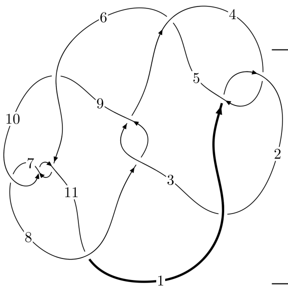
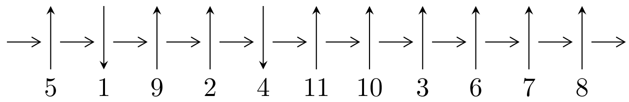
# $11a_{63}$ $(K11a_{63})$




A knot diagram[1]

**Linearized knot diagam**




**Solving Sequence**

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

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

$$I_1^u = \langle 7u^{51} - 22u^{50} + \cdots + 2b + 5,\ -5u^{51} + 8u^{50} + \cdots + 2a + 4,\ u^{52} - 3u^{51} + \cdots + 3u - 1\rangle$$
$$I_2^u = \langle -au + b,\ -u^2a + a^2 - au + 2u^2 - 2a + u + 3,\ u^3 + u^2 + 2u + 1\rangle$$

* 2 irreducible components of $\dim_{\mathbb{C}} = 0$, with total 58 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. $I_1^u = \langle 7u^{51}-22u^{50}+\cdots+2b+5,\ -5u^{51}+8u^{50}+\cdots+2a+4,\ u^{52}-3u^{51}+\cdots+3u-1\rangle$

**(i) Arc colorings**

$$a_6 = \begin{pmatrix}1\\0\end{pmatrix}$$
$$a_{11} = \begin{pmatrix}0\\u\end{pmatrix}$$
$$a_7 = \begin{pmatrix}1\\-u^2\end{pmatrix}$$
$$a_{10} = \begin{pmatrix}-u\\u^3+u\end{pmatrix}$$
$$a_8 = \begin{pmatrix}u^2+1\\-u^4-2u^2\end{pmatrix}$$
$$a_1 = \begin{pmatrix}u^5+2u^3+u\\-u^7-3u^5-2u^3+u\end{pmatrix}$$
$$a_3 = \begin{pmatrix}\frac{5}{2}u^{51}-4u^{50}+\cdots-u-2\\-\frac{7}{2}u^{51}+11u^{50}+\cdots+\frac{19}{2}u-\frac{5}{2}\end{pmatrix}$$
$$a_2 = \begin{pmatrix}u^{51}-u^{50}+\cdots+\frac{3}{2}u-\frac{5}{2}\\-\frac{3}{2}u^{51}+5u^{50}+\cdots+\frac{11}{2}u-\frac{1}{2}\end{pmatrix}$$
$$a_9 = \begin{pmatrix}-u^3-2u\\u^3+u\end{pmatrix}$$
$$a_4 = \begin{pmatrix}-\frac{3}{2}u^{51}+5u^{50}+\cdots+5u-5\\-\frac{1}{2}u^{51}+2u^{50}+\cdots+\frac{5}{2}u+\frac{1}{2}\end{pmatrix}$$
$$a_5 = \begin{pmatrix}\frac{1}{2}u^{51}-u^{50}+\cdots-6u+1\\-\frac{1}{2}u^{51}+u^{50}+\cdots+\frac{3}{2}u-\frac{1}{2}\end{pmatrix}$$
$$a_5 = \begin{pmatrix}\frac{1}{2}u^{51}-u^{50}+\cdots-6u+1\\-\frac{1}{2}u^{51}+u^{50}+\cdots+\frac{3}{2}u-\frac{1}{2}\end{pmatrix}$$

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

**(iii) Cusp Shapes** $= 6u^{51}-\frac{31}{2}u^{50}+\cdots-25u+\frac{27}{2}$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1, c_4$ | $u^{52} + 4u^{51} + \cdots - 2u + 1$ |
| $c_2, c_5$ | $u^{52} + 16u^{51} + \cdots - 2u + 1$ |
| $c_3, c_8$ | $u^{52} + u^{51} + \cdots - 96u - 64$ |
| $c_6, c_7, c_{10}$ | $u^{52} + 3u^{51} + \cdots - 3u - 1$ |
| $c_9, c_{11}$ | $u^{52} - 3u^{51} + \cdots - u - 34$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_4$ | $y^{52} + 16y^{51} + \cdots - 2y + 1$ |
| $c_2, c_5$ | $y^{52} + 44y^{51} + \cdots - 286y + 1$ |
| $c_3, c_8$ | $y^{52} - 35y^{51} + \cdots - 21504y + 4096$ |
| $c_6, c_7, c_{10}$ | $y^{52} + 43y^{51} + \cdots - 21y + 1$ |
| $c_9, c_{11}$ | $y^{52} - 41y^{51} + \cdots - 9793y + 1156$ |

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

| Solutions to $I_1^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.869190 + 0.098347I$<br>$a = 2.62054 - 0.46093I$<br>$b = -2.32308 + 0.14292I$ | $10.69000 + 3.28668I$ | $13.89309 - 1.28472I$ |
| $u = 0.869190 - 0.098347I$<br>$a = 2.62054 + 0.46093I$<br>$b = -2.32308 - 0.14292I$ | $10.69000 - 3.28668I$ | $13.89309 + 1.28472I$ |
| $u = 0.863424 + 0.122136I$<br>$a = -2.58791 + 0.56862I$<br>$b = 2.30392 - 0.17488I$ | $9.82803 + 9.53725I$ | $12.52453 - 6.18800I$ |
| $u = 0.863424 - 0.122136I$<br>$a = -2.58791 - 0.56862I$<br>$b = 2.30392 + 0.17488I$ | $9.82803 - 9.53725I$ | $12.52453 + 6.18800I$ |
| $u = 0.824297$<br>$a = 2.98549$<br>$b = -2.46093$ | $6.31990$ | $15.1000$ |
| $u = -0.814922 + 0.019223I$<br>$a = -0.007593 - 0.403197I$<br>$b = -0.013938 - 0.328428I$ | $5.47556 - 2.92351I$ | $12.21309 + 2.83301I$ |
| $u = -0.814922 - 0.019223I$<br>$a = -0.007593 + 0.403197I$<br>$b = -0.013938 + 0.328428I$ | $5.47556 + 2.92351I$ | $12.21309 - 2.83301I$ |
| $u = -0.016991 + 1.193940I$<br>$a = -0.830637 + 0.202592I$<br>$b = 0.227769 + 0.995176I$ | $-2.37385 - 1.42524I$ | $0$ |
| $u = -0.016991 - 1.193940I$<br>$a = -0.830637 - 0.202592I$<br>$b = 0.227769 - 0.995176I$ | $-2.37385 + 1.42524I$ | $0$ |
| $u = 0.785467 + 0.056391I$<br>$a = -3.17951 + 0.44138I$<br>$b = 2.52229 - 0.16739I$ | $2.59377 + 3.74328I$ | $10.41806 - 4.50899I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.785467 - 0.056391I$<br>$a = -3.17951 - 0.44138I$<br>$b = 2.52229 + 0.16739I$ | $2.59377 - 3.74328I$ | $10.41806 + 4.50899I$ |
| $u = 0.429875 + 1.139080I$<br>$a = -1.01832 + 1.30146I$<br>$b = 1.92022 + 0.60048I$ | $6.71162 - 4.90299I$ | $0$ |
| $u = 0.429875 - 1.139080I$<br>$a = -1.01832 - 1.30146I$<br>$b = 1.92022 - 0.60048I$ | $6.71162 + 4.90299I$ | $0$ |
| $u = 0.429460 + 1.170320I$<br>$a = 1.00282 - 1.33702I$<br>$b = -1.99541 - 0.59942I$ | $7.39955 + 1.36157I$ | $0$ |
| $u = 0.429460 - 1.170320I$<br>$a = 1.00282 + 1.33702I$<br>$b = -1.99541 + 0.59942I$ | $7.39955 - 1.36157I$ | $0$ |
| $u = -0.536150 + 0.527494I$<br>$a = 0.081242 + 0.642665I$<br>$b = 0.382559 + 0.301710I$ | $4.30098 - 4.90907I$ | $10.88602 + 6.29040I$ |
| $u = -0.536150 - 0.527494I$<br>$a = 0.081242 - 0.642665I$<br>$b = 0.382559 - 0.301710I$ | $4.30098 + 4.90907I$ | $10.88602 - 6.29040I$ |
| $u = -0.571004 + 0.467263I$<br>$a = -0.110745 - 0.606288I$<br>$b = -0.346532 - 0.294446I$ | $4.49074 + 0.94301I$ | $11.69221 + 0.65426I$ |
| $u = -0.571004 - 0.467263I$<br>$a = -0.110745 + 0.606288I$<br>$b = -0.346532 + 0.294446I$ | $4.49074 - 0.94301I$ | $11.69221 - 0.65426I$ |
| $u = 0.054364 + 1.261730I$<br>$a = 1.155190 + 0.091004I$<br>$b = 0.05202 - 1.46248I$ | $-3.61886 + 3.25992I$ | $0$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.054364 - 1.261730I$<br>$a = 1.155190 - 0.091004I$<br>$b = 0.05202 + 1.46248I$ | $-3.61886 - 3.25992I$ | 0 |
| $u = -0.192197 + 1.250340I$<br>$a = -0.288871 + 0.142351I$<br>$b = 0.122466 + 0.388546I$ | $-2.79485 - 2.18309I$ | 0 |
| $u = -0.192197 - 1.250340I$<br>$a = -0.288871 - 0.142351I$<br>$b = 0.122466 - 0.388546I$ | $-2.79485 + 2.18309I$ | 0 |
| $u = 0.327134 + 1.228210I$<br>$a = -1.20181 + 1.56811I$<br>$b = 2.31911 + 0.96309I$ | $-0.998594 + 0.270066I$ | 0 |
| $u = 0.327134 - 1.228210I$<br>$a = -1.20181 - 1.56811I$<br>$b = 2.31911 - 0.96309I$ | $-0.998594 - 0.270066I$ | 0 |
| $u = -0.361669 + 1.253070I$<br>$a = -0.116228 + 0.388450I$<br>$b = 0.444718 + 0.286131I$ | $1.65758 - 1.30987I$ | 0 |
| $u = -0.361669 - 1.253070I$<br>$a = -0.116228 - 0.388450I$<br>$b = 0.444718 - 0.286131I$ | $1.65758 + 1.30987I$ | 0 |
| $u = 0.369698 + 1.268120I$<br>$a = 0.96007 - 1.60608I$<br>$b = -2.39163 - 0.62372I$ | $2.38423 + 4.29256I$ | 0 |
| $u = 0.369698 - 1.268120I$<br>$a = 0.96007 + 1.60608I$<br>$b = -2.39163 + 0.62372I$ | $2.38423 - 4.29256I$ | 0 |
| $u = -0.362413 + 1.283420I$<br>$a = 0.090402 - 0.383341I$<br>$b = -0.459225 - 0.254952I$ | $1.42090 - 7.15944I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-0.362413-1.283420I$<br>$a=\ \ 0.090402+0.383341I$<br>$b=-0.459225+0.254952I$ | $1.42090+7.15944I$ | $0$ |
| $u=-0.046906+1.347120I$<br>$a=\ \ 0.608575+0.316639I$<br>$b=\ \ 0.455095-0.804970I$ | $-6.61640-2.33196I$ | $0$ |
| $u=-0.046906-1.347120I$<br>$a=\ \ 0.608575-0.316639I$<br>$b=\ \ 0.455095+0.804970I$ | $-6.61640+2.33196I$ | $0$ |
| $u=-0.639472+0.116337I$<br>$a=-0.129317-0.340252I$<br>$b=-0.122279-0.202537I$ | $0.592117-0.648848I$ | $7.92572+0.14612I$ |
| $u=-0.639472-0.116337I$<br>$a=-0.129317+0.340252I$<br>$b=-0.122279+0.202537I$ | $0.592117+0.648848I$ | $7.92572-0.14612I$ |
| $u=\ \ 0.344529+1.308900I$<br>$a=-0.84005+1.79324I$<br>$b=\ \ 2.63660+0.48172I$ | $-1.67983+7.82276I$ | $0$ |
| $u=\ \ 0.344529-1.308900I$<br>$a=-0.84005-1.79324I$<br>$b=\ \ 2.63660-0.48172I$ | $-1.67983-7.82276I$ | $0$ |
| $u=-0.266521+1.329970I$<br>$a=\ \ 0.007588-0.271037I$<br>$b=-0.358449-0.082329I$ | $-3.96051-3.97418I$ | $0$ |
| $u=-0.266521-1.329970I$<br>$a=\ \ 0.007588+0.271037I$<br>$b=-0.358449+0.082329I$ | $-3.96051+3.97418I$ | $0$ |
| $u=\ \ 0.389641+1.339870I$<br>$a=\ \ 0.68691-1.60534I$<br>$b=-2.41860-0.29487I$ | $6.17902+7.80504I$ | $0$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.389641 - 1.339870I$<br>$a = 0.68691 + 1.60534I$<br>$b = -2.41860 + 0.29487I$ | $6.17902 - 7.80504I$ | 0 |
| $u = 0.381825 + 1.353460I$<br>$a = -0.63387 + 1.62633I$<br>$b = 2.44320 + 0.23695I$ | $5.1887 + 14.0116I$ | 0 |
| $u = 0.381825 - 1.353460I$<br>$a = -0.63387 - 1.62633I$<br>$b = 2.44320 - 0.23695I$ | $5.1887 - 14.0116I$ | 0 |
| $u = -0.16343 + 1.40977I$<br>$a = -0.251508 - 0.354319I$<br>$b = -0.540614 + 0.296661I$ | $-1.50041 - 1.51719I$ | 0 |
| $u = -0.16343 - 1.40977I$<br>$a = -0.251508 + 0.354319I$<br>$b = -0.540614 - 0.296661I$ | $-1.50041 + 1.51719I$ | 0 |
| $u = -0.12967 + 1.42233I$<br>$a = 0.311277 + 0.400831I$<br>$b = 0.610477 - 0.390766I$ | $-1.95701 - 7.04982I$ | 0 |
| $u = -0.12967 - 1.42233I$<br>$a = 0.311277 - 0.400831I$<br>$b = 0.610477 + 0.390766I$ | $-1.95701 + 7.04982I$ | 0 |
| $u = -0.134386 + 0.427009I$<br>$a = 0.202768 + 1.214100I$<br>$b = 0.545679 + 0.076573I$ | $-1.24517 - 1.68566I$ | $2.41923 + 5.81718I$ |
| $u = -0.134386 - 0.427009I$<br>$a = 0.202768 - 1.214100I$<br>$b = 0.545679 - 0.076573I$ | $-1.24517 + 1.68566I$ | $2.41923 - 5.81718I$ |
| $u = -0.364730$<br>$a = -0.713718$<br>$b = -0.260315$ | 0.683535 | 14.8020 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.261340 + 0.092384I$<br>$a = -0.16691 + 3.25412I$<br>$b = 0.344246 - 0.835011I$ | $0.38915 + 2.24131I$ | $1.28116 - 4.34025I$ |
| $u = 0.261340 - 0.092384I$<br>$a = -0.16691 - 3.25412I$<br>$b = 0.344246 + 0.835011I$ | $0.38915 - 2.24131I$ | $1.28116 + 4.34025I$ |

**II.** $\boldsymbol{I_2^u = \langle -au + b,\ -u^2a + a^2 - au + 2u^2 - 2a + u + 3,\ u^3 + u^2 + 2u + 1\rangle}$

**(i) Arc colorings**

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

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

**(iii) Cusp Shapes** $= u^2a - 4au + 5u^2 - a + 5u + 12$

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

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

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

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

### (vi) Complex Volumes and Cusp Shapes

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.215080 + 1.307140I$<br>$a = 0.706350 + 0.266290I$<br>$b = -0.500000 + 0.866025I$ | $-3.02413 - 4.85801I$ | $6.43615 + 6.24253I$ |
| $u = -0.215080 + 1.307140I$<br>$a = -0.583789 + 0.478572I$<br>$b = -0.500000 - 0.866025I$ | $-3.02413 - 0.79824I$ | $2.88198 - 0.84592I$ |
| $u = -0.215080 - 1.307140I$<br>$a = 0.706350 - 0.266290I$<br>$b = -0.500000 - 0.866025I$ | $-3.02413 + 4.85801I$ | $6.43615 - 6.24253I$ |
| $u = -0.215080 - 1.307140I$<br>$a = -0.583789 - 0.478572I$<br>$b = -0.500000 + 0.866025I$ | $-3.02413 + 0.79824I$ | $2.88198 + 0.84592I$ |
| $u = -0.569840$<br>$a = 0.87744 + 1.51977I$<br>$b = -0.500000 - 0.866025I$ | $1.11345 - 2.02988I$ | $12.18187 + 2.43783I$ |
| $u = -0.569840$<br>$a = 0.87744 - 1.51977I$<br>$b = -0.500000 + 0.866025I$ | $1.11345 + 2.02988I$ | $12.18187 - 2.43783I$ |

**III. u-Polynomials**

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $((u^2+u+1)^3)(u^{52}+4u^{51}+\cdots-2u+1)$ |
| $c_2, c_5$ | $((u^2+u+1)^3)(u^{52}+16u^{51}+\cdots-2u+1)$ |
| $c_3, c_8$ | $u^6(u^{52}+u^{51}+\cdots-96u-64)$ |
| $c_4$ | $((u^2-u+1)^3)(u^{52}+4u^{51}+\cdots-2u+1)$ |
| $c_6, c_7$ | $((u^3+u^2+2u+1)^2)(u^{52}+3u^{51}+\cdots-3u-1)$ |
| $c_9, c_{11}$ | $((u^3+u^2-1)^2)(u^{52}-3u^{51}+\cdots-u-34)$ |
| $c_{10}$ | $((u^3-u^2+2u-1)^2)(u^{52}+3u^{51}+\cdots-3u-1)$ |

## IV. Riley Polynomials

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_4$ | $((y^2+y+1)^3)(y^{52}+16y^{51}+\cdots-2y+1)$ |
| $c_2, c_5$ | $((y^2+y+1)^3)(y^{52}+44y^{51}+\cdots-286y+1)$ |
| $c_3, c_8$ | $y^6(y^{52}-35y^{51}+\cdots-21504y+4096)$ |
| $c_6, c_7, c_{10}$ | $((y^3+3y^2+2y-1)^2)(y^{52}+43y^{51}+\cdots-21y+1)$ |
| $c_9, c_{11}$ | $((y^3-y^2+2y-1)^2)(y^{52}-41y^{51}+\cdots-9793y+1156)$ |