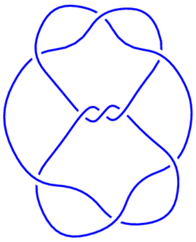
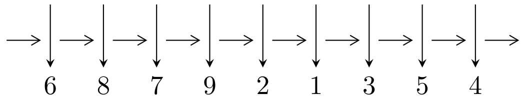
9_{35} $(K9a_{40})$



[1]

Arc Sequences



Solving Sequence

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

Representation Ideals

$$I = \bigcap_{i=1}^{5} I_i^u$$

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

There are 5 irreducible components with 17 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. $I_1^u = \langle u^2+1,\ a+1,\ b+u \rangle$

(i) Arc colorings

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

$$a_8 = \begin{pmatrix} -1 \\ -u \end{pmatrix}$$

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

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

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

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

$$a_1 = \begin{pmatrix} 0 \\ 1 \end{pmatrix}$$

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

$$a_7 = \begin{pmatrix} -u \\ 0 \end{pmatrix}$$

$$a_7 = \begin{pmatrix} -u \\ 0 \end{pmatrix}$$

(ii) Obstruction class $= 1$

(iii) Cusp Shapes $= 0$

(iv) Complex Volumes and Cusp Shapes

Solution to I_1^u	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -1.00000I$ $a = -1.00000$ $b = 1.00000I$	4.93480	0
$u = 1.00000I$ $a = -1.00000$ $b = -1.00000I$	4.93480	0

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

(i) Arc colorings

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

(ii) Obstruction class $= -1$

(iii) Cusp Shapes $= -6u^2 - 6u - 18$

(iv) Complex Volumes and Cusp Shapes

Solution to I_2^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.361103$ $a = \quad 1.00000$ $b = -0.361103$	-0.595615	-16.6158
$u = -0.31945 - 1.63317I$ $a = \quad 1.00000$ $b = -0.31945 - 1.63317I$	$17.5696 - 7.9406I$	$-0.69212 + 3.53846I$
$u = -0.31945 + 1.63317I$ $a = \quad 1.00000$ $b = -0.31945 + 1.63317I$	$17.5696 + 7.9406I$	$-0.69212 - 3.53846I$

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

(i) Arc colorings

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

(ii) Obstruction class $= -1$

(iii) Cusp Shapes $= -4u - 6$

(iv) Complex Volumes and Cusp Shapes

Solution to I_3^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.956685 - 0.641200I$ $a = -0.826150 - 1.069072I$ $b = 0.10488 + 1.55249I$	$10.08061 - 3.16396I$	$-2.17326 + 2.56480I$
$u = -0.956685 + 0.641200I$ $a = -0.826150 + 1.069072I$ $b = 0.10488 - 1.55249I$	$10.08061 + 3.16396I$	$-2.17326 - 2.56480I$
$u = -0.043315 - 1.227186I$ $a = -0.423850 + 0.307015I$ $b = 0.395123 + 0.506844I$	$3.07886 - 1.41510I$	$-5.82674 + 4.90874I$
$u = -0.043315 + 1.227186I$ $a = -0.423850 - 0.307015I$ $b = 0.395123 - 0.506844I$	$3.07886 + 1.41510I$	$-5.82674 - 4.90874I$

IV. $I_4^u = \langle u^4 - u^3 + 3u^2 - 2u + 1,\ a - 1,\ u^3 - u^2 + b + 3u - 1\rangle$

(i) Arc colorings

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

(ii) Obstruction class $= -1$

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

(iv) Complex Volumes and Cusp Shapes

Solution to I_4^u	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 0.10488 - 1.55249I$ $a = 1.00000$ $b = -0.956685 + 0.641200I$	$10.08061 + 3.16396I$	$-2.17326 - 2.56480I$
$u = 0.10488 + 1.55249I$ $a = 1.00000$ $b = -0.956685 - 0.641200I$	$10.08061 - 3.16396I$	$-2.17326 + 2.56480I$
$u = 0.395123 - 0.506844I$ $a = 1.00000$ $b = -0.043315 + 1.227186I$	$3.07886 + 1.41510I$	$-5.82674 - 4.90874I$
$u = 0.395123 + 0.506844I$ $a = 1.00000$ $b = -0.043315 - 1.227186I$	$3.07886 - 1.41510I$	$-5.82674 + 4.90874I$

V. $I_5^u = \langle u^4 - u^3 + 3u^2 - 2u + 1,\ b - u,\ u^3 + a + 2u + 1 \rangle$

(i) Arc colorings

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

(ii) Obstruction class $= -1$

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

(iv) Complex Volumes and Cusp Shapes

Solution to I_5^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u = 0.10488 - 1.55249I$ $a = -0.452576 - 0.585652I$ $b = 0.10488 - 1.55249I$	$10.08061 + 3.16396I$	$-2.17326 - 2.56480I$
$u = 0.10488 + 1.55249I$ $a = -0.452576 + 0.585652I$ $b = 0.10488 + 1.55249I$	$10.08061 - 3.16396I$	$-2.17326 + 2.56480I$
$u = 0.395123 - 0.506844I$ $a = -1.54742 + 1.12087I$ $b = 0.395123 - 0.506844I$	$3.07886 + 1.41510I$	$-5.82674 - 4.90874I$
$u = 0.395123 + 0.506844I$ $a = -1.54742 - 1.12087I$ $b = 0.395123 + 0.506844I$	$3.07886 - 1.41510I$	$-5.82674 + 4.90874I$

VI. u-Polynomials

Crossings	u-Polynomials at each crossings
c_1, c_2, c_3 c_4, c_5, c_6 c_7, c_8, c_9	$(u^2+1)(u^3+u^2+3u+1)(u^4-u^3+3u^2-2u+1)^2$ $(u^4+2u^3+3u^2+3u+2)$

VII. Riley Polynomials

Crossings	Riley Polynomials at each crossings
c_1, c_2, c_3 c_4, c_5, c_6 c_7, c_8, c_9	$(y+1)^2(y^3+5y^2+7y-1)(y^4+2y^3+y^2+3y+4)$ $(y^4+5y^3+7y^2+2y+1)^2$