | $u^{32} + u^{31} + \cdots - 402u + 73$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_3, c_5$ | $(y^{16} - 5y^{15} + \cdots - 4y^2 + 1)^2$ |
| $c_2, c_4$ | $(y^{16} + 11y^{15} + \cdots - 8y + 1)^2$ |
| $c_6, c_8, c_9$ $c_{11}$ | $y^{32} + 21y^{31} + \cdots + 6y + 1$ |
| $c_7, c_{10}$ | $y^{32} - 15y^{31} + \cdots - 89626y + 5329$ |

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

| Solutions to $I_3^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -1.017320 + 0.191091I$<br>$a = 0.77304 - 1.40886I$<br>$b = -0.436018 - 1.310650I$ | $-4.37117 + 5.29622I$ | $-8.10789 - 6.28296I$ |
| $u = -1.017320 + 0.191091I$<br>$a = -0.080344 + 0.145257I$<br>$b = 0.930500 + 0.053773I$ | $-4.37117 + 5.29622I$ | $-8.10789 - 6.28296I$ |
| $u = -1.017320 - 0.191091I$<br>$a = 0.77304 + 1.40886I$<br>$b = -0.436018 + 1.310650I$ | $-4.37117 - 5.29622I$ | $-8.10789 + 6.28296I$ |
| $u = -1.017320 - 0.191091I$<br>$a = -0.080344 - 0.145257I$<br>$b = 0.930500 - 0.053773I$ | $-4.37117 - 5.29622I$ | $-8.10789 + 6.28296I$ |
| $u = 0.908738 + 0.252477I$<br>$a = 0.160770 - 1.402060I$<br>$b = 0.185966 + 0.248413I$ | $-3.61825 - 0.25270I$ | $-6.38985 + 0.96511I$ |
| $u = 0.908738 + 0.252477I$<br>$a = -1.69112 - 0.97289I$<br>$b = -0.058000 - 1.114600I$ | $-3.61825 - 0.25270I$ | $-6.38985 + 0.96511I$ |
| $u = 0.908738 - 0.252477I$<br>$a = 0.160770 + 1.402060I$<br>$b = 0.185966 - 0.248413I$ | $-3.61825 + 0.25270I$ | $-6.38985 - 0.96511I$ |
| $u = 0.908738 - 0.252477I$<br>$a = -1.69112 + 0.97289I$<br>$b = -0.058000 + 1.114600I$ | $-3.61825 + 0.25270I$ | $-6.38985 - 0.96511I$ |
| $u = 0.708362 + 0.611401I$<br>$a = -1.56409 + 0.56471I$<br>$b = 0.153564 - 1.382420I$ | $-3.61825 + 0.25270I$ | $-6.38985 - 0.96511I$ |
| $u = 0.708362 + 0.611401I$<br>$a = -1.17703 - 1.58536I$<br>$b = 0.608496 + 0.923549I$ | $-3.61825 + 0.25270I$ | $-6.38985 - 0.96511I$ |

| Solutions to $I_3^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.708362 - 0.611401I$<br>$a = -1.56409 - 0.56471I$<br>$b = 0.153564 + 1.382420I$ | $-3.61825 - 0.25270I$ | $-6.38985 + 0.96511I$ |
| $u = 0.708362 - 0.611401I$<br>$a = -1.17703 + 1.58536I$<br>$b = 0.608496 - 0.923549I$ | $-3.61825 - 0.25270I$ | $-6.38985 + 0.96511I$ |
| $u = 0.724199 + 0.826388I$<br>$a = 0.873040 + 1.019050I$<br>$b = -0.667529 - 1.233440I$ | $2.34449 + 4.73566I$ | $-1.11364 - 2.91588I$ |
| $u = 0.724199 + 0.826388I$<br>$a = -1.62577 - 0.21392I$<br>$b = 1.060700 - 0.232760I$ | $2.34449 + 4.73566I$ | $-1.11364 - 2.91588I$ |
| $u = 0.724199 - 0.826388I$<br>$a = 0.873040 - 1.019050I$<br>$b = -0.667529 + 1.233440I$ | $2.34449 - 4.73566I$ | $-1.11364 + 2.91588I$ |
| $u = 0.724199 - 0.826388I$<br>$a = -1.62577 + 0.21392I$<br>$b = 1.060700 + 0.232760I$ | $2.34449 - 4.73566I$ | $-1.11364 + 2.91588I$ |
| $u = -0.866890 + 0.696274I$<br>$a = 1.92331 + 0.56041I$<br>$b = -0.212635 + 1.014820I$ | $-0.93480 + 2.67607I$ | $-0.38861 - 3.32415I$ |
| $u = -0.866890 + 0.696274I$<br>$a = 2.69221 - 1.74930I$<br>$b = -0.171716 - 1.089490I$ | $-0.93480 + 2.67607I$ | $-0.38861 - 3.32415I$ |
| $u = -0.866890 - 0.696274I$<br>$a = 1.92331 - 0.56041I$<br>$b = -0.212635 - 1.014820I$ | $-0.93480 - 2.67607I$ | $-0.38861 + 3.32415I$ |
| $u = -0.866890 - 0.696274I$<br>$a = 2.69221 + 1.74930I$<br>$b = -0.171716 + 1.089490I$ | $-0.93480 - 2.67607I$ | $-0.38861 + 3.32415I$ |

| Solutions to $I_3^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.960503 + 0.654282I$<br>$a = 0.874727 - 0.511465I$<br>$b = 0.27490 + 1.49232I$ | $-4.37117 - 5.29622I$ | $-8.10789 + 6.28296I$ |
| $u = 0.960503 + 0.654282I$<br>$a = -2.47726 - 0.17457I$<br>$b = 0.723528 - 1.103510I$ | $-4.37117 - 5.29622I$ | $-8.10789 + 6.28296I$ |
| $u = 0.960503 - 0.654282I$<br>$a = 0.874727 + 0.511465I$<br>$b = 0.27490 - 1.49232I$ | $-4.37117 + 5.29622I$ | $-8.10789 - 6.28296I$ |
| $u = 0.960503 - 0.654282I$<br>$a = -2.47726 + 0.17457I$<br>$b = 0.723528 + 1.103510I$ | $-4.37117 + 5.29622I$ | $-8.10789 - 6.28296I$ |
| $u = -0.977539 + 0.749941I$<br>$a = 0.262243 - 0.231216I$<br>$b = -0.494890 + 0.256259I$ | $2.34449 + 4.73566I$ | $-1.11364 - 2.91588I$ |
| $u = -0.977539 + 0.749941I$<br>$a = -1.72382 + 0.29569I$<br>$b = 0.336437 + 0.940681I$ | $2.34449 + 4.73566I$ | $-1.11364 - 2.91588I$ |
| $u = -0.977539 - 0.749941I$<br>$a = 0.262243 + 0.231216I$<br>$b = -0.494890 - 0.256259I$ | $2.34449 - 4.73566I$ | $-1.11364 + 2.91588I$ |
| $u = -0.977539 - 0.749941I$<br>$a = -1.72382 - 0.29569I$<br>$b = 0.336437 - 0.940681I$ | $2.34449 - 4.73566I$ | $-1.11364 + 2.91588I$ |
| $u = 0.059947 + 0.622852I$<br>$a = 0.467003 - 0.890621I$<br>$b = -0.378599 + 1.075260I$ | $-0.93480 - 2.67607I$ | $-0.38861 + 3.32415I$ |
| $u = 0.059947 + 0.622852I$<br>$a = -1.186920 + 0.555131I$<br>$b = 0.645301 + 0.131928I$ | $-0.93480 - 2.67607I$ | $-0.38861 + 3.32415I$ |

| Solutions to $I_3^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.059947 - 0.622852I$<br>$a = 0.467003 + 0.890621I$<br>$b = -0.378599 - 1.075260I$ | $-0.93480 + 2.67607I$ | $-0.38861 - 3.32415I$ |
| $u = 0.059947 - 0.622852I$<br>$a = -1.186920 - 0.555131I$<br>$b = 0.645301 - 0.131928I$ | $-0.93480 + 2.67607I$ | $-0.38861 - 3.32415I$ |

**IV.** $\boldsymbol{I_4^u = \langle b-1,\ 2a-2u+1,\ u^3+u^2-1\rangle}$

**(i) Arc colorings**

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

$a_5 = \begin{pmatrix} 0 \\ u \end{pmatrix}$

$a_2 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$

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

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

$a_4 = \begin{pmatrix} -u^2+1 \\ u^2 \end{pmatrix}$

$a_8 = \begin{pmatrix} u-\frac{1}{2} \\ 1 \end{pmatrix}$

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

$a_{11} = \begin{pmatrix} u+\frac{1}{2} \\ 1 \end{pmatrix}$

$a_9 = \begin{pmatrix} 2u \\ 2 \end{pmatrix}$

$a_{10} = \begin{pmatrix} \frac{3}{2}u \\ -\frac{1}{2}u^2-\frac{1}{2}u+\frac{3}{2} \end{pmatrix}$

$a_{10} = \begin{pmatrix} \frac{3}{2}u \\ -\frac{1}{2}u^2-\frac{1}{2}u+\frac{3}{2} \end{pmatrix}$

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

**(iii) Cusp Shapes** $= \frac{17}{4}u^2+\frac{17}{4}u+\frac{7}{4}$

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

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

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_5$ | $y^3 - y^2 + 2y - 1$ |
| $c_2, c_4$ | $y^3 + 3y^2 + 2y - 1$ |
| $c_3$ | $y^3$ |
| $c_6, c_8, c_9$ $c_{11}$ | $(y-1)^3$ |
| $c_7, c_{10}$ | $64(64y^3 + 48y^2 + 8y - 1)$ |

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

| Solutions to $I_4^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.877439 + 0.744862I$<br>$a = -1.37744 + 0.74486I$<br>$b = \quad 1.00000$ | $4.66906 + 2.82812I$ | $-1.06503 - 2.38969I$ |
| $u = -0.877439 - 0.744862I$<br>$a = -1.37744 - 0.74486I$<br>$b = \quad 1.00000$ | $4.66906 - 2.82812I$ | $-1.06503 + 2.38969I$ |
| $u = \quad 0.754878$<br>$a = \quad 0.254878$<br>$b = \quad 1.00000$ | $0.531480$ | $7.38010$ |

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

**(i) Arc colorings**

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

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

**(iii) Cusp Shapes** $= -14$

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

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

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

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

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

| Solutions to $I_5^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -1.00000$<br>$a = -0.50000 + 1.32288I$<br>$b = \quad 0.50000 + 1.32288I$ | $-8.22467$ | $-14.0000$ |
| $u = -1.00000$<br>$a = -0.50000 - 1.32288I$<br>$b = \quad 0.50000 - 1.32288I$ | $-8.22467$ | $-14.0000$ |

## VI. $I_6^u = \langle 2b - a + 1,\ a^2 - 2a + 5,\ u - 1\rangle$

**(i) Arc colorings**

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

$$a_5 = \begin{pmatrix} 0 \\ 1 \end{pmatrix}$$

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

$$a_3 = \begin{pmatrix} 0 \\ 1 \end{pmatrix}$$

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

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

$$a_8 = \begin{pmatrix} a \\ \frac{1}{2}a - \frac{1}{2} \end{pmatrix}$$

$$a_7 = \begin{pmatrix} \frac{1}{2}a - \frac{1}{2} \\ -1 \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} \frac{1}{2}a - \frac{3}{2} \\ -1 \end{pmatrix}$$

$$a_9 = \begin{pmatrix} \frac{1}{2}a - \frac{1}{2} \\ 0 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} \frac{1}{2}a - \frac{3}{2} \\ -\frac{1}{2}a + \frac{1}{2} \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} \frac{1}{2}a - \frac{3}{2} \\ -\frac{1}{2}a + \frac{1}{2} \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= -12$

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

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

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

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

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

| Solutions to $I_6^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.00000$<br>$a = 1.00000 + 2.00000I$<br>$b = 1.000000I$ | $-4.93480$ | $-12.0000$ |
| $u = 1.00000$<br>$a = 1.00000 - 2.00000I$<br>$b = -1.000000I$ | $-4.93480$ | $-12.0000$ |

## VII. u-Polynomials

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $((u-1)^4)(u^3+u^2-1)(u^5+u^4+2u+1)^2(u^{16}+u^{15}+\cdots+2u+1)^2$ $\cdot(u^{28}+2u^{27}+\cdots+3u-4)$ |
| $c_2$ | $(u+1)^4(u^3+u^2+2u+1)(u^5+u^4+4u^3+2u^2+4u+1)^2$ $\cdot((u^{16}+5u^{15}+\cdots-4u^2+1)^2)(u^{28}+10u^{27}+\cdots+97u+16)$ |
| $c_3$ | $u^3(u+1)^2(u^2+1)(u^5-u^4+2u-1)^2(u^{16}-u^{15}+\cdots-2u+1)^2$ $\cdot(u^{28}+3u^{27}+\cdots+736u+128)$ |
| $c_4$ | $(u-1)^2(u+1)^2(u^3-u^2+2u-1)(u^5+u^4+4u^3+2u^2+4u+1)^2$ $\cdot((u^{16}+5u^{15}+\cdots-4u^2+1)^2)(u^{28}+10u^{27}+\cdots+97u+16)$ |
| $c_5$ | $(u-1)^2(u+1)^2(u^3-u^2+1)(u^5+u^4+2u+1)^2$ $\cdot((u^{16}+u^{15}+\cdots+2u+1)^2)(u^{28}+2u^{27}+\cdots+3u-4)$ |
| $c_6, c_8$ | $(u+1)^3(u^2+1)(u^2+u+2)$ $\cdot(u^{10}+u^9+2u^8+4u^7+4u^6+5u^5+3u^4+u^3+u^2+1)$ $\cdot(u^{28}-3u^{27}+\cdots-5u-1)(u^{32}+5u^{31}+\cdots+8u+1)$ |
| $c_7$ | $64(u-1)^2(u^2-2u+2)(8u^3+4u^2+4u+1)$ $\cdot(u^{10}+4u^9+8u^8+6u^7+6u^6+7u^5+25u^4+43u^3+56u^2+36u+8)$ $\cdot(8u^{28}-12u^{27}+\cdots+4u+2)(u^{32}+u^{31}+\cdots-402u+73)$ |
| $c_9, c_{11}$ | $(u-1)^3(u^2+1)(u^2+u+2)$ $\cdot(u^{10}+u^9+2u^8+4u^7+4u^6+5u^5+3u^4+u^3+u^2+1)$ $\cdot(u^{28}-3u^{27}+\cdots-5u-1)(u^{32}+5u^{31}+\cdots+8u+1)$ |
| $c_{10}$ | $64(u-1)^2(u^2+2u+2)(8u^3-4u^2+4u-1)$ $\cdot(u^{10}+4u^9+8u^8+6u^7+6u^6+7u^5+25u^4+43u^3+56u^2+36u+8)$ $\cdot(8u^{28}-12u^{27}+\cdots+4u+2)(u^{32}+u^{31}+\cdots-402u+73)$ |

## VIII. Riley Polynomials

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_5$ | $(y-1)^4(y^3-y^2+2y-1)(y^5-y^4+4y^3-2y^2+4y-1)^2$ <br> $\cdot((y^{16}-5y^{15}+\cdots-4y^2+1)^2)(y^{28}-10y^{27}+\cdots-97y+16)$ |
| $c_2, c_4$ | $(y-1)^4(y^3+3y^2+2y-1)(y^5+7y^4+20y^3+26y^2+12y-1)^2$ <br> $\cdot((y^{16}+11y^{15}+\cdots-8y+1)^2)(y^{28}+18y^{27}+\cdots+8543y+256)$ |
| $c_3$ | $y^3(y-1)^2(y+1)^2(y^5-y^4+4y^3-2y^2+4y-1)^2$ <br> $\cdot((y^{16}-5y^{15}+\cdots-4y^2+1)^2)(y^{28}-5y^{27}+\cdots-238592y+16384)$ |
| $c_6, c_8, c_9$ <br> $c_{11}$ | $(y-1)^3(y+1)^2(y^2+3y+4)$ <br> $\cdot(y^{10}+3y^9+4y^8-4y^7-12y^6-3y^5+11y^4+13y^3+7y^2+2y+1)$ <br> $\cdot(y^{28}+11y^{27}+\cdots-51y+1)(y^{32}+21y^{31}+\cdots+6y+1)$ |
| $c_7, c_{10}$ | $4096(y-1)^2(y^2+4)(64y^3+48y^2+8y-1)$ <br> $\cdot(y^{10}+28y^8+\cdots-400y+64)(64y^{28}+176y^{27}+\cdots+40y+4)$ <br> $\cdot(y^{32}-15y^{31}+\cdots-89626y+5329)$ |