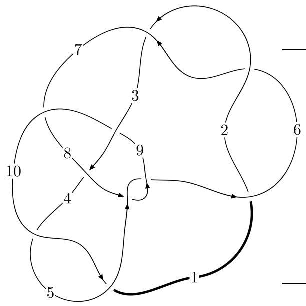
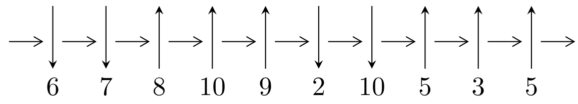
10_{155} $(K10n_{39})$



A knot diagram[1]

Linearized knot diagam



Solving Sequence

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

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

$$
\begin{aligned}
I_1^u &= \langle 2u^3 + 3u^2 + b + 1,\ u^3 + u^2 + a - u,\ u^4 + 3u^3 + 2u^2 + 1 \rangle \\
I_2^u &= \langle -3u^3 + u^2 + 2b + u - 8,\ -2u^3 + u^2 + 2a + u - 5,\ u^4 + u^3 - u^2 + 2u + 4 \rangle \\
I_3^u &= \langle u^2 + b - 1,\ u^3 - u^2 + a - u + 2,\ u^4 - u^3 - 2u^2 + 2u + 1 \rangle \\
I_4^u &= \langle -au + b - 1,\ a^2 + au - a + u,\ u^2 - u - 1 \rangle \\
I_5^u &= \langle -au + b - u + 2,\ a^2 - 2au + 3a - 2u + 4,\ u^2 - u - 1 \rangle
\end{aligned}
$$

* 5 irreducible components of $\dim_{\mathbb{C}} = 0$, with total 20 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. $I^u_1 = \langle 2u^3+3u^2+b+1,\ u^3+u^2+a-u,\ u^4+3u^3+2u^2+1\rangle$

(i) Arc colorings

$$a_7 = \begin{pmatrix}1\\0\end{pmatrix}$$
$$a_{10} = \begin{pmatrix}0\\u\end{pmatrix}$$
$$a_5 = \begin{pmatrix}-u^3-u^2+u\\-2u^3-3u^2-1\end{pmatrix}$$
$$a_8 = \begin{pmatrix}1\\u^2\end{pmatrix}$$
$$a_4 = \begin{pmatrix}-u^3-u^2+u\\-5u^3-7u^2+u-3\end{pmatrix}$$
$$a_3 = \begin{pmatrix}u^3+2u^2+u+1\\-u\end{pmatrix}$$
$$a_2 = \begin{pmatrix}u^3+2u^2+1\\-u\end{pmatrix}$$
$$a_6 = \begin{pmatrix}-u^3-2u^2+u\\-u^2\end{pmatrix}$$
$$a_1 = \begin{pmatrix}-u^2\\u^3-u\end{pmatrix}$$
$$a_9 = \begin{pmatrix}u^3+u^2+1\\2u^3+3u^2+1\end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes $= -2u^3+2u^2+10u+1$

(iv) u-Polynomials at the component

Crossings	u-Polynomials at each crossing
c_1, c_2, c_6 c_7	$u^4 - 3u^3 + 2u^2 + 1$
c_3, c_4, c_{10}	$u^4 + u^3 + 5u^2 - u + 1$
c_5, c_8, c_9	$u^4 - 3u^3 + 5u^2 - 3u + 1$

(v) Riley Polynomials at the component

Crossings	Riley Polynomials at each crossing
c_1, c_2, c_6 c_7	$y^4 - 5y^3 + 6y^2 + 4y + 1$
c_3, c_4, c_{10}	$y^4 + 9y^3 + 29y^2 + 9y + 1$
c_5, c_8, c_9	$y^4 + y^3 + 9y^2 + y + 1$

(vi) Complex Volumes and Cusp Shapes

<table>
<tr><th>Solutions to I_1^u</th><th>$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$</th><th>Cusp shape</th></tr>
<tr><td>$u = 0.192440 + 0.547877I$
$a = 0.621744 + 0.440597I$
$b = 0.121744 - 0.425428I$</td><td>$0.204105 - 1.131010I$</td><td>$2.73047 + 6.10768I$</td></tr>
<tr><td>$u = 0.192440 - 0.547877I$
$a = 0.621744 - 0.440597I$
$b = 0.121744 + 0.425428I$</td><td>$0.204105 + 1.131010I$</td><td>$2.73047 - 6.10768I$</td></tr>
<tr><td>$u = -1.69244 + 0.31815I$
$a = -0.121744 - 1.306620I$
$b = -0.62174 - 2.17265I$</td><td>$-13.3636 + 9.2505I$</td><td>$-1.73047 - 4.37563I$</td></tr>
<tr><td>$u = -1.69244 - 0.31815I$
$a = -0.121744 + 1.306620I$
$b = -0.62174 + 2.17265I$</td><td>$-13.3636 - 9.2505I$</td><td>$-1.73047 + 4.37563I$</td></tr>
</table>

II.

$$\boldsymbol{I^u_2 = \langle -3u^3+u^2+2b+u-8,\ -2u^3+u^2+2a+u-5,\ u^4+u^3-u^2+2u+4\rangle}$$

(i) Arc colorings

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

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

$$a_5 = \begin{pmatrix} u^3 - \frac{1}{2}u^2 - \frac{1}{2}u + \frac{5}{2} \\ \frac{3}{2}u^3 - \frac{1}{2}u^2 - \frac{1}{2}u + 4 \end{pmatrix}$$

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

$$a_4 = \begin{pmatrix} u^3 - \frac{1}{2}u^2 - \frac{1}{2}u + \frac{5}{2} \\ \frac{7}{2}u^3 - \frac{3}{2}u^2 - \frac{3}{2}u + 10 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} -\frac{1}{2}u^3 - \frac{3}{2} \\ \frac{1}{2}u^3 - \frac{1}{2}u^2 + \frac{1}{2}u + 2 \end{pmatrix}$$

$$a_2 = \begin{pmatrix} -\frac{1}{2}u^2 + \frac{1}{2}u + \frac{1}{2} \\ \frac{1}{2}u^3 - \frac{1}{2}u^2 + \frac{1}{2}u + 2 \end{pmatrix}$$

$$a_6 = \begin{pmatrix} \frac{5}{4}u^3 - \frac{1}{4}u^2 - \frac{3}{4}u + 3 \\ \frac{3}{2}u^3 - \frac{1}{2}u^2 - \frac{3}{2}u + 3 \end{pmatrix}$$

$$a_1 = \begin{pmatrix} -\frac{3}{4}u^3 - \frac{1}{4}u^2 + \frac{5}{4}u - 3 \\ -\frac{1}{2}u^3 - \frac{1}{2}u^2 + \frac{1}{2}u - 3 \end{pmatrix}$$

$$a_9 = \begin{pmatrix} \frac{1}{4}u^3 - \frac{1}{4}u^2 + \frac{1}{4}u + 1 \\ \frac{1}{2}u^3 + \frac{1}{2}u^2 + \frac{1}{2}u + 1 \end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes $= -4u^3 + 4u^2 + 4u - 14$

(iv) u-Polynomials at the component

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

(v) Riley Polynomials at the component

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

(vi) Complex Volumes and Cusp Shapes

Solutions to I_2^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 0.895640 + 1.094450I$ $a = -0.250000 - 0.204588I$ $b = 0.456850I$	$-4.93480 - 4.05977I$	$-2.00000 + 6.92820I$
$u = 0.895640 - 1.094450I$ $a = -0.250000 + 0.204588I$ $b = -0.456850I$	$-4.93480 + 4.05977I$	$-2.00000 - 6.92820I$
$u = -1.395640 + 0.228430I$ $a = -0.25000 + 1.52746I$ $b = 2.18890I$	$-4.93480 + 4.05977I$	$-2.00000 - 6.92820I$
$u = -1.395640 - 0.228430I$ $a = -0.25000 - 1.52746I$ $b = -2.18890I$	$-4.93480 - 4.05977I$	$-2.00000 + 6.92820I$

III. $\boldsymbol{I_3^u = \langle u^2 + b - 1,\ u^3 - u^2 + a - u + 2,\ u^4 - u^3 - 2u^2 + 2u + 1\rangle}$

(i) Arc colorings

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

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

$$a_5 = \begin{pmatrix} -u^3 + u^2 + u - 2 \\ -u^2 + 1 \end{pmatrix}$$

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

$$a_4 = \begin{pmatrix} -u^3 + u^2 + u - 2 \\ -u^3 - u^2 + u + 1 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} -u^3 + 2u^2 + u - 3 \\ -u \end{pmatrix}$$

$$a_2 = \begin{pmatrix} -u^3 + 2u^2 - 3 \\ -u \end{pmatrix}$$

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

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

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

(ii) Obstruction class $= 1$

(iii) Cusp Shapes $= 6u^3 - 6u^2 - 10u + 9$

(iv) u-Polynomials at the component

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

(v) Riley Polynomials at the component

Crossings	Riley Polynomials at each crossing
c_1, c_2, c_6 c_7	$y^4 - 5y^3 + 10y^2 - 8y + 1$
c_3, c_4, c_{10}	$y^4 + y^3 + y^2 - 3y + 1$
c_5, c_8, c_9	$y^4 - 3y^3 + y^2 + y + 1$

(vi) Complex Volumes and Cusp Shapes

Solutions to I_3^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u=-1.28879$ $a=\ \ 0.512876$ $b=-0.660993$	0.459232	-0.922080
$u=\ \ 1.339090+0.446630I$ $a=-0.667076-0.670769I$ $b=-0.593691-1.196160I$	$-5.36351-2.52742I$	$-4.35391+2.23809I$
$u=\ \ 1.339090-0.446630I$ $a=-0.667076+0.670769I$ $b=-0.593691+1.196160I$	$-5.36351+2.52742I$	$-4.35391-2.23809I$
$u=-0.389391$ $a=-2.17872$ $b=\ \ 0.848375$	3.68806	11.6300

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

(i) Arc colorings

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

(ii) Obstruction class $= -1$

(iii) Cusp Shapes $= -2$

(iv) u-Polynomials at the component

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

(v) Riley Polynomials at the component

Crossings	Riley Polynomials at each crossing
c_1, c_2, c_6 c_7	$(y^2 - 3y + 1)^2$
c_3, c_4, c_{10}	$y^4 + 6y^3 + 7y^2 - 26y + 1$
c_5, c_8, c_9	$y^4 - 3y^3 + 13y^2 - 28y + 16$

(vi) Complex Volumes and Cusp Shapes

Solutions to I_4^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u = -0.618034$ $a = -0.319053$ $b = 1.19719$	2.96088	−2.00000
$u = -0.618034$ $a = 1.93709$ $b = -0.197186$	2.96088	−2.00000
$u = 1.61803$ $a = -0.309017 + 1.233910I$ $b = 0.50000 + 1.99651I$	−12.8305	−2.00000
$u = 1.61803$ $a = -0.309017 - 1.233910I$ $b = 0.50000 - 1.99651I$	−12.8305	−2.00000

V. $I_5^u = \langle -au + b - u + 2,\ a^2 - 2au + 3a - 2u + 4,\ u^2 - u - 1\rangle$

(i) Arc colorings

$$a_7 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_5 = \begin{pmatrix} a \\ au + u - 2 \end{pmatrix}$$
$$a_8 = \begin{pmatrix} 1 \\ u + 1 \end{pmatrix}$$
$$a_4 = \begin{pmatrix} a \\ 2au + a + u - 2 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} -au + a - u + 2 \\ u - 1 \end{pmatrix}$$
$$a_2 = \begin{pmatrix} -au + a + 1 \\ u - 1 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} -au + 2a - u + 2 \\ u - 2 \end{pmatrix}$$
$$a_1 = \begin{pmatrix} au - 2a + 2u - 2 \\ -u + 2 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} au - a + 2u - 3 \\ au - a + 2u - 2 \end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes $= -2$

(iv) u-Polynomials at the component

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

(v) Riley Polynomials at the component

Crossings	Riley Polynomials at each crossing
c_1, c_2, c_6 c_7	$(y^2 - 3y + 1)^2$
c_3, c_4, c_{10}	$y^4 + y^3 - 3y^2 + 4y + 16$
c_5, c_8, c_9	$(y^2 + y + 1)^2$

(vi) Complex Volumes and Cusp Shapes

Solutions to I_5^u	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.618034$ $a = -2.11803 + 0.86603I$ $b = -1.30902 - 0.53523I$	-4.93480	-2.00000
$u = -0.618034$ $a = -2.11803 - 0.86603I$ $b = -1.30902 + 0.53523I$	-4.93480	-2.00000
$u = 1.61803$ $a = 0.118034 + 0.866025I$ $b = -0.19098 + 1.40126I$	-4.93480	-2.00000
$u = 1.61803$ $a = 0.118034 - 0.866025I$ $b = -0.19098 - 1.40126I$	-4.93480	-2.00000

VI. u-Polynomials

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

VII. Riley Polynomials

Crossings	Riley Polynomials at each crossing
c_1, c_2, c_6 c_7	$(y^2-3y+1)^4(y^4-5y^3+6y^2+4y+1)(y^4-5y^3+10y^2-8y+1)$ $\cdot(y^4-3y^3+5y^2-12y+16)$
c_3, c_4, c_{10}	$(y^2+5y+1)^2(y^4+y^3-3y^2+4y+16)(y^4+y^3+y^2-3y+1)$ $\cdot(y^4+6y^3+7y^2-26y+1)(y^4+9y^3+29y^2+9y+1)$
c_5, c_8, c_9	$(y^2+y+1)^4(y^4-3y^3+y^2+y+1)(y^4-3y^3+13y^2-28y+16)$ $\cdot(y^4+y^3+9y^2+y+1)$