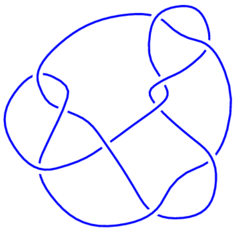
10_{40} ($K10a_{30}$)



[1]

Arc Sequences

$\uparrow$	$\downarrow$	$\uparrow$	$\uparrow$	$\uparrow$	$\uparrow$	$\uparrow$	$\downarrow$	$\downarrow$	$\uparrow$
6	9	10	7	1	5	3	2	8	4

Solving Sequence

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

Representation Ideals

$$I = \bigcap_{i=1}^{3} I_i^u$$

$$I_1^u = \langle u - 1 \rangle$$
$$I_2^u = \langle u^4 + u^3 + 1 \rangle$$
$$I_3^u = \langle u^{32} + u^{31} + \cdots + 2u + 1 \rangle$$

There are 3 irreducible components with 37 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. $I_1^u = \langle u - 1 \rangle$

(i) Arc colorings

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

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

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

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

$$a_7 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

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

$$a_{10} = \begin{pmatrix} 0 \\ 1 \end{pmatrix}$$

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

$$a_8 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

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

(ii) Obstruction class $= -1$

(iii) Cusp Shapes $= 6$

(iv) Complex Volumes and Cusp Shapes

Solution to I_1^u		$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u =$	1.00000	1.64493	6.00000

II. $I_2^u = \langle u^4 + u^3 + 1 \rangle$

(i) Arc colorings

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

(ii) Obstruction class $= -1$

(iii) Cusp Shapes $= 6$

(iv) Complex Volumes and Cusp Shapes

Solution to I_2^u	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -1.018913 - 0.602565I$	1.64493	6.00000
$u = -1.018913 + 0.602565I$	1.64493	6.00000
$u = \quad 0.518913 - 0.666610I$	1.64493	6.00000
$u = \quad 0.518913 + 0.666610I$	1.64493	6.00000

III. $I_3^u = \langle u^{32} + u^{31} + \cdots + 2u + 1 \rangle$

(i) Arc colorings

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

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

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

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

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

$$a_4 = \begin{pmatrix} -u^3 \\ u^5 - u^3 + u \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} -u^8 + u^6 - u^4 + 1 \\ u^{10} - 2u^8 + 3u^6 - 2u^4 + u^2 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} u^{13} - 2u^{11} + 3u^9 - 2u^7 - u \\ -u^{15} + 3u^{13} - 6u^{11} + 7u^9 - 6u^7 + 4u^5 - 2u^3 + u \end{pmatrix}$$

$$a_8 = \begin{pmatrix} u^{25} - 4u^{23} + \cdots + 2u^3 + u \\ -u^{27} + 5u^{25} + \cdots - 3u^3 + u \end{pmatrix}$$

$$a_9 = \begin{pmatrix} u^{31} - 6u^{29} + \cdots - 18u^5 + 6u^3 \\ u^{31} - 5u^{29} + \cdots - 2u^3 + u \end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes
$= -4u^{30} + 20u^{28} + 4u^{27} - 68u^{26} - 20u^{25} + 156u^{24} + 68u^{23} - 276u^{22} - 160u^{21} + 380u^{20} + 292u^{19} - 404u^{18} - 428u^{17} + 328u^{16} + 504u^{15} - 160u^{14} - 496u^{13} - 8u^{12} + 392u^{11} + 124u^{10} - 252u^9 - 156u^8 + 120u^7 + 116u^6 - 28u^5 - 64u^4 - 4u^3 + 16u^2 + 12u + 2$

(iv) Complex Volumes and Cusp Shapes

Solution to I_3^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u = -1.093529 - 0.032199I$	$6.73005 + 1.36697I$	$11.90065 - 0.55023I$
$u = -1.093529 + 0.032199I$	$6.73005 - 1.36697I$	$11.90065 + 0.55023I$
$u = -1.036494 - 0.686644I$	$0.19628 + 12.88874I$	$3.87677 - 9.41526I$
$u = -1.036494 + 0.686644I$	$0.19628 - 12.88874I$	$3.87677 + 9.41526I$
$u = -0.997643 - 0.681461I$	$-2.66422 + 5.49753I$	$0.37719 - 4.60034I$
$u = -0.997643 + 0.681461I$	$-2.66422 - 5.49753I$	$0.37719 + 4.60034I$
$u = -0.858258 - 0.694285I$	$-2.60826 + 2.66625I$	$2.22295 - 3.31297I$
$u = -0.858258 + 0.694285I$	$-2.60826 - 2.66625I$	$2.22295 + 3.31297I$
$u = -0.849583 - 0.407230I$	$0.10900 + 4.15286I$	$6.01286 - 7.18864I$
$u = -0.849583 + 0.407230I$	$0.10900 - 4.15286I$	$6.01286 + 7.18864I$
$u = -0.674958 - 0.742403I$	$-3.63561 - 0.05779I$	$-1.67435 - 0.61686I$
$u = -0.674958 + 0.742403I$	$-3.63561 + 0.05779I$	$-1.67435 + 0.61686I$
$u = -0.613006 - 0.792175I$	$-1.06972 - 7.30693I$	$1.82356 + 4.86883I$
$u = -0.613006 + 0.792175I$	$-1.06972 + 7.30693I$	$1.82356 - 4.86883I$
$u = -0.416995 - 0.648442I$	$0.08923 + 4.79464I$	$2.70911 - 5.61871I$
$u = -0.416995 + 0.648442I$	$0.08923 - 4.79464I$	$2.70911 + 5.61871I$
$u = -0.164238 - 0.469611I$	$-1.64326 - 1.19641I$	$-1.57525 + 0.85209I$
$u = -0.164238 + 0.469611I$	$-1.64326 + 1.19641I$	$-1.57525 - 0.85209I$
$u = 0.600521 - 0.762759I$	$0.98960 + 2.26361I$	$5.01894 - 0.67006I$
$u = 0.600521 + 0.762759I$	$0.98960 - 2.26361I$	$5.01894 + 0.67006I$
$u = 0.730192 - 0.168194I$	$1.169215 - 0.193186I$	$9.20830 + 0.78328I$
$u = 0.730192 + 0.168194I$	$1.169215 + 0.193186I$	$9.20830 - 0.78328I$
$u = 0.828553 - 0.741140I$	$-5.70053 + 0.95663I$	$-2.35494 - 0.97622I$
$u = 0.828553 + 0.741140I$	$-5.70053 - 0.95663I$	$-2.35494 + 0.97622I$
$u = 0.891994 - 0.729689I$	$-5.50827 - 6.53878I$	$-1.61404 + 6.99151I$
$u = 0.891994 + 0.729689I$	$-5.50827 + 6.53878I$	$-1.61404 - 6.99151I$
$u = 1.022973 - 0.630121I$	$3.03384 - 5.05352I$	$8.11469 + 5.31459I$
$u = 1.022973 + 0.630121I$	$3.03384 + 5.05352I$	$8.11469 - 5.31459I$
$u = 1.031611 - 0.673233I$	$2.26376 - 7.72193I$	$6.98438 + 5.32873I$
$u = 1.031611 + 0.673233I$	$2.26376 + 7.72193I$	$6.98438 - 5.32873I$

Solution to I_3^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u = 1.098860 - 0.059621I$	$4.95901 - 6.50568I$	$8.96918 + 5.51070I$
$u = 1.098860 + 0.059621I$	$4.95901 + 6.50568I$	$8.96918 - 5.51070I$

IV. u-Polynomials

Crossings	u-Polynomials at each crossings
c_1, c_5	$(u-1)(u^4+u^3+1)(u^{32}+u^{31}+\cdots+2u+1)$
c_2, c_8	$(u-1)(u^4+u^3+1)(u^{32}+u^{31}+\cdots-u^2+1)$
c_3, c_{10}	$(u+1)^5(u^{32}-4u^{31}+\cdots-28u+4)$
c_4, c_6	$(u+1)(u^4+u^3+2u^2+1)(u^{32}+11u^{31}+\cdots+2u+1)$
c_7	$(u)(u^4-u^2-2u+3)(u^{32}+3u^{31}+\cdots+2u+3)$
c_9	$(u+1)(u^4+u^3+2u^2+1)(u^{32}+15u^{31}+\cdots+2u+1)$

V. Riley Polynomials

Crossings	Riley Polynomials at each crossings
c_1, c_5	$(y-1)(y^4-y^3+2y^2+1)(y^{32}-11y^{31}+\cdots-2y+1)$
c_2, c_8	$(y-1)(y^4-y^3+2y^2+1)(y^{32}-15y^{31}+\cdots-2y+1)$
c_3, c_{10}	$(y-1)^5(y^{32}-20y^{31}+\cdots-184y+16)$
c_4, c_6	$(y-1)(y^4+3y^3+\cdots+4y+1)(y^{32}+21y^{31}+\cdots+2y+1)$
c_7	$(y)(y^4-2y^3+\cdots-10y+9)(y^{32}+5y^{31}+\cdots+164y+9)$
c_9	$(y-1)(y^4+3y^3+\cdots+4y+1)(y^{32}+5y^{31}+\cdots+2y+1)$