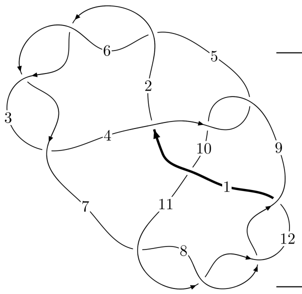
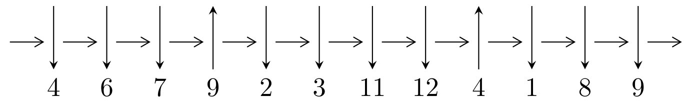
$12n_{0722}$ ($K12n_{0722}$)



A knot diagram[1]

Linearized knot diagam



Solving Sequence

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

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

$$\begin{aligned}
I_1^u &= \langle -u^6 + 3u^4 - u^3 - u^2 + b + 2u + 1,\ -u^6 + 3u^4 - u^3 - u^2 + a + 2u, \\
&\quad u^9 + u^8 - 5u^7 - 4u^6 + 8u^5 + 3u^4 - 5u^3 + 2u^2 + 3u + 1\rangle \\
I_2^u &= \langle 4u^{21} + 3u^{20} + \cdots + b - 8u,\ u^{21} - 2u^{20} + \cdots + a + 6,\ u^{22} + 2u^{21} + \cdots - 5u + 1\rangle \\
I_3^u &= \langle b - 2u - 2,\ a - 2u - 1,\ u^2 - u - 1\rangle \\
I_4^u &= \langle b + 2,\ a + u,\ u^2 - u - 1\rangle
\end{aligned}$$

* 4 irreducible components of $\dim_{\mathbb{C}} = 0$, with total 35 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. $\boldsymbol{I_1^u =}$
$\boldsymbol{\langle -u^6+3u^4-u^3-u^2+b+2u+1,\ -u^6+3u^4-u^3-u^2+a+2u,\ u^9+u^8+\cdots+3u+1\rangle}$

(i) Arc colorings

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

(ii) Obstruction class $= -1$

(iii) Cusp Shapes $= -4u^8 - 2u^7 + 24u^6 + 6u^5 - 46u^4 + 4u^3 + 28u^2 - 18u - 18$

(iv) u-Polynomials at the component

Crossings	u-Polynomials at each crossing
c_1, c_{10}	$u^9 - u^8 + 7u^7 - 2u^6 + 16u^5 + 3u^4 + 9u^3 + 10u^2 + 3u + 1$
c_2, c_3, c_5 c_6, c_7, c_8 c_{11}, c_{12}	$u^9 + u^8 - 5u^7 - 4u^6 + 8u^5 + 3u^4 - 5u^3 + 2u^2 + 3u + 1$
c_4, c_9	$u^9 + 5u^8 + 10u^7 + 9u^6 - u^5 - 15u^4 - 22u^3 - 16u^2 - 8u - 4$

(v) Riley Polynomials at the component

Crossings	Riley Polynomials at each crossing
c_1, c_{10}	$y^9 + 13y^8 + \cdots - 11y - 1$
c_2, c_3, c_5 c_6, c_7, c_8 c_{11}, c_{12}	$y^9 - 11y^8 + 49y^7 - 112y^6 + 140y^5 - 105y^4 + 69y^3 - 40y^2 + 5y - 1$
c_4, c_9	$y^9 - 5y^8 + 8y^7 + 5y^6 - 25y^5 - 13y^4 + 92y^3 - 24y^2 - 64y - 16$

(vi) Complex Volumes and Cusp Shapes

Solutions to I_1^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 0.556651 + 0.655843I$ $a = -0.0328003 - 0.0846569I$ $b = -1.032800 - 0.084657I$	$4.56735 - 4.47297I$	$-7.81258 + 6.23831I$
$u = 0.556651 - 0.655843I$ $a = -0.0328003 + 0.0846569I$ $b = -1.032800 + 0.084657I$	$4.56735 + 4.47297I$	$-7.81258 - 6.23831I$
$u = -1.28665$ $a = -1.58604$ $b = -2.58604$	-6.48693	-13.7120
$u = 1.51165 + 0.13243I$ $a = -1.75672 + 1.70564I$ $b = -2.75672 + 1.70564I$	$-13.17090 - 3.99995I$	$-16.3846 + 2.3960I$
$u = 1.51165 - 0.13243I$ $a = -1.75672 - 1.70564I$ $b = -2.75672 - 1.70564I$	$-13.17090 + 3.99995I$	$-16.3846 - 2.3960I$
$u = -0.338768 + 0.252040I$ $a = 0.829715 - 0.547946I$ $b = -0.170285 - 0.547946I$	$-0.531790 + 0.852880I$	$-9.17076 - 8.14648I$
$u = -0.338768 - 0.252040I$ $a = 0.829715 + 0.547946I$ $b = -0.170285 + 0.547946I$	$-0.531790 - 0.852880I$	$-9.17076 + 8.14648I$
$u = -1.58621 + 0.20573I$ $a = -3.24718 - 1.53651I$ $b = -4.24718 - 1.53651I$	$-9.8278 + 10.8008I$	$-14.7759 - 5.3771I$
$u = -1.58621 - 0.20573I$ $a = -3.24718 + 1.53651I$ $b = -4.24718 + 1.53651I$	$-9.8278 - 10.8008I$	$-14.7759 + 5.3771I$

II.

$\boldsymbol{I_2^u = \langle 4u^{21}+3u^{20}+\cdots+b-8u,\ u^{21}-2u^{20}+\cdots+a+6,\ u^{22}+2u^{21}+\cdots-5u+1\rangle}$

(i) Arc colorings

$$a_8 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_{11} = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_{12} = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} -u \\ -u^3 + u \end{pmatrix}$$
$$a_1 = \begin{pmatrix} -u^2 + 1 \\ -u^4 + 2u^2 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} -u^{21} + 2u^{20} + \cdots + 13u - 6 \\ -4u^{21} - 3u^{20} + \cdots - 16u^2 + 8u \end{pmatrix}$$
$$a_7 = \begin{pmatrix} u \\ u \end{pmatrix}$$
$$a_4 = \begin{pmatrix} 2u^{21} + 4u^{20} + \cdots + 5u - 5 \\ -u^{21} - u^{20} + \cdots - 8u^2 + 1 \end{pmatrix}$$
$$a_5 = \begin{pmatrix} 3u^{20} + 3u^{19} + \cdots + 15u - 7 \\ -3u^{21} - 3u^{20} + \cdots - 15u^2 + 7u \end{pmatrix}$$
$$a_6 = \begin{pmatrix} -u^{21} + 11u^{19} + \cdots - 17u^3 + 9u \\ -2u^{21} - 2u^{20} + \cdots - 11u^2 + 2u \end{pmatrix}$$
$$a_2 = \begin{pmatrix} -u^{20} - u^{19} + \cdots - 7u + 1 \\ u^{21} + u^{20} + \cdots + 6u^3 + 8u^2 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} -u^6 + 3u^4 - 2u^2 + 1 \\ -u^8 + 4u^6 - 4u^4 \end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes
$= 3u^{20} + 3u^{19} - 32u^{18} - 27u^{17} + 138u^{16} + 81u^{15} - 317u^{14} - 62u^{13} + 439u^{12} - 123u^{11} - 384u^{10} + 246u^9 + 177u^8 - 178u^7 - 27u^6 + 115u^5 + 25u^4 - 37u^3 + 20u^2 + 18u - 11$

(iv) u-Polynomials at the component

Crossings	u-Polynomials at each crossing
c_1, c_{10}	$u^{22} - 4u^{21} + \cdots - 11u - 1$
c_2, c_3, c_5 c_6, c_7, c_8 c_{11}, c_{12}	$u^{22} + 2u^{21} + \cdots - 5u + 1$
c_4, c_9	$(u^{11} - 2u^{10} - 3u^9 + 8u^8 - 8u^6 + 9u^5 - 8u^4 - 7u^3 + 12u^2 + u - 2)^2$

(v) Riley Polynomials at the component

Crossings	Riley Polynomials at each crossing
c_1, c_{10}	$y^{22} + 12y^{21} + \cdots - 103y + 1$
c_2, c_3, c_5 c_6, c_7, c_8 c_{11}, c_{12}	$y^{22} - 24y^{21} + \cdots - 27y + 1$
c_4, c_9	$(y^{11} - 10y^{10} + \cdots + 49y - 4)^2$

(vi) Complex Volumes and Cusp Shapes

Solutions to I_2^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u = 0.653871 + 0.639377I$ $a = 0.678912 + 0.802720I$ $b = 2.04567 - 0.21056I$	$-2.35449 - 7.64539I$	$-11.71373 + 6.03391I$
$u = 0.653871 - 0.639377I$ $a = 0.678912 - 0.802720I$ $b = 2.04567 + 0.21056I$	$-2.35449 + 7.64539I$	$-11.71373 - 6.03391I$
$u = 0.452757 + 0.672728I$ $a = -0.132038 - 0.926413I$ $b = 0.244470$	4.87434	$-6.59077 + 0.I$
$u = 0.452757 - 0.672728I$ $a = -0.132038 + 0.926413I$ $b = 0.244470$	4.87434	$-6.59077 + 0.I$
$u = 0.326778 + 0.705531I$ $a = -0.32042 + 2.18575I$ $b = 0.242416 + 0.347557I$	$-1.39120 + 3.13582I$	$-9.76425 - 0.75545I$
$u = 0.326778 - 0.705531I$ $a = -0.32042 - 2.18575I$ $b = 0.242416 - 0.347557I$	$-1.39120 - 3.13582I$	$-9.76425 + 0.75545I$
$u = -0.715155$ $a = 0.362929$ $b = 0.686958$	-1.26486	-6.07510
$u = -1.300610 + 0.077299I$ $a = -1.58364 + 0.11845I$ $b = -2.57660$	-6.48450	$-13.63121 + 0.I$
$u = -1.300610 - 0.077299I$ $a = -1.58364 - 0.11845I$ $b = -2.57660$	-6.48450	$-13.63121 + 0.I$
$u = -0.472498 + 0.509885I$ $a = -0.670269 - 0.742959I$ $b = 0.829406 + 0.775983I$	$-6.60747 + 1.76997I$	$-13.10604 - 3.70025I$

Solutions to I_2^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u = -0.472498 - 0.509885I$ $a = -0.670269 + 0.742959I$ $b = 0.829406 - 0.775983I$	$-6.60747 - 1.76997I$	$-13.10604 + 3.70025I$
$u = 1.48308 + 0.04696I$ $a = 0.500256 - 1.109360I$ $b = 0.829406 - 0.775983I$	$-6.60747 - 1.76997I$	$-13.10604 + 3.70025I$
$u = 1.48308 - 0.04696I$ $a = 0.500256 + 1.109360I$ $b = 0.829406 + 0.775983I$	$-6.60747 + 1.76997I$	$-13.10604 - 3.70025I$
$u = -1.48082 + 0.20358I$ $a = 0.090121 - 0.149824I$ $b = 0.242416 + 0.347557I$	$-1.39120 + 3.13582I$	$-9.76425 - 0.75545I$
$u = -1.48082 - 0.20358I$ $a = 0.090121 + 0.149824I$ $b = 0.242416 - 0.347557I$	$-1.39120 - 3.13582I$	$-9.76425 + 0.75545I$
$u = -1.52066$ $a = 4.11109$ $b = 5.21838$	-16.2219	-13.6940
$u = -1.54155 + 0.21133I$ $a = 1.57352 + 0.56059I$ $b = 2.04567 + 0.21056I$	$-2.35449 + 7.64539I$	$-11.71373 - 6.03391I$
$u = -1.54155 - 0.21133I$ $a = 1.57352 - 0.56059I$ $b = 2.04567 - 0.21056I$	$-2.35449 - 7.64539I$	$-11.71373 + 6.03391I$
$u = 0.443905$ $a = 1.87359$ $b = -1.80820$	-9.54474	0.158940
$u = 1.63437$ $a = -1.53660$ $b = -1.80820$	-9.54474	0.158940

Solutions to I_2^u	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 1.68381$ $a = 4.31528$ $b = 5.21838$	-16.2219	-13.6940
$u = 0.231731$ $a = -2.39918$ $b = 0.686958$	-1.26486	-6.07510

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

(i) Arc colorings

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

(ii) Obstruction class $= 1$

(iii) Cusp Shapes $= -20$

(iv) u-Polynomials at the component

Crossings	u-Polynomials at each crossing
c_1, c_2, c_3 c_7, c_8, c_{10}	$u^2 + u - 1$
c_4, c_9	u^2
c_5, c_6, 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_3 c_5, c_6, c_7 c_8, c_{10}, c_{11} c_{12}	$y^2 - 3y + 1$
c_4, c_9	y^2

(vi) Complex Volumes and Cusp Shapes

Solutions to I_3^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u = -0.618034$ $a = -0.236068$ $b = 0.763932$	-1.97392	-20.0000
$u = 1.61803$ $a = 4.23607$ $b = 5.23607$	-17.7653	-20.0000

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

(i) Arc colorings

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

$$a_{11} = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

$$a_{12} = \begin{pmatrix} 1 \\ u+1 \end{pmatrix}$$

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

$$a_1 = \begin{pmatrix} -u \\ -u \end{pmatrix}$$

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

$$a_7 = \begin{pmatrix} u \\ u \end{pmatrix}$$

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

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

$$a_6 = \begin{pmatrix} u-1 \\ -u+2 \end{pmatrix}$$

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

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

(ii) Obstruction class $= 1$

(iii) Cusp Shapes $= -25$

(iv) u-Polynomials at the component

Crossings	u-Polynomials at each crossing
c_1, c_2, c_3 c_7, c_8, c_{10}	$u^2 + u - 1$
c_4, c_9	u^2
c_5, c_6, 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_3 c_5, c_6, c_7 c_8, c_{10}, c_{11} c_{12}	$y^2 - 3y + 1$
c_4, c_9	y^2

(vi) Complex Volumes and Cusp Shapes

Solutions to I_4^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.618034$ $a = \ \ 0.618034$ $b = -2.00000$	-9.86960	-25.0000
$u = \ \ 1.61803$ $a = -1.61803$ $b = -2.00000$	-9.86960	-25.0000

V. u-Polynomials

Crossings	u-Polynomials at each crossing
c_1, c_{10}	$((u^2+u-1)^2)(u^9-u^8+\cdots+3u+1)$ $\cdot(u^{22}-4u^{21}+\cdots-11u-1)$
c_2, c_3, c_7 c_8	$(u^2+u-1)^2(u^9+u^8-5u^7-4u^6+8u^5+3u^4-5u^3+2u^2+3u+1)$ $\cdot(u^{22}+2u^{21}+\cdots-5u+1)$
c_4, c_9	$u^4(u^9+5u^8+10u^7+9u^6-u^5-15u^4-22u^3-16u^2-8u-4)$ $\cdot(u^{11}-2u^{10}-3u^9+8u^8-8u^6+9u^5-8u^4-7u^3+12u^2+u-2)^2$
c_5, c_6, c_{11} c_{12}	$(u^2-u-1)^2(u^9+u^8-5u^7-4u^6+8u^5+3u^4-5u^3+2u^2+3u+1)$ $\cdot(u^{22}+2u^{21}+\cdots-5u+1)$

VI. Riley Polynomials

Crossings	Riley Polynomials at each crossing
c_1, c_{10}	$((y^2-3y+1)^2)(y^9+13y^8+\cdots-11y-1)$ $\cdot(y^{22}+12y^{21}+\cdots-103y+1)$
c_2, c_3, c_5 c_6, c_7, c_8 c_{11}, c_{12}	$(y^2-3y+1)^2$ $\cdot(y^9-11y^8+49y^7-112y^6+140y^5-105y^4+69y^3-40y^2+5y-1)$ $\cdot(y^{22}-24y^{21}+\cdots-27y+1)$
c_4, c_9	$y^4(y^9-5y^8+8y^7+5y^6-25y^5-13y^4+92y^3-24y^2-64y-16)$ $\cdot(y^{11}-10y^{10}+\cdots+49y-4)^2$