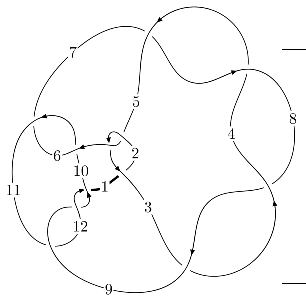
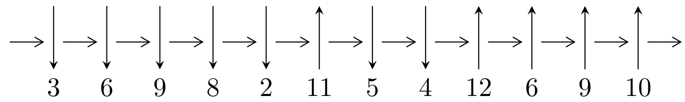
$12n_{0456}$ $(K12n_{0456})$



A knot diagram[1]

Linearized knot diagam



Solving Sequence

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

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

$$
\begin{aligned}
I_1^u = \langle & 6263646729160u^{18} + 14140809413971u^{17} + \cdots + 891009803400036b - 30737815843748, \\
& 18590835030469u^{18} + 42781634933956u^{17} + \cdots + 89100980340036a + 3563580716326, \\
& u^{19} + 2u^{18} + \cdots - 4u + 4\rangle \\
I_2^u = \langle & -2u^4 + 3u^3 - 8u^2 + 3b + 7u - 5,\ -2u^4 + 3u^3 - 8u^2 + 3a + 7u - 5,\ u^5 - u^4 + 4u^3 - 3u^2 + 3u - 1\rangle \\
I_3^u = \langle & au + 3b - 4a - 2u - 1,\ 2a^2 + 3au - 2a + u - 3,\ u^2 + 2\rangle
\end{aligned}
$$

$$I_1^v = \langle a,\ b - v + 2,\ v^2 - 3v + 1\rangle$$

* 4 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.

$\boldsymbol{I_1^u = \langle 6.26\times10^{12}u^{18} + 1.41\times10^{13}u^{17} + \cdots + 8.91\times10^{13}b - 3.07\times10^{13},\ 1.86\times10^{13}u^{18} + 4.28\times10^{13}u^{17} + \cdots + 8.91\times10^{13}a + 3.56\times10^{12},\ u^{19} + 2u^{18} + \cdots - 4u + 4\rangle}$

(i) Arc colorings

$$a_5 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_8 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_4 = \begin{pmatrix} 1 \\ -u^2 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} -u \\ u^3 + u \end{pmatrix}$$
$$a_{11} = \begin{pmatrix} -0.208649u^{18} - 0.480148u^{17} + \cdots + 3.87234u - 0.0399949 \\ -0.0702983u^{18} - 0.158705u^{17} + \cdots + 2.22000u + 0.344977 \end{pmatrix}$$
$$a_{12} = \begin{pmatrix} -0.244992u^{18} - 0.555084u^{17} + \cdots + 4.64401u + 0.313303 \\ -0.0108279u^{18} - 0.00284769u^{17} + \cdots + 1.31196u - 0.0173194 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} u^2 + 1 \\ -u^4 - 2u^2 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} u \\ u \end{pmatrix}$$
$$a_6 = \begin{pmatrix} -0.224318u^{18} - 0.601824u^{17} + \cdots + 0.750211u + 2.25690 \\ 0.0287859u^{18} + 0.0720971u^{17} + \cdots + 0.834764u + 0.0468869 \end{pmatrix}$$
$$a_2 = \begin{pmatrix} -0.274839u^{18} - 0.716004u^{17} + \cdots + 1.86949u + 2.91655 \\ 0.135398u^{18} + 0.314325u^{17} + \cdots - 1.55333u - 1.32495 \end{pmatrix}$$
$$a_1 = \begin{pmatrix} -0.328521u^{18} - 0.867710u^{17} + \cdots + 1.09177u + 2.92776 \\ 0.181013u^{18} + 0.450207u^{17} + \cdots - 1.64773u - 1.56042 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} 0.265765u^{18} + 0.718930u^{17} + \cdots + 0.293501u - 3.20338 \\ -0.180775u^{18} - 0.461139u^{17} + \cdots + 2.62586u + 1.11854 \end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes
$= \frac{71570433112501}{66825735255027}u^{18} + \frac{150381276390913}{66825735255027}u^{17} + \cdots - \frac{2412887014500530}{66825735255027}u - \frac{508458695878388}{66825735255027}$

(iv) u-Polynomials at the component

Crossings	u-Polynomials at each crossing
c_1	$u^{19} + 26u^{18} + \cdots + 17485u + 361$
c_2, c_5	$u^{19} + 4u^{18} + \cdots - 105u - 19$
c_3, c_4, c_7 c_8	$u^{19} - 2u^{18} + \cdots - 4u - 4$
c_6, c_{10}	$u^{19} + 2u^{18} + \cdots - 384u - 288$
c_9, c_{11}, c_{12}	$u^{19} + 9u^{18} + \cdots - 48u + 9$

(v) Riley Polynomials at the component

Crossings	Riley Polynomials at each crossing
c_1	$y^{19} - 58y^{18} + \cdots + 218537949y - 130321$
c_2, c_5	$y^{19} - 26y^{18} + \cdots + 17485y - 361$
c_3, c_4, c_7 c_8	$y^{19} + 16y^{18} + \cdots + 336y - 16$
c_6, c_{10}	$y^{19} + 24y^{18} + \cdots + 1101312y - 82944$
c_9, c_{11}, c_{12}	$y^{19} - 5y^{18} + \cdots + 3042y - 81$

(vi) Complex Volumes and Cusp Shapes

Solutions to I_1^u	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.074260 + 0.917453I$ $a = -0.994466 - 0.538689I$ $b = -0.317235 + 0.013665I$	$1.53865 - 1.34534I$	$0.43995 + 3.44940I$
$u = -0.074260 - 0.917453I$ $a = -0.994466 + 0.538689I$ $b = -0.317235 - 0.013665I$	$1.53865 + 1.34534I$	$0.43995 - 3.44940I$
$u = 0.682490 + 0.464817I$ $a = -0.506827 + 0.094261I$ $b = 0.670269 - 1.079920I$	$-1.35153 - 0.43293I$	$-1.33817 + 2.53322I$
$u = 0.682490 - 0.464817I$ $a = -0.506827 - 0.094261I$ $b = 0.670269 + 1.079920I$	$-1.35153 + 0.43293I$	$-1.33817 - 2.53322I$
$u = 0.017361 + 1.304010I$ $a = 1.72921 - 0.99084I$ $b = 1.41667 - 1.52874I$	$4.96292 + 0.91602I$	$7.77670 - 1.28958I$
$u = 0.017361 - 1.304010I$ $a = 1.72921 + 0.99084I$ $b = 1.41667 + 1.52874I$	$4.96292 - 0.91602I$	$7.77670 + 1.28958I$
$u = -1.302620 + 0.369270I$ $a = 0.245431 - 0.163795I$ $b = 0.25437 + 1.92922I$	$-11.99340 + 5.23790I$	$-1.08128 - 2.47083I$
$u = -1.302620 - 0.369270I$ $a = 0.245431 + 0.163795I$ $b = 0.25437 - 1.92922I$	$-11.99340 - 5.23790I$	$-1.08128 + 2.47083I$
$u = 0.537549$ $a = -2.91204$ $b = 0.537401$	6.81454	-5.63570
$u = 0.58466 + 1.34467I$ $a = 0.940809 - 0.609725I$ $b = -0.099480 - 1.008040I$	$1.61779 - 4.70658I$	$1.34919 + 3.92901I$

Solutions to I_1^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 0.58466 - 1.34467I$ $a = 0.940809 + 0.609725I$ $b = -0.099480 + 1.008040I$	$1.61779 + 4.70658I$	$1.34919 - 3.92901I$
$u = -0.88316 + 1.34583I$ $a = 0.905620 + 0.537079I$ $b = -0.13821 + 1.90748I$	$-9.13960 + 2.40553I$	$-0.343243 - 1.215158I$
$u = -0.88316 - 1.34583I$ $a = 0.905620 - 0.537079I$ $b = -0.13821 - 1.90748I$	$-9.13960 - 2.40553I$	$-0.343243 + 1.215158I$
$u = 0.360199$ $a = -0.304748$ $b = 0.772322$	-1.03641	-12.4460
$u = 0.13765 + 1.63790I$ $a = -0.009641 - 0.326348I$ $b = -0.387996 + 0.243197I$	$13.18610 - 2.66860I$	$6.26035 - 0.13482I$
$u = 0.13765 - 1.63790I$ $a = -0.009641 + 0.326348I$ $b = -0.387996 - 0.243197I$	$13.18610 + 2.66860I$	$6.26035 + 0.13482I$
$u = -0.47543 + 1.60768I$ $a = -1.18254 - 0.93225I$ $b = -0.40816 - 2.02733I$	$-5.61029 + 11.60150I$	$1.76287 - 4.79752I$
$u = -0.47543 - 1.60768I$ $a = -1.18254 + 0.93225I$ $b = -0.40816 + 2.02733I$	$-5.61029 - 11.60150I$	$1.76287 + 4.79752I$
$u = -0.271135$ $a = -2.37175$ $b = -0.623508$	1.22081	10.2060

II. $\boldsymbol{I^u_2 = \langle -2u^4 + 3u^3 - 8u^2 + 3b + 7u - 5,\ -2u^4 + 3u^3 - 8u^2 + 3a + 7u - 5,\ u^5 - u^4 + 4u^3 - 3u^2 + 3u - 1\rangle}$

(i) Arc colorings

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

(ii) Obstruction class $= 1$

(iii) Cusp Shapes $= -\frac{58}{9}u^4 + \frac{13}{3}u^3 - \frac{211}{9}u^2 + \frac{128}{9}u - \frac{115}{9}$

(iv) u-Polynomials at the component

Crossings	u-Polynomials at each crossing
c_1, c_3, c_4	$u^5 - u^4 + 4u^3 - 3u^2 + 3u - 1$
c_2	$u^5 - u^4 + u^2 + u - 1$
c_5	$u^5 + u^4 - u^2 + u + 1$
c_6, c_{10}	u^5
c_7, c_8	$u^5 + u^4 + 4u^3 + 3u^2 + 3u + 1$
c_9	$(u + 1)^5$
c_{11}, c_{12}	$(u - 1)^5$

(v) Riley Polynomials at the component

Crossings	Riley Polynomials at each crossing
c_1, c_3, c_4 c_7, c_8	$y^5 + 7y^4 + 16y^3 + 13y^2 + 3y - 1$
c_2, c_5	$y^5 - y^4 + 4y^3 - 3y^2 + 3y - 1$
c_6, c_{10}	y^5
c_9, c_{11}, c_{12}	$(y-1)^5$

(vi) Complex Volumes and Cusp Shapes

Solutions to I_2^u	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 0.233677 + 0.885557I$ $a = -0.046507 - 0.815869I$ $b = -0.046507 - 0.815869I$	$3.46474 - 2.21397I$	$2.99716 + 4.40290I$
$u = 0.233677 - 0.885557I$ $a = -0.046507 + 0.815869I$ $b = -0.046507 + 0.815869I$	$3.46474 + 2.21397I$	$2.99716 - 4.40290I$
$u = 0.416284$ $a = 1.10533$ $b = 1.10533$	0.762751	-10.8010
$u = 0.05818 + 1.69128I$ $a = -0.172825 + 0.649395I$ $b = -0.172825 + 0.649395I$	$12.60320 - 3.33174I$	$0.51443 + 5.79761I$
$u = 0.05818 - 1.69128I$ $a = -0.172825 - 0.649395I$ $b = -0.172825 - 0.649395I$	$12.60320 + 3.33174I$	$0.51443 - 5.79761I$

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

(i) Arc colorings

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

(ii) Obstruction class $= 1$

(iii) Cusp Shapes $= 4$

(iv) u-Polynomials at the component

Crossings	u-Polynomials at each crossing
c_1, c_5	$(u-1)^4$
c_2	$(u+1)^4$
c_3, c_4, c_7 c_8	$(u^2+2)^2$
c_6, c_{11}, c_{12}	$(u^2+u-1)^2$
c_9, c_{10}	$(u^2-u-1)^2$

(v) Riley Polynomials at the component

Crossings	Riley Polynomials at each crossing
c_1, c_2, c_5	$(y-1)^4$
c_3, c_4, c_7 c_8	$(y+2)^4$
c_6, c_9, c_{10} c_{11}, c_{12}	$(y^2-3y+1)^2$

(vi) Complex Volumes and Cusp Shapes

Solutions to I_3^u	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 1.414210I$ $a = -0.618034 - 0.270091I$ $b = -0.618034 + 0.874032I$	12.1725	4.00000
$u = 1.414210I$ $a = 1.61803 - 1.85123I$ $b = 1.61803 - 2.28825I$	4.27683	4.00000
$u = -1.414210I$ $a = -0.618034 + 0.270091I$ $b = -0.618034 - 0.874032I$	12.1725	4.00000
$u = -1.414210I$ $a = 1.61803 + 1.85123I$ $b = 1.61803 + 2.28825I$	4.27683	4.00000

IV. $I_1^v = \langle a,\ b - v + 2,\ v^2 - 3v + 1\rangle$

(i) Arc colorings

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

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

$$a_4 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

$$a_9 = \begin{pmatrix} v \\ 0 \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} 0 \\ v - 2 \end{pmatrix}$$

$$a_{12} = \begin{pmatrix} 2v - 1 \\ v - 2 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

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

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

$$a_2 = \begin{pmatrix} -v + 1 \\ -1 \end{pmatrix}$$

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

$$a_{10} = \begin{pmatrix} -2v + 1 \\ -1 \end{pmatrix}$$

(ii) Obstruction class $= 1$

(iii) Cusp Shapes $= 14$

(iv) u-Polynomials at the component

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

(v) Riley Polynomials at the component

Crossings	Riley Polynomials at each crossing
c_1, c_2, c_5	$(y-1)^2$
c_3, c_4, c_7 c_8	y^2
c_6, c_9, c_{10} c_{11}, c_{12}	$y^2 - 3y + 1$

(vi) Complex Volumes and Cusp Shapes

Solutions to I_1^v	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$v = 0.381966$ $a = 0$ $b = -1.61803$	-0.657974	14.0000
$v = 2.61803$ $a = 0$ $b = 0.618034$	7.23771	14.0000

V. u-Polynomials

Crossings	u-Polynomials at each crossing
c_1	$(u-1)^6(u^5-u^4+4u^3-3u^2+3u-1)$ $\cdot(u^{19}+26u^{18}+\cdots+17485u+361)$
c_2	$((u-1)^2)(u+1)^4(u^5-u^4+\cdots+u-1)(u^{19}+4u^{18}+\cdots-105u-19)$
c_3, c_4	$u^2(u^2+2)^2(u^5-u^4+\cdots+3u-1)(u^{19}-2u^{18}+\cdots-4u-4)$
c_5	$((u-1)^4)(u+1)^2(u^5+u^4+\cdots+u+1)(u^{19}+4u^{18}+\cdots-105u-19)$
c_6	$u^5(u^2-u-1)(u^2+u-1)^2(u^{19}+2u^{18}+\cdots-384u-288)$
c_7, c_8	$u^2(u^2+2)^2(u^5+u^4+\cdots+3u+1)(u^{19}-2u^{18}+\cdots-4u-4)$
c_9	$((u+1)^5)(u^2-u-1)^3(u^{19}+9u^{18}+\cdots-48u+9)$
c_{10}	$u^5(u^2-u-1)^2(u^2+u-1)(u^{19}+2u^{18}+\cdots-384u-288)$
c_{11}, c_{12}	$((u-1)^5)(u^2+u-1)^3(u^{19}+9u^{18}+\cdots-48u+9)$

VI. Riley Polynomials

Crossings	Riley Polynomials at each crossing
c_1	$(y-1)^6(y^5+7y^4+16y^3+13y^2+3y-1)$ $\cdot(y^{19}-58y^{18}+\cdots+218537949y-130321)$
c_2, c_5	$(y-1)^6(y^5-y^4+4y^3-3y^2+3y-1)$ $\cdot(y^{19}-26y^{18}+\cdots+17485y-361)$
c_3, c_4, c_7 c_8	$y^2(y+2)^4(y^5+7y^4+16y^3+13y^2+3y-1)$ $\cdot(y^{19}+16y^{18}+\cdots+336y-16)$
c_6, c_{10}	$y^5(y^2-3y+1)^3(y^{19}+24y^{18}+\cdots+1101312y-82944)$
c_9, c_{11}, c_{12}	$((y-1)^5)(y^2-3y+1)^3(y^{19}-5y^{18}+\cdots+3042y-81)$