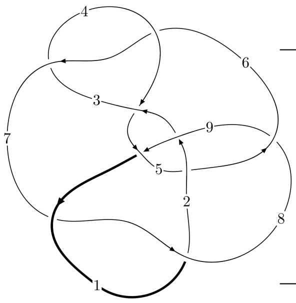
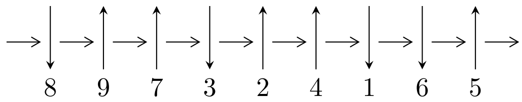
# $9_{33}$ $(K9a_{11})$




A knot diagram[1]

**Linearized knot diagam**




**Solving Sequence**

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

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

$$I_1^u = \langle 523552400u^{29} - 519151600u^{28} + \cdots + 6282411349b - 519170884,$$
$$- 571526124u^{29} + 47533644u^{28} + \cdots + 6282411349a + 20413019584,\ u^{30} - u^{29} + \cdots - 3u + 1\rangle$$

* 1 irreducible components of $\dim_{\mathbb{C}} = 0$, with total 30 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.**
$\boldsymbol{I_1^u = \langle 5.24\times 10^{8}u^{29} - 5.19\times 10^{8}u^{28} + \cdots + 6.28\times 10^{9}b - 5.19\times 10^{8},\ -5.72\times 10^{8}u^{29} + 4.75\times 10^{7}u^{28} + \cdots + 6.28\times 10^{9}a + 2.04\times 10^{10},\ u^{30} - u^{29} + \cdots - 3u + 1\rangle}$

**(i) Arc colorings**

$$a_3 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_4 = \begin{pmatrix} 1 \\ -u^2 \end{pmatrix}$$
$$a_5 = \begin{pmatrix} u^2+1 \\ -u^2 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} 0.0909724u^{29} - 0.00756615u^{28} + \cdots + 2.67520u - 3.24923 \\ -0.0833362u^{29} + 0.0826357u^{28} + \cdots + 1.59305u + 0.0826388 \end{pmatrix}$$
$$a_1 = \begin{pmatrix} 0.816944u^{29} - 0.800274u^{28} + \cdots + 4.33394u - 3.18861 \\ -0.816587u^{29} + 0.821929u^{28} + \cdots + 1.76785u + 0.0219457 \end{pmatrix}$$
$$a_2 = \begin{pmatrix} -0.830556u^{29} - 0.00273693u^{28} + \cdots - 3.66064u + 0.113929 \\ 0.833293u^{29} - 0.830507u^{28} + \cdots + 2.37774u - 0.830556 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} -u \\ u^3+u \end{pmatrix}$$
$$a_8 = \begin{pmatrix} 0.732222u^{29} - 0.798905u^{28} + \cdots + 2.66425u - 3.24557 \\ -0.733373u^{29} + 0.728883u^{28} + \cdots + 2.69552u - 0.0711119 \end{pmatrix}$$
$$a_8 = \begin{pmatrix} 0.732222u^{29} - 0.798905u^{28} + \cdots + 2.66425u - 3.24557 \\ -0.733373u^{29} + 0.728883u^{28} + \cdots + 2.69552u - 0.0711119 \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= -\frac{19978037336}{6282411349}u^{29} + \frac{14950008300}{6282411349}u^{28} + \cdots + \frac{24593576724}{6282411349}u - \frac{28775538078}{6282411349}$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1, c_7$ | $u^{30} - u^{29} + \cdots - 5u + 1$ |
| $c_2$ | $u^{30} + 5u^{29} + \cdots + u + 1$ |
| $c_3, c_6$ | $u^{30} + u^{29} + \cdots + 3u + 1$ |
| $c_4$ | $u^{30} + 13u^{29} + \cdots + 3u + 1$ |
| $c_5$ | $u^{30} + 3u^{29} + \cdots + u + 1$ |
| $c_8$ | $u^{30} - 3u^{29} + \cdots - 9u + 1$ |
| $c_9$ | $u^{30} - u^{29} + \cdots + 11u + 1$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_7$ | $y^{30} - 19y^{29} + \cdots - 5y + 1$ |
| $c_2$ | $y^{30} - 3y^{29} + \cdots - 5y + 1$ |
| $c_3, c_6$ | $y^{30} + 13y^{29} + \cdots + 3y + 1$ |
| $c_4$ | $y^{30} + 9y^{29} + \cdots + 39y + 1$ |
| $c_5$ | $y^{30} + 5y^{29} + \cdots + 3y + 1$ |
| $c_8$ | $y^{30} - 27y^{29} + \cdots + 11y + 1$ |
| $c_9$ | $y^{30} - 23y^{29} + \cdots - 9y + 1$ |

### (vi) Complex Volumes and Cusp Shapes

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.907923 + 0.426568I$<br>$a = -1.169900 + 0.764529I$<br>$b = 1.065260 - 0.854723I$ | $-0.60287 - 7.55963I$ | $1.09191 + 4.94493I$ |
| $u = 0.907923 - 0.426568I$<br>$a = -1.169900 - 0.764529I$<br>$b = 1.065260 + 0.854723I$ | $-0.60287 + 7.55963I$ | $1.09191 - 4.94493I$ |
| $u = 0.365761 + 0.979876I$<br>$a = -1.59795 + 1.33270I$<br>$b = 1.43354 + 0.57946I$ | $-4.52085 + 1.19841I$ | $-7.97414 - 1.50646I$ |
| $u = 0.365761 - 0.979876I$<br>$a = -1.59795 - 1.33270I$<br>$b = 1.43354 - 0.57946I$ | $-4.52085 - 1.19841I$ | $-7.97414 + 1.50646I$ |
| $u = -0.485323 + 0.928263I$<br>$a = 1.61933 - 1.81589I$<br>$b = -0.365965 - 0.331561I$ | $-1.86283 - 2.41995I$ | $7.1505 - 13.4441I$ |
| $u = -0.485323 - 0.928263I$<br>$a = 1.61933 + 1.81589I$<br>$b = -0.365965 + 0.331561I$ | $-1.86283 + 2.41995I$ | $7.1505 + 13.4441I$ |
| $u = 0.702308 + 0.543288I$<br>$a = 1.12249 - 1.09131I$<br>$b = -1.170130 + 0.757580I$ | $2.66519 - 2.12888I$ | $4.79788 + 2.27450I$ |
| $u = 0.702308 - 0.543288I$<br>$a = 1.12249 + 1.09131I$<br>$b = -1.170130 - 0.757580I$ | $2.66519 + 2.12888I$ | $4.79788 - 2.27450I$ |
| $u = -0.630570 + 0.920314I$<br>$a = -1.078230 - 0.484581I$<br>$b = 0.527369 - 0.255959I$ | $0.59733 - 2.56045I$ | $2.74559 + 1.69203I$ |
| $u = -0.630570 - 0.920314I$<br>$a = -1.078230 + 0.484581I$<br>$b = 0.527369 + 0.255959I$ | $0.59733 + 2.56045I$ | $2.74559 - 1.69203I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.419790 + 0.765608I$<br>$a = -0.38715 + 1.97907I$<br>$b = -0.071716 + 0.565767I$ | $-1.28380 - 1.43143I$ | $-4.72992 + 7.90920I$ |
| $u = -0.419790 - 0.765608I$<br>$a = -0.38715 - 1.97907I$<br>$b = -0.071716 - 0.565767I$ | $-1.28380 + 1.43143I$ | $-4.72992 - 7.90920I$ |
| $u = 0.488147 + 1.019990I$<br>$a = 0.469424 + 0.779563I$<br>$b = 0.91649 - 1.42667I$ | $-3.68107 + 4.90989I$ | $-5.62064 - 7.63658I$ |
| $u = 0.488147 - 1.019990I$<br>$a = 0.469424 - 0.779563I$<br>$b = 0.91649 + 1.42667I$ | $-3.68107 - 4.90989I$ | $-5.62064 + 7.63658I$ |
| $u = -0.874083 + 0.729953I$<br>$a = -0.810701 - 0.043239I$<br>$b = 0.692011 - 0.163163I$ | $0.99971 - 3.02182I$ | $5.70717 + 7.15965I$ |
| $u = -0.874083 - 0.729953I$<br>$a = -0.810701 + 0.043239I$<br>$b = 0.692011 + 0.163163I$ | $0.99971 + 3.02182I$ | $5.70717 - 7.15965I$ |
| $u = 0.104954 + 0.846587I$<br>$a = -1.013570 + 0.508000I$<br>$b = -0.214087 + 1.056250I$ | $-1.84656 - 1.46172I$ | $-3.40911 + 4.12645I$ |
| $u = 0.104954 - 0.846587I$<br>$a = -1.013570 - 0.508000I$<br>$b = -0.214087 - 1.056250I$ | $-1.84656 + 1.46172I$ | $-3.40911 - 4.12645I$ |
| $u = 0.606261 + 1.034690I$<br>$a = 1.77136 - 0.83961I$<br>$b = -1.26265 - 1.09290I$ | $1.20556 + 7.17470I$ | $1.40394 - 7.73482I$ |
| $u = 0.606261 - 1.034690I$<br>$a = 1.77136 + 0.83961I$<br>$b = -1.26265 + 1.09290I$ | $1.20556 - 7.17470I$ | $1.40394 + 7.73482I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.739608 + 0.193899I$<br>$a = 0.491712 - 0.140537I$<br>$b = -0.711939 + 0.029552I$ | $1.50909 - 0.09583I$ | $7.75398 - 0.81660I$ |
| $u = -0.739608 - 0.193899I$<br>$a = 0.491712 + 0.140537I$<br>$b = -0.711939 - 0.029552I$ | $1.50909 + 0.09583I$ | $7.75398 + 0.81660I$ |
| $u = 0.066161 + 1.287720I$<br>$a = 0.153531 - 0.197790I$<br>$b = 0.644560 - 0.905239I$ | $-6.75726 - 4.69908I$ | $-5.55546 + 4.95856I$ |
| $u = 0.066161 - 1.287720I$<br>$a = 0.153531 + 0.197790I$<br>$b = 0.644560 + 0.905239I$ | $-6.75726 + 4.69908I$ | $-5.55546 - 4.95856I$ |
| $u = 0.651249 + 1.142680I$<br>$a = -1.59583 + 0.80518I$<br>$b = 1.15164 + 1.02775I$ | $-2.77714 + 13.28050I$ | $-1.34939 - 8.37714I$ |
| $u = 0.651249 - 1.142680I$<br>$a = -1.59583 - 0.80518I$<br>$b = 1.15164 - 1.02775I$ | $-2.77714 - 13.28050I$ | $-1.34939 + 8.37714I$ |
| $u = -0.611458 + 1.208770I$<br>$a = 0.528417 + 0.484423I$<br>$b = -0.632962 + 0.456161I$ | $-1.48004 - 5.18678I$ | $-0.12994 + 9.32507I$ |
| $u = -0.611458 - 1.208770I$<br>$a = 0.528417 - 0.484423I$<br>$b = -0.632962 - 0.456161I$ | $-1.48004 + 5.18678I$ | $-0.12994 - 9.32507I$ |
| $u = 0.368067 + 0.266876I$<br>$a = -2.50293 - 0.01848I$<br>$b = 0.498568 + 0.860476I$ | $-1.90369 - 1.10699I$ | $-1.88237 + 2.02123I$ |
| $u = 0.368067 - 0.266876I$<br>$a = -2.50293 + 0.01848I$<br>$b = 0.498568 - 0.860476I$ | $-1.90369 + 1.10699I$ | $-1.88237 - 2.02123I$ |

## II. u-Polynomials

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1, c_7$ | $u^{30} - u^{29} + \cdots - 5u + 1$ |
| $c_2$ | $u^{30} + 5u^{29} + \cdots + u + 1$ |
| $c_3, c_6$ | $u^{30} + u^{29} + \cdots + 3u + 1$ |
| $c_4$ | $u^{30} + 13u^{29} + \cdots + 3u + 1$ |
| $c_5$ | $u^{30} + 3u^{29} + \cdots + u + 1$ |
| $c_8$ | $u^{30} - 3u^{29} + \cdots - 9u + 1$ |
| $c_9$ | $u^{30} - u^{29} + \cdots + 11u + 1$ |

### III. Riley Polynomials

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_7$ | $y^{30} - 19y^{29} + \cdots - 5y + 1$ |
| $c_2$ | $y^{30} - 3y^{29} + \cdots - 5y + 1$ |
| $c_3, c_6$ | $y^{30} + 13y^{29} + \cdots + 3y + 1$ |
| $c_4$ | $y^{30} + 9y^{29} + \cdots + 39y + 1$ |
| $c_5$ | $y^{30} + 5y^{29} + \cdots + 3y + 1$ |
| $c_8$ | $y^{30} - 27y^{29} + \cdots + 11y + 1$ |
| $c_9$ | $y^{30} - 23y^{29} + \cdots - 9y + 1$ |