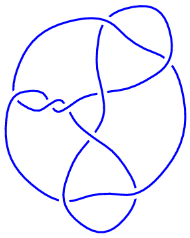
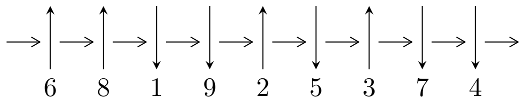
9_{37} $(K9a_{18})$



[1]

Arc Sequences



Solving Sequence

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

Representation Ideals

$$I = \bigcap_{i=1}^{6} I_i^u$$

$$I_1^u = \langle u^2 + 1,\ b + u,\ a - u - 1 \rangle$$
$$I_2^u = \langle u^4 - u^3 + 2u^2 - 2u + 1,\ -u^3 + b - u + 1,\ -u^3 + u^2 + a - 2u + 2 \rangle$$
$$I_3^u = \langle u^6 + u^4 + 2u^3 + u^2 + u + 2,\ -u^3 + b - 1,\ -u^5 - u^3 - 2u^2 + 2a - u - 1 \rangle$$
$$I_4^u = \langle u^8 - u^7 + 2u^6 - 2u^5 + 4u^4 - 3u^3 + 2u^2 + 1,\ b - u,\ u^7 + 2u^3 + u^2 + 2a - 3u + 1 \rangle$$
$$I_5^u = \langle u^2 + u + 1,\ a + 2,\ b - u \rangle$$
$$I_6^u = \langle b^4 - b^3 + 2b^2 - 2b + 1,\ -b^3 - b + a,\ -b^3 - b + u + 1 \rangle$$

There are 6 irreducible components with 26 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. $I_1^u = \langle u^2 + 1,\ b + u,\ a - u - 1 \rangle$

(i) Arc colorings

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

(ii) Obstruction class $= -1$

(iii) Cusp Shapes $= -4$

(iv) Complex Volumes and Cusp Shapes

Solution to I_1^u		$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u =$	$-1.00000I$		
$a =$	$1.00000 - 1.00000I$	-1.64493	-4.00000
$b =$	$1.00000I$		
$u =$	$1.00000I$		
$a =$	$1.00000 + 1.00000I$	-1.64493	-4.00000
$b =$	$-1.00000I$		

II. $\boldsymbol{I_2^u = \langle u^4 - u^3 + 2u^2 - 2u + 1,\ -u^3 + b - u + 1,\ -u^3 + u^2 + a - 2u + 2\rangle}$

(i) Arc colorings

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

(ii) Obstruction class $= -1$

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

(iv) Complex Volumes and Cusp Shapes

Solution to I_2^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.121744 - 1.306622I$ $a = 0.070696 - 0.758745I$ $b = -0.500000 + 0.866025I$	$-\,2.02988I$	$3.46410I$
$u = -0.121744 + 1.306622I$ $a = 0.070696 + 0.758745I$ $b = -0.500000 - 0.866025I$	$2.02988I$	$-\,3.46410I$
$u = 0.621744 - 0.440597I$ $a = -1.070696 - 0.758745I$ $b = -0.500000 - 0.866025I$	$2.02988I$	$-\,3.46410I$
$u = 0.621744 + 0.440597I$ $a = -1.070696 + 0.758745I$ $b = -0.500000 + 0.866025I$	$-\,2.02988I$	$3.46410I$

III.

$$\boldsymbol{I_3^u = \langle u^6 + u^4 + 2u^3 + u^2 + u + 2,\ -u^3 + b - 1,\ -u^5 - u^3 - 2u^2 + 2a - u - 1\rangle}$$

(i) Arc colorings

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

(ii) Obstruction class $= -1$

(iii) Cusp Shapes $= -4u^4 - 4u^3 - 8u - 6$

(iv) Complex Volumes and Cusp Shapes

Solution to I_3^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.931903 - 0.428993I$		
$a = 0.885437 - 0.407603I$	$6.15087 - 5.13794I$	$3.31793 + 3.20902I$
$b = 0.705204 - 1.038718I$		
$u = -0.931903 + 0.428993I$		
$a = 0.885437 + 0.407603I$	$6.15087 + 5.13794I$	$3.31793 - 3.20902I$
$b = 0.705204 + 1.038718I$		
$u = 0.226699 - 1.074326I$		
$a = -0.188043 - 0.891136I$	-4.07707	-8.63587
$b = 0.226699 + 1.074326I$		
$u = 0.226699 + 1.074326I$		
$a = -0.188043 + 0.891136I$	-4.07707	-8.63587
$b = 0.226699 - 1.074326I$		
$u = 0.705204 - 1.038718I$		
$a = -0.447394 - 0.658981I$	$6.15087 - 5.13794I$	$3.31793 + 3.20902I$
$b = -0.931903 - 0.428993I$		
$u = 0.705204 + 1.038718I$		
$a = -0.447394 + 0.658981I$	$6.15087 + 5.13794I$	$3.31793 - 3.20902I$
$b = -0.931903 + 0.428993I$		

IV.

$$\boldsymbol{I^u_4 = \langle u^8-u^7+2u^6-2u^5+4u^4-3u^3+2u^2+1,\ b-u,\ u^7+2u^3+u^2+2a-3u+1\rangle}$$

(i) Arc colorings

$$a_2 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

$$a_8 = \begin{pmatrix} -\frac{1}{2}u^7 - u^3 - \frac{1}{2}u^2 + \frac{3}{2}u - \frac{1}{2} \\ u \end{pmatrix}$$

$$a_3 = \begin{pmatrix} \frac{1}{2}u^7 - u^6 + \cdots + \frac{1}{2}u + \frac{1}{2} \\ -u^2 \end{pmatrix}$$

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

$$a_6 = \begin{pmatrix} u \\ u \end{pmatrix}$$

$$a_7 = \begin{pmatrix} u \\ u^3 + u \end{pmatrix}$$

$$a_9 = \begin{pmatrix} -\frac{1}{2}u^7 - \frac{1}{2}u^2 + \frac{3}{2}u - \frac{1}{2} \\ u^5 + u^3 + u \end{pmatrix}$$

$$a_1 = \begin{pmatrix} u^2 + 1 \\ u^2 \end{pmatrix}$$

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

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

(ii) Obstruction class $= -1$

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

(iv) Complex Volumes and Cusp Shapes

Solution to I_4^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.666851 - 1.155534I$ $a = -1.55320 + 0.75511I$ $b = -0.666851 - 1.155534I$	$3.94193 + 10.98945I$	$0.47099 - 7.14773I$
$u = -0.666851 + 1.155534I$ $a = -1.55320 - 0.75511I$ $b = -0.666851 + 1.155534I$	$3.94193 - 10.98945I$	$0.47099 + 7.14773I$
$u = -0.273948 - 0.520074I$ $a = -1.011913 - 0.934421I$ $b = -0.273948 - 0.520074I$	$0.221012 + 1.276802I$	$1.83102 - 5.88514I$
$u = -0.273948 + 0.520074I$ $a = -1.011913 + 0.934421I$ $b = -0.273948 + 0.520074I$	$0.221012 - 1.276802I$	$1.83102 + 5.88514I$
$u = 0.578102 - 1.055334I$ $a = 1.84091 + 0.61494I$ $b = 0.578102 - 1.055334I$	$-1.73404 - 6.79402I$	$-3.11839 + 7.09473I$
$u = 0.578102 + 1.055334I$ $a = 1.84091 - 0.61494I$ $b = 0.578102 + 1.055334I$	$-1.73404 + 6.79402I$	$-3.11839 - 7.09473I$
$u = 0.862697 - 0.615401I$ $a = 1.224206 + 0.050581I$ $b = 0.862697 - 0.615401I$	$7.44069 - 0.66722I$	$4.81639 + 2.10627I$
$u = 0.862697 + 0.615401I$ $a = 1.224206 - 0.050581I$ $b = 0.862697 + 0.615401I$	$7.44069 + 0.66722I$	$4.81639 - 2.10627I$

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

(i) Arc colorings

$$a_2 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

$$a_8 = \begin{pmatrix} -2 \\ u \end{pmatrix}$$

$$a_3 = \begin{pmatrix} 2u + 1 \\ u + 1 \end{pmatrix}$$

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

$$a_6 = \begin{pmatrix} u \\ u \end{pmatrix}$$

$$a_7 = \begin{pmatrix} u \\ u + 1 \end{pmatrix}$$

$$a_9 = \begin{pmatrix} -1 \\ 0 \end{pmatrix}$$

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

$$a_4 = \begin{pmatrix} u \\ u \end{pmatrix}$$

$$a_4 = \begin{pmatrix} u \\ u \end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes $= 4u + 2$

(iv) Complex Volumes and Cusp Shapes

Solution to I_5^u	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.500000 - 0.866025I$ $a = -2.00000$ $b = -0.500000 - 0.866025I$	$2.02988I$	$-3.46410I$
$u = -0.500000 + 0.866025I$ $a = -2.00000$ $b = -0.500000 + 0.866025I$	$-2.02988I$	$3.46410I$

VI. $I_6^u = \langle b^4 - b^3 + 2b^2 - 2b + 1,\ -b^3 - b + a,\ -b^3 - b + u + 1\rangle$

(i) Arc colorings

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

(ii) Obstruction class $= -1$

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

(iv) Complex Volumes and Cusp Shapes

Solution to I_6^u	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.500000 + 0.866025I$ $a = \quad 0.500000 + 0.866025I$ $b = -0.121744 - 1.306622I$	$-2.02988I$	$3.46410I$
$u = -0.500000 - 0.866025I$ $a = \quad 0.500000 - 0.866025I$ $b = -0.121744 + 1.306622I$	$2.02988I$	$-3.46410I$
$u = -0.500000 - 0.866025I$ $a = \quad 0.500000 - 0.866025I$ $b = \quad 0.621744 - 0.440597I$	$2.02988I$	$-3.46410I$
$u = -0.500000 + 0.866025I$ $a = \quad 0.500000 + 0.866025I$ $b = \quad 0.621744 + 0.440597I$	$-2.02988I$	$3.46410I$

VII. u-Polynomials

Crossings	u-Polynomials at each crossings
c_1, c_2, c_5 c_7	$(u^2+1)(u^2+u+1)^3(u^4-u^3+\cdots-2u+1)(u^6+u^4+\cdots+u+2)$ $(u^8-u^7+2u^6-2u^5+4u^4-3u^3+2u^2+1)$
c_3, c_4, c_9	$(u^2+1)(u^2+u+1)(u^3+2u+1)^2(u^4-u^3+2u^2-2u+1)^2$ $(u^8+2u^7+6u^6+8u^5+10u^4+9u^3+5u^2+3u+2)$
c_6, c_8	$(u+1)^2(u^2+u+1)^3(u^4+3u^3+2u^2+1)$ $(u^6+2u^5+3u^4+2u^3+u^2+3u+4)$ $(u^8+3u^7+8u^6+10u^5+14u^4+11u^3+12u^2+4u+1)$

VIII. Riley Polynomials

Crossings	Riley Polynomials at each crossings
c_1, c_2, c_5 c_7	$(y+1)^2(y^2+y+1)^3(y^4+3y^3+2y^2+1)$ $(y^6+2y^5+3y^4+2y^3+y^2+3y+4)$ $(y^8+3y^7+8y^6+10y^5+14y^4+11y^3+12y^2+4y+1)$
c_3, c_4, c_9	$(y+1)^2(y^2+y+1)(y^3+4y^2+4y-1)^2(y^4+3y^3+2y^2+1)^2$ $(y^8+8y^7+24y^6+30y^5+8y^4-5y^3+11y^2+11y+4)$
c_6, c_8	$(y-1)^2(y^2+y+1)^3(y^4-5y^3+6y^2+4y+1)$ $(y^6+2y^5+3y^4-2y^3+13y^2-y+16)$ $(y^8+7y^7+32y^6+82y^5+146y^4+151y^3+84y^2+8y+1)$