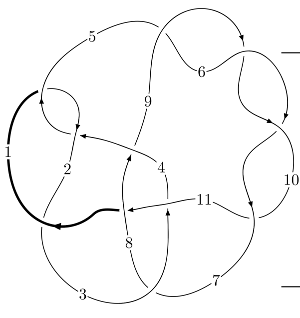
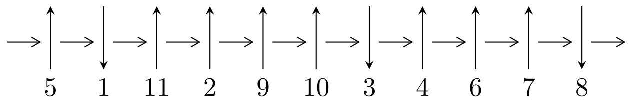
# $11a_{53}$ $(K11a_{53})$



A knot diagram[1]

**Linearized knot diagam**




**Solving Sequence**

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

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

$$I_1^u = \langle 2.81606 \times 10^{31} u^{49} + 5.08261 \times 10^{31} u^{48} + \cdots + 4.27879 \times 10^{31} b - 1.93634 \times 10^{30},$$
$$- 4.15334 \times 10^{31} u^{49} - 1.01081 \times 10^{32} u^{48} + \cdots + 5.34849 \times 10^{30} a + 8.37501 \times 10^{31},\ u^{50} + 3u^{49} + \cdots - 8u -$$
$$I_2^u = \langle b^2 - b + 1,\ a + 1,\ u + 1 \rangle$$

* 2 irreducible components of $\dim_{\mathbb{C}} = 0$, with total 52 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.**

$\boldsymbol{I_1^u = \langle 2.82\times10^{31}u^{49}+5.08\times10^{31}u^{48}+\cdots+4.28\times10^{31}b-1.94\times10^{30},\ -4.15\times10^{31}u^{49}-1.01\times10^{32}u^{48}+\cdots+5.35\times10^{30}a+8.38\times10^{31},\ u^{50}+3u^{49}+\cdots-8u-1\rangle}$

**(i) Arc colorings**

$$a_5 = \begin{pmatrix}1\\0\end{pmatrix}$$
$$a_9 = \begin{pmatrix}0\\u\end{pmatrix}$$
$$a_6 = \begin{pmatrix}1\\-u^2\end{pmatrix}$$
$$a_{10} = \begin{pmatrix}u\\-u^3+u\end{pmatrix}$$
$$a_2 = \begin{pmatrix}7.76545u^{49}+18.8989u^{48}+\cdots-81.3213u-15.6586\\-0.658144u^{49}-1.18786u^{48}+\cdots+4.71381u+0.0452544\end{pmatrix}$$
$$a_7 = \begin{pmatrix}-u^2+1\\u^4-2u^2\end{pmatrix}$$
$$a_1 = \begin{pmatrix}8.42359u^{49}+20.0868u^{48}+\cdots-86.0351u-15.7039\\-0.658144u^{49}-1.18786u^{48}+\cdots+4.71381u+0.0452544\end{pmatrix}$$
$$a_3 = \begin{pmatrix}16.5522u^{49}+40.5819u^{48}+\cdots-183.821u-29.5368\\-0.186883u^{49}-0.0491952u^{48}+\cdots-0.958193u+0.142958\end{pmatrix}$$
$$a_4 = \begin{pmatrix}-15.7480u^{49}-38.5171u^{48}+\cdots+171.517u+27.4764\\0.344150u^{49}+0.520346u^{48}+\cdots-2.34513u-0.685097\end{pmatrix}$$
$$a_8 = \begin{pmatrix}-13.2353u^{49}-30.8285u^{48}+\cdots+140.710u+20.3271\\3.76331u^{49}+9.12279u^{48}+\cdots-33.9045u-5.65366\end{pmatrix}$$
$$a_{11} = \begin{pmatrix}-u^3+2u\\u^5-3u^3+u\end{pmatrix}$$
$$a_{11} = \begin{pmatrix}-u^3+2u\\u^5-3u^3+u\end{pmatrix}$$

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

**(iii) Cusp Shapes** $= 24.5612u^{49}+62.4649u^{48}+\cdots-284.357u-43.1928$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1, c_4$ | $u^{50} + 2u^{49} + \cdots - 11u + 1$ |
| $c_2$ | $u^{50} + 18u^{49} + \cdots - 71u + 1$ |
| $c_3$ | $u^{50} + 5u^{49} + \cdots + 12u + 4$ |
| $c_5, c_6, c_9$<br>$c_{10}$ | $u^{50} - 3u^{49} + \cdots + 8u - 1$ |
| $c_7$ | $u^{50} - 2u^{49} + \cdots - 293u - 41$ |
| $c_8$ | $u^{50} + 13u^{48} + \cdots + 3545u - 3881$ |
| $c_{11}$ | $u^{50} + 3u^{49} + \cdots - 2u - 1$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_4$ | $y^{50} + 18y^{49} + \cdots - 71y + 1$ |
| $c_2$ | $y^{50} + 30y^{49} + \cdots - 6727y + 1$ |
| $c_3$ | $y^{50} - 15y^{49} + \cdots + 24y + 16$ |
| $c_5, c_6, c_9$<br>$c_{10}$ | $y^{50} - 61y^{49} + \cdots + 2y + 1$ |
| $c_7$ | $y^{50} + 66y^{49} + \cdots - 16723y + 1681$ |
| $c_8$ | $y^{50} + 26y^{49} + \cdots - 134903907y + 15062161$ |
| $c_{11}$ | $y^{50} + 3y^{49} + \cdots + 2y + 1$ |

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

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.937098 + 0.462135I$<br>$a = 0.211512 + 0.192941I$<br>$b = 0.858299 - 0.573619I$ | $4.82985 + 5.83927I$ | 0 |
| $u = 0.937098 - 0.462135I$<br>$a = 0.211512 - 0.192941I$<br>$b = 0.858299 + 0.573619I$ | $4.82985 - 5.83927I$ | 0 |
| $u = -0.839672 + 0.647094I$<br>$a = -0.81593 - 1.41627I$<br>$b = 0.661316 - 0.821509I$ | $3.56400 - 2.80079I$ | 0 |
| $u = -0.839672 - 0.647094I$<br>$a = -0.81593 + 1.41627I$<br>$b = 0.661316 + 0.821509I$ | $3.56400 + 2.80079I$ | 0 |
| $u = 0.912689 + 0.553110I$<br>$a = -1.10695 + 1.60264I$<br>$b = 0.696189 + 1.071020I$ | $3.32747 + 11.61540I$ | 0 |
| $u = 0.912689 - 0.553110I$<br>$a = -1.10695 - 1.60264I$<br>$b = 0.696189 - 1.071020I$ | $3.32747 - 11.61540I$ | 0 |
| $u = -0.976441 + 0.595366I$<br>$a = 0.230649 + 0.449741I$<br>$b = 0.650338 + 0.887749I$ | $3.35842 + 2.29493I$ | 0 |
| $u = -0.976441 - 0.595366I$<br>$a = 0.230649 - 0.449741I$<br>$b = 0.650338 - 0.887749I$ | $3.35842 - 2.29493I$ | 0 |
| $u = 0.841656 + 0.047389I$<br>$a = 0.1347570 - 0.0218999I$<br>$b = -0.920135 - 0.479166I$ | $4.03403 + 1.68694I$ | $17.7316 - 3.8537I$ |
| $u = 0.841656 - 0.047389I$<br>$a = 0.1347570 + 0.0218999I$<br>$b = -0.920135 + 0.479166I$ | $4.03403 - 1.68694I$ | $17.7316 + 3.8537I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.013239 + 0.817870I$<br>$a = 0.14125 - 1.78357I$<br>$b = 0.652193 - 1.000830I$ | $0.50489 - 7.07418I$ | $6.05066 + 7.49946I$ |
| $u = -0.013239 - 0.817870I$<br>$a = 0.14125 + 1.78357I$<br>$b = 0.652193 + 1.000830I$ | $0.50489 + 7.07418I$ | $6.05066 - 7.49946I$ |
| $u = 0.777120 + 0.168669I$<br>$a = 1.10335 - 1.09992I$<br>$b = -0.722164 - 1.091670I$ | $2.23469 + 4.31809I$ | $12.5022 - 9.4172I$ |
| $u = 0.777120 - 0.168669I$<br>$a = 1.10335 + 1.09992I$<br>$b = -0.722164 + 1.091670I$ | $2.23469 - 4.31809I$ | $12.5022 + 9.4172I$ |
| $u = 0.682472 + 0.374309I$<br>$a = 0.57023 - 1.65391I$<br>$b = -0.099953 - 1.191010I$ | $-1.85305 + 4.44722I$ | $3.76604 - 8.28097I$ |
| $u = 0.682472 - 0.374309I$<br>$a = 0.57023 + 1.65391I$<br>$b = -0.099953 + 1.191010I$ | $-1.85305 - 4.44722I$ | $3.76604 + 8.28097I$ |
| $u = -1.221480 + 0.183402I$<br>$a = -1.080910 - 0.602437I$<br>$b = 0.279012 - 0.809479I$ | $1.05793 - 1.23765I$ | $0$ |
| $u = -1.221480 - 0.183402I$<br>$a = -1.080910 + 0.602437I$<br>$b = 0.279012 + 0.809479I$ | $1.05793 + 1.23765I$ | $0$ |
| $u = -0.757757$<br>$a = -0.709973$<br>$b = -0.110317$ | $1.34192$ | $6.63920$ |
| $u = -0.131668 + 0.739765I$<br>$a = 0.376094 + 1.066140I$<br>$b = 0.687246 + 0.639785I$ | $1.57561 - 1.87137I$ | $8.35358 + 3.09221I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.131668 - 0.739765I$<br>$a = 0.376094 - 1.066140I$<br>$b = 0.687246 - 0.639785I$ | $1.57561 + 1.87137I$ | $8.35358 - 3.09221I$ |
| $u = -0.685724 + 0.043728I$<br>$a = 4.76222 - 1.81115I$<br>$b = -0.527660 + 0.858592I$ | $1.19764 - 2.12710I$ | $-32.7806 - 10.7013I$ |
| $u = -0.685724 - 0.043728I$<br>$a = 4.76222 + 1.81115I$<br>$b = -0.527660 - 0.858592I$ | $1.19764 + 2.12710I$ | $-32.7806 + 10.7013I$ |
| $u = 0.199761 + 0.536069I$<br>$a = -1.28134 + 2.18752I$<br>$b = 0.039661 + 1.022140I$ | $-3.29175 - 1.28959I$ | $-1.33459 + 1.03958I$ |
| $u = 0.199761 - 0.536069I$<br>$a = -1.28134 - 2.18752I$<br>$b = 0.039661 - 1.022140I$ | $-3.29175 + 1.28959I$ | $-1.33459 - 1.03958I$ |
| $u = -0.333573 + 0.304189I$<br>$a = -1.30977 + 1.12638I$<br>$b = -0.233321 + 0.353112I$ | $0.612959 - 1.077400I$ | $6.64880 + 6.13369I$ |
| $u = -0.333573 - 0.304189I$<br>$a = -1.30977 - 1.12638I$<br>$b = -0.233321 - 0.353112I$ | $0.612959 + 1.077400I$ | $6.64880 - 6.13369I$ |
| $u = 1.57172 + 0.04490I$<br>$a = -0.40787 - 1.60676I$<br>$b = -0.155069 - 0.894721I$ | $7.32051 + 1.86287I$ | $0$ |
| $u = 1.57172 - 0.04490I$<br>$a = -0.40787 + 1.60676I$<br>$b = -0.155069 + 0.894721I$ | $7.32051 - 1.86287I$ | $0$ |
| $u = -1.62108 + 0.08215I$<br>$a = 0.341548 + 1.070770I$<br>$b = -0.158199 + 1.345830I$ | $6.10353 - 6.02446I$ | $0$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -1.62108 - 0.08215I$<br>$a = 0.341548 - 1.070770I$<br>$b = -0.158199 - 1.345830I$ | $6.10353 + 6.02446I$ | $0$ |
| $u = -0.345144 + 0.142770I$<br>$a = -3.26141 - 2.20278I$<br>$b = -0.487438 - 0.764766I$ | $0.63823 + 1.46904I$ | $4.89468 - 6.43467I$ |
| $u = -0.345144 - 0.142770I$<br>$a = -3.26141 + 2.20278I$<br>$b = -0.487438 + 0.764766I$ | $0.63823 - 1.46904I$ | $4.89468 + 6.43467I$ |
| $u = 1.63598 + 0.01535I$<br>$a = 2.27440 + 0.34670I$<br>$b = -0.602748 - 0.867884I$ | $9.40555 + 2.37088I$ | $0$ |
| $u = 1.63598 - 0.01535I$<br>$a = 2.27440 - 0.34670I$<br>$b = -0.602748 + 0.867884I$ | $9.40555 - 2.37088I$ | $0$ |
| $u = -1.65081 + 0.03847I$<br>$a = 0.853099 + 0.632218I$<br>$b = -0.82834 + 1.18201I$ | $10.75670 - 5.06095I$ | $0$ |
| $u = -1.65081 - 0.03847I$<br>$a = 0.853099 - 0.632218I$<br>$b = -0.82834 - 1.18201I$ | $10.75670 + 5.06095I$ | $0$ |
| $u = 1.65329$<br>$a = -0.266847$<br>$b = -0.430236$ | $9.89733$ | $0$ |
| $u = -1.66404 + 0.01144I$<br>$a = 0.376644 - 0.005262I$<br>$b = -1.132200 + 0.490348I$ | $12.84420 - 1.90653I$ | $0$ |
| $u = -1.66404 - 0.01144I$<br>$a = 0.376644 + 0.005262I$<br>$b = -1.132200 - 0.490348I$ | $12.84420 + 1.90653I$ | $0$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -1.68368 + 0.15912I$<br>$a = -1.17332 - 1.00102I$<br>$b = 0.738252 - 1.117030I$ | $12.2572 - 14.4160I$ | 0 |
| $u = -1.68368 - 0.15912I$<br>$a = -1.17332 + 1.00102I$<br>$b = 0.738252 + 1.117030I$ | $12.2572 + 14.4160I$ | 0 |
| $u = -1.68783 + 0.12889I$<br>$a = -0.224075 - 0.279217I$<br>$b = 0.973382 + 0.580176I$ | $13.9293 - 8.1748I$ | 0 |
| $u = -1.68783 - 0.12889I$<br>$a = -0.224075 + 0.279217I$<br>$b = 0.973382 - 0.580176I$ | $13.9293 + 8.1748I$ | 0 |
| $u = 1.68474 + 0.18629I$<br>$a = -1.027680 + 0.904887I$<br>$b = 0.706180 + 0.945723I$ | $12.25070 + 6.06384I$ | 0 |
| $u = 1.68474 - 0.18629I$<br>$a = -1.027680 - 0.904887I$<br>$b = 0.706180 - 0.945723I$ | $12.25070 - 6.06384I$ | 0 |
| $u = 1.71548 + 0.13705I$<br>$a = -0.311148 - 0.002274I$<br>$b = 0.740020 - 0.757612I$ | $12.82000 + 0.55523I$ | 0 |
| $u = 1.71548 - 0.13705I$<br>$a = -0.311148 + 0.002274I$<br>$b = 0.740020 + 0.757612I$ | $12.82000 - 0.55523I$ | 0 |
| $u = -0.052112 + 0.257497I$<br>$a = -2.38696 + 2.67757I$<br>$b = -0.544579 + 0.964237I$ | $-0.08326 - 2.77748I$ | $2.22169 + 1.37022I$ |
| $u = -0.052112 - 0.257497I$<br>$a = -2.38696 - 2.67757I$<br>$b = -0.544579 - 0.964237I$ | $-0.08326 + 2.77748I$ | $2.22169 - 1.37022I$ |

## II. $I_2^u = \langle b^2 - b + 1,\ a + 1,\ u + 1 \rangle$

**(i) Arc colorings**

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

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

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

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

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

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

$$a_1 = \begin{pmatrix} -b-1 \\ b \end{pmatrix}$$

$$a_3 = \begin{pmatrix} -b+1 \\ b-1 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} -b+1 \\ b-1 \end{pmatrix}$$

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

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

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

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

**(iii) Cusp Shapes** $= -4b + 11$

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

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

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

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

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

| Solutions to $I_2^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -1.00000$<br>$a = -1.00000$<br>$b = \ \ 0.500000 + 0.866025I$ | $1.64493 + 2.02988I$ | $9.00000 - 3.46410I$ |
| $u = -1.00000$<br>$a = -1.00000$<br>$b = \ \ 0.500000 - 0.866025I$ | $1.64493 - 2.02988I$ | $9.00000 + 3.46410I$ |

**III. u-Polynomials**

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $(u^2+u+1)(u^{50}+2u^{49}+\cdots-11u+1)$ |
| $c_2$ | $(u^2+u+1)(u^{50}+18u^{49}+\cdots-71u+1)$ |
| $c_3$ | $u^2(u^{50}+5u^{49}+\cdots+12u+4)$ |
| $c_4$ | $(u^2-u+1)(u^{50}+2u^{49}+\cdots-11u+1)$ |
| $c_5, c_6$ | $((u+1)^2)(u^{50}-3u^{49}+\cdots+8u-1)$ |
| $c_7$ | $(u^2-u+1)(u^{50}-2u^{49}+\cdots-293u-41)$ |
| $c_8$ | $(u^2-u+1)(u^{50}+13u^{48}+\cdots+3545u-3881)$ |
| $c_9, c_{10}$ | $((u-1)^2)(u^{50}-3u^{49}+\cdots+8u-1)$ |
| $c_{11}$ | $((u-1)^2)(u^{50}+3u^{49}+\cdots-2u-1)$ |

## IV. Riley Polynomials

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_4$ | $(y^2+y+1)(y^{50}+18y^{49}+\cdots-71y+1)$ |
| $c_2$ | $(y^2+y+1)(y^{50}+30y^{49}+\cdots-6727y+1)$ |
| $c_3$ | $y^2(y^{50}-15y^{49}+\cdots+24y+16)$ |
| $c_5, c_6, c_9$ $c_{10}$ | $((y-1)^2)(y^{50}-61y^{49}+\cdots+2y+1)$ |
| $c_7$ | $(y^2+y+1)(y^{50}+66y^{49}+\cdots-16723y+1681)$ |
| $c_8$ | $(y^2+y+1)(y^{50}+26y^{49}+\cdots-1.34904\times10^8y+1.50622\times10^7)$ |
| $c_{11}$ | $((y-1)^2)(y^{50}+3y^{49}+\cdots+2y+1)$ |