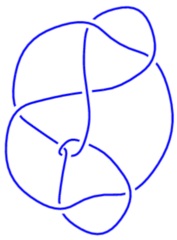
9_{44} ($K9n_1$)



[1]

Arc Sequences

$$\to \underset{6}{\uparrow} \to \underset{9}{\uparrow} \to \underset{1}{\downarrow} \to \underset{7}{\downarrow} \to \underset{1}{\uparrow} \to \underset{8}{\downarrow} \to \underset{5}{\downarrow} \to \underset{3}{\uparrow} \to \underset{8}{\downarrow} \to$$

Solving Sequence

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

Representation Ideals

$$I = \bigcap_{i=1}^{2} I_i^u$$

$$\begin{aligned}
I_1^u &= \langle b^2 - b + 1,\ b + a,\ u - 1 \rangle \\
I_2^u &= \langle u^{10} + 3u^9 + 4u^8 - u^7 - 6u^6 - 6u^5 + u^4 + 2u^3 + 3u^2 + 2u + 1, \\
&\quad - u^9 - 4u^8 - 6u^7 + u^6 + 11u^5 + 9u^4 - 4u^3 - 6u^2 + 2a - u - 3, \\
&\quad - u^9 - 6u^8 - 8u^7 + u^6 + 15u^5 + 9u^4 - 4u^3 - 6u^2 + 2b - 5u - 3 \rangle
\end{aligned}$$

There are 2 irreducible components with 12 representations.

[1]The knot diagram image is adapter from "C. Livingston and A. H. Moore, KnotInfo: Table of Knot Invariants, http://www.indiana.edu/ knotinfo"

I. $I^u_1 = \langle b^2 - b + 1,\ b + a,\ u - 1\rangle$

(i) Arc colorings

$$a_8 = \begin{pmatrix} 0 \\ 1 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} -b \\ b \end{pmatrix}$$
$$a_1 = \begin{pmatrix} -b \\ 0 \end{pmatrix}$$
$$a_5 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$
$$a_4 = \begin{pmatrix} 0 \\ -1 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} -b+1 \\ -1 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_2 = \begin{pmatrix} -b \\ 0 \end{pmatrix}$$
$$a_2 = \begin{pmatrix} -b \\ 0 \end{pmatrix}$$

(ii) Obstruction class $= 1$

(iii) Cusp Shapes $= 4b - 5$

(iv) Complex Volumes and Cusp Shapes

Solution to I_1^u	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 1.00000$ $a = -0.500000 + 0.866025I$ $b = 0.500000 - 0.866025I$	$-1.64493 + 2.02988I$	$-3.00000 - 3.46410I$
$u = 1.00000$ $a = -0.500000 - 0.866025I$ $b = 0.500000 + 0.866025I$	$-1.64493 - 2.02988I$	$-3.00000 + 3.46410I$

II.

$\boldsymbol{I^u_2 = \langle u^{10}+3u^9+\cdots+2u+1,\ -u^9-4u^8+\cdots+2a-3,\ -u^9-6u^8+\cdots+2b-3\rangle}$

(i) Arc colorings

$$a_8 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_9 = \begin{pmatrix} \frac{1}{2}u^9 + 2u^8 + \cdots + \frac{1}{2}u + \frac{3}{2} \\ \frac{1}{2}u^9 + 3u^8 + \cdots + \frac{5}{2}u + \frac{3}{2} \end{pmatrix}$$
$$a_1 = \begin{pmatrix} \frac{1}{2}u^9 + 2u^8 + \cdots + \frac{1}{2}u + \frac{3}{2} \\ u^8 + 2u^7 + u^6 - 3u^5 - 3u^4 + 2u^2 + u + 1 \end{pmatrix}$$
$$a_5 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} u \\ u \end{pmatrix}$$
$$a_4 = \begin{pmatrix} -u^2 + 1 \\ -u^2 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} \frac{1}{2}u^9 + u^8 + \cdots + \frac{5}{2}u + \frac{1}{2} \\ u^5 - u^3 - 2u^2 + u \end{pmatrix}$$
$$a_6 = \begin{pmatrix} u \\ -u^3 + u \end{pmatrix}$$
$$a_2 = \begin{pmatrix} \frac{3}{2}u^9 + 4u^8 + \cdots + \frac{3}{2}u + \frac{3}{2} \\ u^9 + u^8 + u^7 - 2u^6 - u^5 - 3u^4 + 2u^3 + 2u^2 + u \end{pmatrix}$$
$$a_2 = \begin{pmatrix} \frac{3}{2}u^9 + 4u^8 + \cdots + \frac{3}{2}u + \frac{3}{2} \\ u^9 + u^8 + u^7 - 2u^6 - u^5 - 3u^4 + 2u^3 + 2u^2 + u \end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes $= -3u^9 - 7u^8 - 5u^7 + 12u^6 + 15u^5 + 2u^4 - 16u^3 - 2u^2 - 5u$

(iv) Complex Volumes and Cusp Shapes

Solution to I_2^u	$\sqrt{-1}(\text{vol}+\sqrt{-1}CS)$	Cusp shape
$u=-1.12142-1.03617I$ $a=\ 0.932766+0.782391I$ $b=\ 3.52866-2.77938I$	$9.39914-7.40677I$	$0.74326+4.41038I$
$u=-1.12142+1.03617I$ $a=\ 0.932766-0.782391I$ $b=\ 3.52866+2.77938I$	$9.39914+7.40677I$	$0.74326-4.41038I$
$u=-0.98889-1.13481I$ $a=-0.947158-0.665874I$ $b=-3.75699+2.10557I$	$9.86147-0.50253I$	$1.49701-0.08773I$
$u=-0.98889+1.13481I$ $a=-0.947158+0.665874I$ $b=-3.75699-2.10557I$	$9.86147+0.50253I$	$1.49701+0.08773I$
$u=-0.482659-0.410726I$ $a=\ 1.90368+0.22589I$ $b=\ 0.760492-0.647662I$	$-0.41291-2.81207I$	$0.88002+4.64391I$
$u=-0.482659+0.410726I$ $a=\ 1.90368-0.22589I$ $b=\ 0.760492+0.647662I$	$-0.41291+2.81207I$	$0.88002-4.64391I$
$u=\ 0.076965-0.657059I$ $a=-1.125839+0.300072I$ $b=-1.129985-0.735030I$	$1.14579+1.46073I$	$2.65931-3.28644I$
$u=\ 0.076965+0.657059I$ $a=-1.125839-0.300072I$ $b=-1.129985+0.735030I$	$1.14579-1.46073I$	$2.65931+3.28644I$
$u=\ 1.016004-0.211624I$ $a=-0.263447+0.177419I$ $b=\ 0.597827-0.812982I$	$-1.89922+0.79591I$	$-4.77960+0.81155I$
$u=\ 1.016004+0.211624I$ $a=-0.263447-0.177419I$ $b=\ 0.597827+0.812982I$	$-1.89922-0.79591I$	$-4.77960-0.81155I$

III. u-Polynomials

Crossings	u-Polynomials at each crossings
c_1, c_5	$u^2(u^{10}+u^9-7u^8-8u^7+13u^6+14u^5-2u^4+2u^3+13u^2+12u+4)$
c_2	$(u^2-u+1)(u^{10}+2u^9+3u^8+2u^7+4u^6+3u^5+3u^4+3u^2+u+1)$
c_3	$(u^2+u+1)(u^{10}+2u^9+\cdots-21u+17)$
c_4	$(u-1)^2(u^{10}+3u^9+4u^8-u^7-6u^6-6u^5+u^4+2u^3+3u^2+2u+1)$
c_6	$(u-1)^2$ $(u^{10}+u^9+10u^8+11u^7+26u^6+30u^5+u^4-14u^3+3u^2-2u+1)$
c_7	$(u+1)^2(u^{10}+3u^9+4u^8-u^7-6u^6-6u^5+u^4+2u^3+3u^2+2u+1)$
c_8	$(u^2+u+1)(u^{10}+2u^9+3u^8+2u^7+4u^6+3u^5+3u^4+3u^2+u+1)$
c_9	(u^2+u+1) $(u^{10}+2u^9+9u^8+14u^7+28u^6+31u^5+35u^4+20u^3+15u^2+5u+1)$

IV. Riley Polynomials

Crossings	Riley Polynomials at each crossings
c_1, c_5	$y^2(y^{10} - 15y^9 + \cdots - 40y + 16)$
c_2, c_8	$(y^2 + y + 1)$ $(y^{10} + 2y^9 + 9y^8 + 14y^7 + 28y^6 + 31y^5 + 35y^4 + 20y^3 + 15y^2 + 5y + 1)$
c_3	$(y^2 + y + 1)(y^{10} + 26y^9 + \cdots + 2925y + 289)$
c_4, c_7	$(y - 1)^2$ $(y^{10} - y^9 + 10y^8 - 11y^7 + 26y^6 - 30y^5 + y^4 + 14y^3 + 3y^2 + 2y + 1)$
c_6	$(y - 1)^2(y^{10} + 19y^9 + \cdots + 2y + 1)$
c_9	$(y^2 + y + 1)(y^{10} + 14y^9 + \cdots + 5y + 1)$