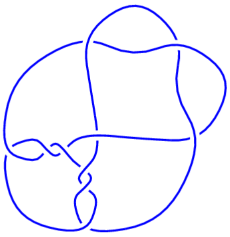
10_{64} $(K10a_{122})$



[1]

Arc Sequences

$\rightarrow \uparrow_{6} \rightarrow \downarrow_{9} \rightarrow \downarrow_{7} \rightarrow \downarrow_{8} \rightarrow \uparrow_{1} \rightarrow \uparrow_{10} \rightarrow \downarrow_{4} \rightarrow \downarrow_{2} \rightarrow \downarrow_{3} \rightarrow \uparrow_{5} \rightarrow$

Solving Sequence

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

Representation Ideals

$$I = \bigcap_{i=1}^{3} I_i^u \bigcap I_1^v$$

$$\begin{aligned}
I_1^u &= \langle u^2 - 2,\ 2a - u,\ b - u + 1\rangle \\
I_2^u &= \langle a^{16} - a^{15} + \cdots - 4a - 1,\ 2081923744a^{15} + 6485789563u + \cdots - 12167596690a + 7370902750, \\
&\quad 3089784376a^{15} + 6485789563b + \cdots + 6084275869a - 2629158746\rangle \\
I_3^u &= \langle u^{12} - 3u^{11} - u^{10} + 8u^9 + u^8 - 8u^7 - 6u^6 + 2u^5 + 7u^4 + 8u^3 - 6u^2 - 2u - 2, \\
&\quad - u^{11} + u^{10} + 5u^9 - 2u^8 - 11u^7 - 4u^6 + 10u^5 + 14u^4 + 3u^3 - 10u^2 + 2a - 8u - 2, \\
&\quad - 3u^{11} + 5u^{10} + 10u^9 - 11u^8 - 19u^7 - u^6 + 19u^5 + 21u^4 + 5u^3 - 20u^2 + b - 9u - 5\rangle
\end{aligned}$$

$$I_1^v = \langle v + 1,\ b + 1,\ a\rangle$$

There are 4 irreducible components with 31 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. $I_1^u = \langle u^2 - 2,\ 2a - u,\ b - u + 1 \rangle$

(i) Arc colorings

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

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

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

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

$$a_8 = \begin{pmatrix} \frac{1}{2}u \\ u - 1 \end{pmatrix}$$

$$a_9 = \begin{pmatrix} \frac{1}{2}u + 1 \\ u + 1 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} \frac{1}{2}u \\ 2u - 1 \end{pmatrix}$$

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

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

$$a_{10} = \begin{pmatrix} 1 \\ 2 \end{pmatrix}$$

(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
$u=-1.41421$ $a=-0.707107$ $b=-2.41421$	1.64493	-4.00000
$u=\ 1.41421$ $a=\ 0.707107$ $b=\ 0.414214$	1.64493	-4.00000

II. $\boldsymbol{I_2^u = \langle a^{16} - a^{15} + \cdots - 4a - 1,\ 6.49 \times 10^9 u + 2.08 \times 10^9 a^{15} + \cdots - 1.22 \times 10^{10} a + 7.37 \times 10^9,\ 6.49 \times 10^9 b + 3.09 \times 10^9 a^{15} + \cdots + 6.08 \times 10^9 a - 2.63 \times 10^9 \rangle}$

(i) Arc colorings

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

$$a_5 = \begin{pmatrix} 0 \\ -0.320998a^{15} - 0.349012a^{14} + \cdots + 1.87604a - 1.13647 \end{pmatrix}$$

$$a_6 = \begin{pmatrix} -0.320998a^{15} - 0.349012a^{14} + \cdots + 1.87604a - 1.13647 \\ -0.320998a^{15} - 0.349012a^{14} + \cdots + 1.87604a - 1.13647 \end{pmatrix}$$

$$a_2 = \begin{pmatrix} 0.509448a^{15} - 0.233254a^{14} + \cdots + 3.37383a - 0.219652 \\ 0.509448a^{15} - 0.233254a^{14} + \cdots + 3.37383a - 1.21965 \end{pmatrix}$$

$$a_8 = \begin{pmatrix} a \\ -0.476393a^{15} + 0.192769a^{14} + \cdots - 0.938093a + 0.405372 \end{pmatrix}$$

$$a_9 = \begin{pmatrix} -0.664560a^{15} - 0.0844927a^{14} + \cdots - 0.604404a - 1.14741 \\ -1.33887a^{15} - 0.246334a^{14} + \cdots - 0.775228a - 1.34628 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} -0.823430a^{15} + 0.0715779a^{14} + \cdots - 3.00103a - 0.670009 \\ -1.88989a^{15} + 0.228920a^{14} + \cdots - 6.63211a - 2.64244 \end{pmatrix}$$

$$a_7 = \begin{pmatrix} -0.121394a^{15} - 0.161019a^{14} + \cdots + 1.48259a + 0.0515978 \\ -0.541764a^{15} - 0.0430660a^{14} + \cdots - 0.434518a + 0.697512 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} -0.674313a^{15} - 0.161841a^{14} + \cdots - 0.170824a - 0.198872 \\ -1.33887a^{15} - 0.246334a^{14} + \cdots - 0.775228a - 1.34628 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} 1 \\ -0.509448a^{15} + 0.233254a^{14} + \cdots - 3.37383a + 1.21965 \end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes $= \frac{7185317952}{6485789563}a^{15} + \frac{748682304}{6485789563}a^{14} + \cdots - \frac{9912316388}{6485789563}a + \frac{11617526406}{6485789563}$

(iv) Complex Volumes and Cusp Shapes

Solution to I_2^u	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 0.463640$ $a = -2.48966$ $b = -0.0201511$	-2.44483	-0.105536
$u = 1.180118 - 0.268597I$ $a = -1.109972 - 0.323689I$ $b = -0.071164 - 1.296906I$	$-2.24921 - 1.13123I$	$-4.58478 + 0.51079I$
$u = 1.180118 + 0.268597I$ $a = -1.109972 + 0.323689I$ $b = -0.071164 + 1.296906I$	$-2.24921 + 1.13123I$	$-4.58478 - 0.51079I$
$u = -1.37100$ $a = -0.625910$ $b = -1.06456$	3.21286	1.86404
$u = -1.37100$ $a = -0.175095$ $b = 0.601386$	3.21286	1.86404
$u = -1.334527 + 0.318930I$ $a = -0.131473 - 0.693518I$ $b = -0.36338 - 2.34099I$	$-0.91019 - 6.44354I$	$-2.57155 + 5.29417I$
$u = -1.334527 - 0.318930I$ $a = -0.131473 + 0.693518I$ $b = -0.36338 + 2.34099I$	$-0.91019 + 6.44354I$	$-2.57155 - 5.29417I$
$u = 0.108090 + 0.747508I$ $a = 0.13632 - 1.87108I$ $b = 0.332245 - 1.136470I$	$-5.44928 + 2.57849I$	$-7.72292 - 3.56796I$
$u = 0.108090 - 0.747508I$ $a = 0.13632 + 1.87108I$ $b = 0.332245 + 1.136470I$	$-5.44928 - 2.57849I$	$-7.72292 + 3.56796I$
$u = 1.180118 - 0.268597I$ $a = 0.784038 - 0.369645I$ $b = 0.96451 - 1.42753I$	$-2.24921 - 1.13123I$	$-4.58478 + 0.51079I$

Solution to I_2^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u = 1.180118 + 0.268597I$ $a = 0.784038 + 0.369645I$ $b = 0.96451 + 1.42753I$	$-2.24921 + 1.13123I$	$-4.58478 - 0.51079I$
$u = 0.108090 - 0.747508I$ $a = 0.898304 - 0.876567I$ $b = -0.527948 - 0.225860I$	$-5.44928 - 2.57849I$	$-7.72292 + 3.56796I$
$u = 0.108090 + 0.747508I$ $a = 0.898304 + 0.876567I$ $b = -0.527948 + 0.225860I$	$-5.44928 + 2.57849I$	$-7.72292 - 3.56796I$
$u = -1.334527 - 0.318930I$ $a = 0.973902 - 0.403682I$ $b = 0.83491 - 2.12464I$	$-0.91019 + 6.44354I$	$-2.57155 - 5.29417I$
$u = -1.334527 + 0.318930I$ $a = 0.973902 + 0.403682I$ $b = 0.83491 + 2.12464I$	$-0.91019 - 6.44354I$	$-2.57155 + 5.29417I$
$u = 0.463640$ $a = 1.18843$ $b = 1.14496$	-2.44483	-0.105536

III.

$\boldsymbol{I_3^u = \langle u^{12}-3u^{11}+\cdots-2u-2,\ -u^{11}+u^{10}+\cdots+2a-2,\ -3u^{11}+5u^{10}+\cdots+b-5\rangle}$

(i) Arc colorings

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

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

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

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

$$a_8 = \begin{pmatrix}\frac{1}{2}u^{11}-\frac{1}{2}u^{10}+\cdots+4u+1\\3u^{11}-5u^{10}+\cdots+9u+5\end{pmatrix}$$

$$a_9 = \begin{pmatrix}\frac{1}{2}u^{11}-\frac{1}{2}u^{10}+\cdots+3u^2+2u\\2u^{11}-3u^{10}+\cdots+5u+3\end{pmatrix}$$

$$a_4 = \begin{pmatrix}\frac{1}{2}u^{11}-\frac{1}{2}u^{10}+\cdots+u+1\\u^{11}-u^{10}-3u^9+u^8+4u^7+3u^6-2u^5-5u^4-3u^3+3u^2+2u+1\end{pmatrix}$$

$$a_7 = \begin{pmatrix}-u^3+2u\\-u^5+u^3+u\end{pmatrix}$$

$$a_3 = \begin{pmatrix}\frac{3}{2}u^{11}-\frac{5}{2}u^{10}+\cdots+3u+3\\2u^{11}-3u^{10}+\cdots+5u+3\end{pmatrix}$$

$$a_{10} = \begin{pmatrix}1\\u^2\end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes $= -2u^9+8u^7+6u^6-10u^5-18u^4-8u^3+12u^2+22u+4$

(iv) Complex Volumes and Cusp Shapes

Solution to I_3^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u=-1.33675$ $a=-0.394988$ $b=-0.225955$	3.24831	0.826741
$u=-0.966488-0.563243I$ $a=\ \ 1.252410-0.588706I$ $b=\ \ 0.743064-0.143449I$	$-10.10897-1.20346I$	$-7.47592-0.43067I$
$u=-0.966488+0.563243I$ $a=\ \ 1.252410+0.588706I$ $b=\ \ 0.743064+0.143449I$	$-10.10897+1.20346I$	$-7.47592+0.43067I$
$u=-0.245698-0.893102I$ $a=-0.17937+1.67606I$ $b=-0.721402+0.719192I$	$-12.33395+6.28413I$	$-9.23554-3.97965I$
$u=-0.245698+0.893102I$ $a=-0.17937-1.67606I$ $b=-0.721402-0.719192I$	$-12.33395-6.28413I$	$-9.23554+3.97965I$
$u=-0.171953-0.439263I$ $a=-0.537058-0.769300I$ $b=\ \ 0.080483-0.344336I$	$-0.111574+0.933771I$	$-2.28396-7.38290I$
$u=-0.171953+0.439263I$ $a=-0.537058+0.769300I$ $b=\ \ 0.080483+0.344336I$	$-0.111574-0.933771I$	$-2.28396+7.38290I$
$u=\ \ 1.341599-0.180783I$ $a=\ \ 0.154799+0.502944I$ $b=-0.09990+1.84048I$	$4.65271-3.28049I$	$2.99435+5.25300I$
$u=\ \ 1.341599+0.180783I$ $a=\ \ 0.154799-0.502944I$ $b=-0.09990-1.84048I$	$4.65271+3.28049I$	$2.99435-5.25300I$
$u=\ \ 1.42167-0.37922I$ $a=-0.928853-0.482477I$ $b=-1.57778-2.21027I$	$-7.04968-10.86809I$	$-5.35737+5.74032I$

Solution to I_3^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u = 1.42167 + 0.37922I$ $a = -0.928853 + 0.482477I$ $b = -1.57778 + 2.21027I$	$-7.04968 + 10.86809I$	$-5.35737 - 5.74032I$
$u = 1.57848$ $a = 0.871126$ $b = 2.37701$	-1.04846	-6.10988

IV. $I_1^v = \langle v+1,\ b+1,\ a \rangle$

(i) Arc colorings

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

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

$$a_6 = \begin{pmatrix} -1 \\ 0 \end{pmatrix}$$

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

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

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

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

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

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

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

(ii) Obstruction class $= 1$

(iii) Cusp Shapes $= -12$

(iv) Complex Volumes and Cusp Shapes

Solution to I_1^v	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$v = -1.00000$ $a = \quad 0$ $b = -1.00000$	-3.28987	-12.0000

V. u-Polynomials

Crossings	u-Polynomials at each crossings
c_1, c_5, c_{10}	$u(u^2-2)(u^8-u^7-3u^6+2u^5+3u^4-2u-1)^2$ $(u^{12}+3u^{11}+\cdots+2u-2)$
c_2, c_7	$(u-1)^2(u+1)$ $(u^{12}+u^{11}-7u^{10}-6u^9+18u^8+11u^7-19u^6-2u^5+6u^4-8u^3+1)$ $(u^{16}+u^{15}+\cdots+6u-1)$
c_3, c_4, c_8 c_9	$(u-1)(u+1)^2$ $(u^{12}+u^{11}-7u^{10}-6u^9+18u^8+11u^7-19u^6-2u^5+6u^4-8u^3+1)$ $(u^{16}+u^{15}+\cdots+6u-1)$
c_6	$u(u^2-2)(u^8-3u^7+7u^6-10u^5+11u^4-10u^3+6u^2-4u+1)^2$ $(u^{12}+9u^{11}+\cdots-102u-22)$

VI. Riley Polynomials

Crossings	Riley Polynomials at each crossings
c_1, c_5, c_{10}	$y(y-2)^2(y^8-7y^7+19y^6-22y^5+3y^4+14y^3-6y^2-4y+1)^2$ $(y^{12}-11y^{11}+\cdots+20y+4)$
c_2, c_3, c_4 c_7, c_8, c_9	$(y-1)^3(y^{12}-15y^{11}+\cdots+12y^2+1)(y^{16}-13y^{15}+\cdots-24y+1)$
c_6	$y(y-2)^2(y^8+5y^7+11y^6+6y^5-17y^4-34y^3-22y^2-4y+1)^2$ $(y^{12}+y^{11}+\cdots+1300y+484)$