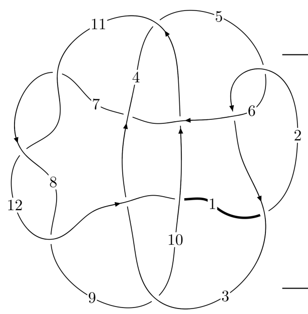
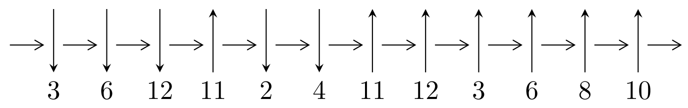
$12n_{0439}$ $(K12n_{0439})$



A knot diagram[1]

Linearized knot diagam



Solving Sequence

$$8{,}12 \underset{c_8}{\to} 4{,}9 \underset{c_3}{\to} 3 \underset{c_9}{\to} 10 \underset{c_{12}}{\to} 1 \underset{c_{11}}{\to} 11 \underset{c_4}{\to} 5 \underset{c_7}{\to} 7 \underset{c_6}{\to} 6 \underset{c_2}{\to} 2 \twoheadrightarrow c_1, c_5, c_{10}$$

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

$$\begin{aligned}
I_1^u = \langle & -51u^8 + 4u^7 + 487u^6 + 424u^5 - 1094u^4 - 281u^3 + 1891u^2 + 551b + 812u + 165, \\
& 267u^8 + 919u^7 + 173u^6 - 2317u^5 + 185u^4 + 5555u^3 + 2060u^2 + 1102a - 2436u - 799, \\
& u^9 + 5u^8 + 7u^7 - 3u^6 - 7u^5 + 17u^4 + 32u^3 + 18u^2 + 7u + 2\rangle \\
I_2^u = \langle & u^7 - 2u^6 - u^5 + 5u^4 - 2u^3 - 5u^2 + b + 2u + 2,\ -u^7 + 3u^6 - u^5 - 4u^4 + 3u^3 + 3u^2 + 3a - u - 4, \\
& u^8 - 3u^7 + u^6 + 7u^5 - 9u^4 - 3u^3 + 10u^2 - 2u - 3\rangle \\
I_3^u = \langle & b + 2a - 1,\ 4a^2 - 6a + 7,\ u - 2\rangle
\end{aligned}$$

$$I_1^v = \langle a,\ b + v,\ v^2 - v + 1\rangle$$

* 4 irreducible components of $\dim_{\mathbb{C}} = 0$, with total 21 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. $\boldsymbol{I_1^u = \langle -51u^8+4u^7+\cdots+551b+165,\ 267u^8+919u^7+\cdots+1102a-799,\ u^9+5u^8+\cdots+7u+2\rangle}$

(i) Arc colorings

$$a_8 = \begin{pmatrix}1\\0\end{pmatrix}$$
$$a_{12} = \begin{pmatrix}0\\u\end{pmatrix}$$
$$a_4 = \begin{pmatrix}-0.242287u^8-0.833938u^7+\cdots+2.21053u+0.725045\\0.0925590u^8-0.00725953u^7+\cdots-1.47368u-0.299456\end{pmatrix}$$
$$a_9 = \begin{pmatrix}1\\-u^2\end{pmatrix}$$
$$a_3 = \begin{pmatrix}-0.242287u^8-0.833938u^7+\cdots+2.21053u+0.725045\\0.441016u^8+1.25953u^7+\cdots+0.684211u+0.455535\end{pmatrix}$$
$$a_{10} = \begin{pmatrix}0.0735027u^8+0.376588u^7+\cdots-0.0526316u+0.409256\\-0.0326679u^8-0.0562613u^7+\cdots+0.578947u-0.0707804\end{pmatrix}$$
$$a_1 = \begin{pmatrix}-0.0408348u^8-0.320327u^7+\cdots-0.526316u-0.338475\\-0.0907441u^8+0.399274u^7+\cdots+2.05263u+0.470054\end{pmatrix}$$
$$a_{11} = \begin{pmatrix}-u\\u\end{pmatrix}$$
$$a_5 = \begin{pmatrix}0.227768u^8+0.697822u^7+\cdots+3.15789u+0.910163\\-0.377495u^8-1.53902u^7+\cdots-2.42105u-0.484574\end{pmatrix}$$
$$a_7 = \begin{pmatrix}-u^2+1\\u^2\end{pmatrix}$$
$$a_6 = \begin{pmatrix}0.0825771u^8+0.336661u^7+\cdots-1.15789u+0.262250\\-0.00907441u^8+0.0399274u^7+\cdots+1.10526u+0.147005\end{pmatrix}$$
$$a_2 = \begin{pmatrix}-0.0735027u^8-0.376588u^7+\cdots+1.05263u+0.590744\\-0.0762250u^8-0.464610u^7+\cdots-0.315789u-0.165154\end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes
$= \frac{1779}{551}u^8+\frac{8482}{551}u^7+\frac{9752}{551}u^6-\frac{10058}{551}u^5-\frac{11137}{551}u^4+\frac{36963}{551}u^3+\frac{46798}{551}u^2+\frac{379}{19}u+\frac{5232}{551}$

(iv) u-Polynomials at the component

Crossings	u-Polynomials at each crossing
c_1	$u^9 + 6u^8 + \cdots + 1105u + 16$
c_2, c_5	$u^9 + 6u^8 + 15u^7 + 19u^6 + 39u^5 + 96u^4 + 137u^3 + 93u^2 + 19u - 4$
c_3, c_6	$u^9 - u^8 + 6u^7 + 6u^6 + 39u^5 + 60u^4 + 40u^3 + 13u^2 + u - 1$
c_4, c_9	$u^9 + u^8 + 7u^7 + 9u^6 + 14u^5 + 11u^4 + 8u^3 + u^2 - u - 1$
c_7, c_8, c_{11}	$u^9 - 5u^8 + 7u^7 + 3u^6 - 7u^5 - 17u^4 + 32u^3 - 18u^2 + 7u - 2$
c_{10}, c_{12}	$u^9 + 6u^8 + 14u^7 - 5u^6 + 66u^5 - 202u^4 + 132u^3 + u^2 - 10u - 1$

(v) Riley Polynomials at the component

Crossings	Riley Polynomials at each crossing
c_1	$y^9 + 114y^8 + \cdots + 1135425y - 256$
c_2, c_5	$y^9 - 6y^8 + \cdots + 1105y - 16$
c_3, c_6	$y^9 + 11y^8 + \cdots + 27y - 1$
c_4, c_9	$y^9 + 13y^8 + 59y^7 + 109y^6 + 106y^5 + 73y^4 + 32y^3 + 5y^2 + 3y - 1$
c_7, c_8, c_{11}	$y^9 - 11y^8 + \cdots - 23y - 4$
c_{10}, c_{12}	$y^9 - 8y^8 + \cdots + 102y - 1$

(vi) Complex Volumes and Cusp Shapes

Solutions to I_1^u	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 1.18169 + 0.81660I$ $a = -1.13356 - 0.92427I$ $b = 0.538744 + 0.723261I$	$4.72372 - 1.44557I$	$2.79413 + 0.05589I$
$u = 1.18169 - 0.81660I$ $a = -1.13356 + 0.92427I$ $b = 0.538744 - 0.723261I$	$4.72372 + 1.44557I$	$2.79413 - 0.05589I$
$u = -0.557684$ $a = -0.337455$ $b = -0.425472$	0.803810	12.4850
$u = -1.42962 + 0.20941I$ $a = 0.119321 + 0.349200I$ $b = -0.023607 - 1.115360I$	$3.18435 - 3.04209I$	$1.27965 + 3.40109I$
$u = -1.42962 - 0.20941I$ $a = 0.119321 - 0.349200I$ $b = -0.023607 + 1.115360I$	$3.18435 + 3.04209I$	$1.27965 - 3.40109I$
$u = -0.058623 + 0.424215I$ $a = 0.74163 + 1.41569I$ $b = 0.476502 - 0.460767I$	$-1.48784 + 0.34537I$	$-5.00907 - 1.24859I$
$u = -0.058623 - 0.424215I$ $a = 0.74163 - 1.41569I$ $b = 0.476502 + 0.460767I$	$-1.48784 - 0.34537I$	$-5.00907 + 1.24859I$
$u = -1.91461 + 0.93499I$ $a = -0.308657 - 1.376960I$ $b = -0.27890 + 2.28182I$	$13.7395 - 8.2460I$	$2.69287 + 2.56767I$
$u = -1.91461 - 0.93499I$ $a = -0.308657 + 1.376960I$ $b = -0.27890 - 2.28182I$	$13.7395 + 8.2460I$	$2.69287 - 2.56767I$

II. $\boldsymbol{I_2^u = \langle u^7 - 2u^6 - u^5 + 5u^4 - 2u^3 - 5u^2 + b + 2u + 2,\ -u^7 + 3u^6 + \cdots + 3a - 4,\ u^8 - 3u^7 + \cdots - 2u - 3\rangle}$

(i) Arc colorings

$$a_8 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_{12} = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_4 = \begin{pmatrix} \frac{1}{3}u^7 - u^6 + \cdots + \frac{1}{3}u + \frac{4}{3} \\ -u^7 + 2u^6 + u^5 - 5u^4 + 2u^3 + 5u^2 - 2u - 2 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} 1 \\ -u^2 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} \frac{1}{3}u^7 - u^6 + \cdots + \frac{1}{3}u + \frac{4}{3} \\ -u^7 + 3u^6 - u^5 - 5u^4 + 5u^3 + 3u^2 - 3u - 2 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} \frac{2}{3}u^7 - u^6 + \cdots + \frac{2}{3}u + \frac{8}{3} \\ -u^7 + u^6 + 2u^5 - 4u^4 - u^3 + 5u^2 + u - 1 \end{pmatrix}$$
$$a_1 = \begin{pmatrix} \frac{1}{3}u^7 - \frac{2}{3}u^5 + \cdots - \frac{5}{3}u - \frac{5}{3} \\ 2u^7 - 5u^6 - 2u^5 + 14u^4 - 8u^3 - 15u^2 + 11u + 7 \end{pmatrix}$$
$$a_{11} = \begin{pmatrix} -u \\ u \end{pmatrix}$$
$$a_5 = \begin{pmatrix} -\frac{2}{3}u^7 + u^6 + \cdots - \frac{11}{3}u - \frac{5}{3} \\ -u^5 + 2u^4 - 3u^2 + 2u + 1 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} -u^2 + 1 \\ u^2 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} -\frac{1}{3}u^7 + u^6 + \cdots - \frac{7}{3}u + \frac{2}{3} \\ u^7 - 2u^6 - u^5 + 6u^4 - 3u^3 - 5u^2 + 3u + 2 \end{pmatrix}$$
$$a_2 = \begin{pmatrix} \frac{2}{3}u^7 - u^6 + \cdots + \frac{5}{3}u + \frac{5}{3} \\ -u^3 + u^2 - 1 \end{pmatrix}$$

(ii) Obstruction class $= 1$

(iii) Cusp Shapes $= 3u^7 - 7u^6 + 3u^5 + 10u^4 - 12u^3 - 2u^2 + 3u + 3$

(iv) u-Polynomials at the component

Crossings	u-Polynomials at each crossing
c_1	$u^8 - 10u^7 + 39u^6 - 81u^5 + 117u^4 - 122u^3 + 63u^2 - 11u + 1$
c_2	$u^8 + 4u^7 + 3u^6 - 7u^5 - 13u^4 - 4u^3 + 7u^2 + 5u + 1$
c_3, c_6	$u^8 + 2u^7 - 2u^5 - 3u^4 - 3u^3 + 3u^2 + 4u + 1$
c_4, c_9	$u^8 + 7u^6 + 10u^4 - 5u^3 - u^2 - 2u - 1$
c_5	$u^8 - 4u^7 + 3u^6 + 7u^5 - 13u^4 + 4u^3 + 7u^2 - 5u + 1$
c_7, c_8	$u^8 - 3u^7 + u^6 + 7u^5 - 9u^4 - 3u^3 + 10u^2 - 2u - 3$
c_{10}, c_{12}	$u^8 + u^7 + 3u^6 + 2u^5 - 6u^4 + 6u^3 - 8u^2 + 5u - 1$
c_{11}	$u^8 + 3u^7 + u^6 - 7u^5 - 9u^4 + 3u^3 + 10u^2 + 2u - 3$

(v) Riley Polynomials at the component

Crossings	Riley Polynomials at each crossing
c_1	$y^8 - 22y^7 + 135y^6 + 251y^5 - 1379y^4 - 1846y^3 + 1519y^2 + 5y + 1$
c_2, c_5	$y^8 - 10y^7 + 39y^6 - 81y^5 + 117y^4 - 122y^3 + 63y^2 - 11y + 1$
c_3, c_6	$y^8 - 4y^7 + 2y^6 + 14y^5 - 17y^4 - 11y^3 + 27y^2 - 10y + 1$
c_4, c_9	$y^8 + 14y^7 + 69y^6 + 138y^5 + 84y^4 - 59y^3 - 39y^2 - 2y + 1$
c_7, c_8, c_{11}	$y^8 - 7y^7 + 25y^6 - 65y^5 + 125y^4 - 167y^3 + 142y^2 - 64y + 9$
c_{10}, c_{12}	$y^8 + 5y^7 - 7y^6 - 68y^5 - 48y^4 + 34y^3 + 16y^2 - 9y + 1$

(vi) Complex Volumes and Cusp Shapes

Solutions to I_2^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u=-1.143550+0.105994I$ $a=\ \ 0.027839+1.059490I$ $b=-0.039265-0.565787I$	$4.97207-3.05412I$	$5.35335+5.43549I$
$u=-1.143550-0.105994I$ $a=\ \ 0.027839-1.059490I$ $b=-0.039265+0.565787I$	$4.97207+3.05412I$	$5.35335-5.43549I$
$u=\ \ 1.084730+0.492548I$ $a=\ \ 0.753232-0.582528I$ $b=\ \ 0.13996+2.26543I$	$-12.04710+1.95234I$	$-1.37368-3.45942I$
$u=\ \ 1.084730-0.492548I$ $a=\ \ 0.753232+0.582528I$ $b=\ \ 0.13996-2.26543I$	$-12.04710-1.95234I$	$-1.37368+3.45942I$
$u=\ \ 1.03265+1.04538I$ $a=-0.527623+0.897663I$ $b=-0.31449-1.42869I$	$-5.86984+3.80835I$	$2.98023-3.30420I$
$u=\ \ 1.03265-1.04538I$ $a=-0.527623-0.897663I$ $b=-0.31449+1.42869I$	$-5.86984-3.80835I$	$2.98023+3.30420I$
$u=-0.483343$ $a=\ \ 1.10069$ $b=-0.358657$	-0.371792	2.79670
$u=\ \ 1.53567$ $a=-0.274253$ $b=\ \ 0.786231$	6.52231	9.28350

III. $\boldsymbol{I_3^u = \langle b + 2a - 1,\ 4a^2 - 6a + 7,\ u - 2\rangle}$

(i) Arc colorings

$$a_8 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

$$a_{12} = \begin{pmatrix} 0 \\ 2 \end{pmatrix}$$

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

$$a_9 = \begin{pmatrix} 1 \\ -4 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} a \\ -6a + 1 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} 2a - \frac{5}{2} \\ -10a + 16 \end{pmatrix}$$

$$a_1 = \begin{pmatrix} -8a - \frac{3}{2} \\ 54a - 8 \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} -2 \\ 2 \end{pmatrix}$$

$$a_5 = \begin{pmatrix} -3a + 4 \\ 2a - 3 \end{pmatrix}$$

$$a_7 = \begin{pmatrix} -3 \\ 4 \end{pmatrix}$$

$$a_6 = \begin{pmatrix} 0.5 \\ -2a \end{pmatrix}$$

$$a_2 = \begin{pmatrix} a - \frac{3}{2} \\ 1 \end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes $= 3$

(iv) u-Polynomials at the component

Crossings	u-Polynomials at each crossing
c_1	$(u+9)^2$
c_2, c_5	$(u-3)^2$
c_3, c_6	u^2-3u+7
c_4, c_9	u^2-u+5
c_7, c_8, c_{11}	$(u+2)^2$
c_{10}, c_{12}	$u^2-4u+23$

(v) Riley Polynomials at the component

Crossings	Riley Polynomials at each crossing
c_1	$(y-81)^2$
c_2, c_5	$(y-9)^2$
c_3, c_6	$y^2+5y+49$
c_4, c_9	$y^2+9y+25$
c_7, c_8, c_{11}	$(y-4)^2$
c_{10}, c_{12}	$y^2+30y+529$

(vi) Complex Volumes and Cusp Shapes

Solutions to I_3^u	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u = \quad 2.00000$ $a = \quad 0.750000 + 1.089730I$ $b = -0.50000 - 2.17945I$	-9.86960	3.00000
$u = \quad 2.00000$ $a = \quad 0.750000 - 1.089730I$ $b = -0.50000 + 2.17945I$	-9.86960	3.00000

IV. $I_1^v = \langle a,\ b+v,\ v^2-v+1\rangle$

(i) Arc colorings

$$a_8 = \begin{pmatrix}1\\0\end{pmatrix}$$
$$a_{12} = \begin{pmatrix}v\\0\end{pmatrix}$$
$$a_4 = \begin{pmatrix}0\\-v\end{pmatrix}$$
$$a_9 = \begin{pmatrix}1\\0\end{pmatrix}$$
$$a_3 = \begin{pmatrix}1\\-v\end{pmatrix}$$
$$a_{10} = \begin{pmatrix}v+1\\-v+1\end{pmatrix}$$
$$a_1 = \begin{pmatrix}-1\\v-1\end{pmatrix}$$
$$a_{11} = \begin{pmatrix}v\\0\end{pmatrix}$$
$$a_5 = \begin{pmatrix}1\\-v\end{pmatrix}$$
$$a_7 = \begin{pmatrix}1\\0\end{pmatrix}$$
$$a_6 = \begin{pmatrix}1\\-v+1\end{pmatrix}$$
$$a_2 = \begin{pmatrix}0\\-1\end{pmatrix}$$

(ii) Obstruction class $= 1$

(iii) Cusp Shapes $= 3$

(iv) u-Polynomials at the component

Crossings	u-Polynomials at each crossing
c_1, c_2, c_{10} c_{12}	$(u-1)^2$
c_3, c_4, c_6 c_9	u^2+u+1
c_5	$(u+1)^2$
c_7, c_8, c_{11}	u^2

(v) Riley Polynomials at the component

Crossings	Riley Polynomials at each crossing
c_1, c_2, c_5 c_{10}, c_{12}	$(y-1)^2$
c_3, c_4, c_6 c_9	y^2+y+1
c_7, c_8, c_{11}	y^2

(vi) Complex Volumes and Cusp Shapes

Solutions to I_1^v	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$v = 0.500000 + 0.866025I$ $a = 0$ $b = -0.500000 - 0.866025I$	0	3.00000
$v = 0.500000 - 0.866025I$ $a = 0$ $b = -0.500000 + 0.866025I$	0	3.00000

V. u-Polynomials

Crossings	u-Polynomials at each crossing
c_1	$(u-1)^2(u+9)^2$ $\cdot(u^8-10u^7+39u^6-81u^5+117u^4-122u^3+63u^2-11u+1)$ $\cdot(u^9+6u^8+\cdots+1105u+16)$
c_2	$((u-3)^2)(u-1)^2(u^8+4u^7+\cdots+5u+1)$ $\cdot(u^9+6u^8+15u^7+19u^6+39u^5+96u^4+137u^3+93u^2+19u-4)$
c_3, c_6	$(u^2-3u+7)(u^2+u+1)(u^8+2u^7+\cdots+4u+1)$ $\cdot(u^9-u^8+6u^7+6u^6+39u^5+60u^4+40u^3+13u^2+u-1)$
c_4, c_9	$(u^2-u+5)(u^2+u+1)(u^8+7u^6+10u^4-5u^3-u^2-2u-1)$ $\cdot(u^9+u^8+7u^7+9u^6+14u^5+11u^4+8u^3+u^2-u-1)$
c_5	$((u-3)^2)(u+1)^2(u^8-4u^7+\cdots-5u+1)$ $\cdot(u^9+6u^8+15u^7+19u^6+39u^5+96u^4+137u^3+93u^2+19u-4)$
c_7, c_8	$u^2(u+2)^2(u^8-3u^7+u^6+7u^5-9u^4-3u^3+10u^2-2u-3)$ $\cdot(u^9-5u^8+7u^7+3u^6-7u^5-17u^4+32u^3-18u^2+7u-2)$
c_{10}, c_{12}	$((u-1)^2)(u^2-4u+23)(u^8+u^7+\cdots+5u-1)$ $\cdot(u^9+6u^8+14u^7-5u^6+66u^5-202u^4+132u^3+u^2-10u-1)$
c_{11}	$u^2(u+2)^2(u^8+3u^7+u^6-7u^5-9u^4+3u^3+10u^2+2u-3)$ $\cdot(u^9-5u^8+7u^7+3u^6-7u^5-17u^4+32u^3-18u^2+7u-2)$

VI. Riley Polynomials

Crossings	Riley Polynomials at each crossing
c_1	$(y-81)^2(y-1)^2$ $\cdot\,(y^8-22y^7+135y^6+251y^5-1379y^4-1846y^3+1519y^2+5y+1)$ $\cdot\,(y^9+114y^8+\cdots+1135425y-256)$
c_2, c_5	$(y-9)^2(y-1)^2$ $\cdot\,(y^8-10y^7+39y^6-81y^5+117y^4-122y^3+63y^2-11y+1)$ $\cdot\,(y^9-6y^8+\cdots+1105y-16)$
c_3, c_6	$(y^2+y+1)(y^2+5y+49)$ $\cdot\,(y^8-4y^7+2y^6+14y^5-17y^4-11y^3+27y^2-10y+1)$ $\cdot\,(y^9+11y^8+\cdots+27y-1)$
c_4, c_9	$(y^2+y+1)(y^2+9y+25)$ $\cdot\,(y^8+14y^7+69y^6+138y^5+84y^4-59y^3-39y^2-2y+1)$ $\cdot\,(y^9+13y^8+59y^7+109y^6+106y^5+73y^4+32y^3+5y^2+3y-1)$
c_7, c_8, c_{11}	$y^2(y-4)^2$ $\cdot\,(y^8-7y^7+25y^6-65y^5+125y^4-167y^3+142y^2-64y+9)$ $\cdot\,(y^9-11y^8+\cdots-23y-4)$
c_{10}, c_{12}	$(y-1)^2(y^2+30y+529)$ $\cdot\,(y^8+5y^7-7y^6-68y^5-48y^4+34y^3+16y^2-9y+1)$ $\cdot\,(y^9-8y^8+\cdots+102y-1)$