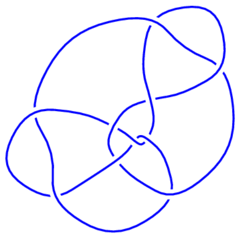
10_{96} $(K10a_{24})$



[1]

Arc Sequences

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

Solving Sequence

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

Representation Ideals

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

$$I_1^u = \langle b^2 - b + 1,\ u + 1,\ -b + 2a + 2\rangle$$
$$I_2^u = \langle u^{18} - 2u^{17} + \cdots - u + 1,\ -u^{17} + 3u^{16} + \cdots + 128a - 129,\ -u^{17} + 3u^{16} + \cdots + 64b - 1\rangle$$
$$\begin{aligned} I_3^u = \langle & u^{30} + 5u^{29} + \cdots + 2u + 1, \\ & -2565167625496u^{29} - 27839481267868u^{28} + \cdots + 159364162472743b - 45291453532542, \\ & 93643165589120u^{29} + 526093382107822u^{28} + \cdots + 159364162472743a - 86472965170133\rangle \end{aligned}$$

There are 3 irreducible components with 50 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. $I_1^u = \langle b^2 - b + 1,\ u + 1,\ -b + 2a + 2\rangle$

(i) Arc colorings

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

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

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

$$a_9 = \begin{pmatrix} \frac{1}{2}b - 1 \\ b \end{pmatrix}$$

$$a_1 = \begin{pmatrix} -\frac{1}{2}b + \frac{1}{2} \\ b - 1 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} \frac{1}{4}b + 1 \\ -\frac{1}{2}b - 1 \end{pmatrix}$$

$$a_5 = \begin{pmatrix} 1 \\ -2 \end{pmatrix}$$

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

$$a_7 = \begin{pmatrix} -\frac{1}{4}b \\ \frac{1}{2}b - 1 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} -\frac{1}{2}b + \frac{1}{2} \\ b - 1 \end{pmatrix}$$

(ii) Obstruction class $= 1$

(iii) Cusp Shapes $= -\frac{1}{4}b + 2$

(iv) Complex Volumes and Cusp Shapes

Solution to I_1^u	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -1.00000$ $a = -0.750000 - 0.433013I$ $b = 0.500000 - 0.866025I$	$1.64493 - 2.02988I$	$1.87500 + 0.21651I$
$u = -1.00000$ $a = -0.750000 + 0.433013I$ $b = 0.500000 + 0.866025I$	$1.64493 + 2.02988I$	$1.87500 - 0.21651I$

II. $\boldsymbol{I_2^u =}$
$\boldsymbol{\langle u^{18}-2u^{17}+\cdots-u+1,\ -u^{17}+3u^{16}+\cdots+128a-129,\ -u^{17}+3u^{16}+\cdots+64b-1\rangle}$

(i) Arc colorings

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

$$a_6 = \begin{pmatrix}0\\u\end{pmatrix}$$

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

$$a_9 = \begin{pmatrix}0.00781250u^{17} - 0.0234375u^{16} + \cdots - 0.0156250u + 1.00781\\ 0.0156250u^{17} - 0.0468750u^{16} + \cdots + 1.96875u + 0.0156250\end{pmatrix}$$

$$a_1 = \begin{pmatrix}-0.0703125u^{17} + 0.0859375u^{16} + \cdots + 2.51563u + 0.804688\\ -0.421875u^{17} + 1.01563u^{16} + \cdots + 1.59375u - 0.671875\end{pmatrix}$$

$$a_4 = \begin{pmatrix}0.00390625u^{17} - 0.0117188u^{16} + \cdots + 1.99219u + 0.00390625\\ -0.00781250u^{17} + 0.0234375u^{16} + \cdots - 0.984375u - 0.00781250\end{pmatrix}$$

$$a_5 = \begin{pmatrix}-u\\u^3+u\end{pmatrix}$$

$$a_8 = \begin{pmatrix}-0.00781250u^{17} + 0.0234375u^{16} + \cdots - 1.98438u + 0.992188\\ 0.0156250u^{17} - 0.0468750u^{16} + \cdots + 1.96875u + 0.0156250\end{pmatrix}$$

$$a_7 = \begin{pmatrix}-0.00390625u^{17} + 0.0117188u^{16} + \cdots - 1.99219u + 0.996094\\ 0.00781250u^{17} - 0.0234375u^{16} + \cdots + 1.98438u + 0.00781250\end{pmatrix}$$

$$a_{10} = \begin{pmatrix}0.617188u^{17} - 1.47656u^{16} + \cdots + 2.64063u + 0.992188\\ -0.796875u^{17} + 1.14063u^{16} + \cdots + 2.34375u - 1.04688\end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes $= -\frac{223}{256}u^{17} + \frac{93}{256}u^{16} + \cdots - \frac{1473}{128}u + \frac{481}{256}$

(iv) Complex Volumes and Cusp Shapes

Solution to I_2^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.57190 - 1.33178I$ $a = 0.95381 - 1.77666I$ $b = -0.644327 - 1.178323I$	$-6.1478 + 15.1779I$	$-2.47148 - 8.89088I$
$u = -0.57190 + 1.33178I$ $a = 0.95381 + 1.77666I$ $b = -0.644327 + 1.178323I$	$-6.1478 - 15.1779I$	$-2.47148 + 8.89088I$
$u = -0.527077 - 1.253952I$ $a = -0.375425 - 0.256609I$ $b = -0.954364 + 0.371541I$	$-3.68268 + 9.36876I$	$-0.27355 - 5.71519I$
$u = -0.527077 + 1.253952I$ $a = -0.375425 + 0.256609I$ $b = -0.954364 - 0.371541I$	$-3.68268 - 9.36876I$	$-0.27355 + 5.71519I$
$u = -0.343795 - 1.275011I$ $a = -0.34272 + 1.92019I$ $b = -0.123550 + 1.355420I$	$-9.80486 + 5.84779I$	$-6.18830 - 4.95030I$
$u = -0.343795 + 1.275011I$ $a = -0.34272 - 1.92019I$ $b = -0.123550 - 1.355420I$	$-9.80486 - 5.84779I$	$-6.18830 + 4.95030I$
$u = -0.278239 - 0.862332I$ $a = -0.238062 + 1.259201I$ $b = 0.881883 + 0.896090I$	$-0.64162 + 4.35809I$	$2.09542 - 8.94470I$
$u = -0.278239 + 0.862332I$ $a = -0.238062 - 1.259201I$ $b = 0.881883 - 0.896090I$	$-0.64162 - 4.35809I$	$2.09542 + 8.94470I$
$u = -0.123272 - 0.375141I$ $a = 1.010196 + 0.160304I$ $b = 0.567357 - 0.706169I$	$0.11776 - 1.42471I$	$0.46661 + 2.50425I$
$u = -0.123272 + 0.375141I$ $a = 1.010196 - 0.160304I$ $b = 0.567357 + 0.706169I$	$0.11776 + 1.42471I$	$0.46661 - 2.50425I$

Solution to I_2^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u = 0.254607 - 0.632963I$ $a = 0.745797 - 0.387213I$ $b = 0.715844 - 0.165207I$	$0.38947 - 1.38737I$	$5.20835 + 5.01616I$
$u = 0.254607 + 0.632963I$ $a = 0.745797 + 0.387213I$ $b = 0.715844 + 0.165207I$	$0.38947 + 1.38737I$	$5.20835 - 5.01616I$
$u = 0.301163 - 1.054571I$ $a = -0.45866 - 2.23881I$ $b = 0.554083 - 1.298626I$	$-3.73889 - 6.36829I$	$-2.64340 + 9.34206I$
$u = 0.301163 + 1.054571I$ $a = -0.45866 + 2.23881I$ $b = 0.554083 + 1.298626I$	$-3.73889 + 6.36829I$	$-2.64340 - 9.34206I$
$u = 1.010018 - 0.434093I$ $a = 0.861908 + 0.474810I$ $b = -0.501769 + 0.662267I$	$2.35859 - 1.45777I$	$5.68941 - 2.64543I$
$u = 1.010018 + 0.434093I$ $a = 0.861908 - 0.474810I$ $b = -0.501769 - 0.662267I$	$2.35859 + 1.45777I$	$5.68941 + 2.64543I$
$u = 1.278491 - 0.262032I$ $a = 0.593152 - 0.568497I$ $b = -0.495157 - 0.969336I$	$1.41086 + 2.64017I$	$-3.75807 - 9.26255I$
$u = 1.278491 + 0.262032I$ $a = 0.593152 + 0.568497I$ $b = -0.495157 + 0.969336I$	$1.41086 - 2.64017I$	$-3.75807 + 9.26255I$

III. $\boldsymbol{I_3^u =}$
$\boldsymbol{\langle u^{30}+5u^{29}+\cdots+2u+1,\ -2.57\times10^{12}u^{29}-2.78\times10^{13}u^{28}+\cdots+1.59\times10^{14}b-4.53\times10^{13},\ 9.36\times10^{13}u^{29}+5.26\times10^{14}u^{28}+\cdots+1.59\times10^{14}a-8.65\times10^{13}\rangle}$

(i) Arc colorings

$$a_2 = \begin{pmatrix}1\\0\end{pmatrix}$$
$$a_6 = \begin{pmatrix}0\\u\end{pmatrix}$$
$$a_3 = \begin{pmatrix}1\\-u^2\end{pmatrix}$$
$$a_9 = \begin{pmatrix}-0.587605u^{29}-3.30120u^{28}+\cdots-1.51848u+0.542612\\0.0160963u^{29}+0.174691u^{28}+\cdots+0.285765u+0.284201\end{pmatrix}$$
$$a_1 = \begin{pmatrix}0.588823u^{29}+2.64605u^{28}+\cdots-0.149507u+1.10855\\0.656704u^{29}+3.06689u^{28}+\cdots+0.823266u+0.271283\end{pmatrix}$$
$$a_4 = \begin{pmatrix}-1.03080u^{29}-3.52620u^{28}+\cdots+4.23727u+3.87572\\-0.323013u^{29}-1.93524u^{28}+\cdots-1.97203u-0.629481\end{pmatrix}$$
$$a_5 = \begin{pmatrix}-u\\u^3+u\end{pmatrix}$$
$$a_8 = \begin{pmatrix}-0.603701u^{29}-3.47589u^{28}+\cdots-1.80424u+0.258411\\0.0160963u^{29}+0.174691u^{28}+\cdots+0.285765u+0.284201\end{pmatrix}$$
$$a_7 = \begin{pmatrix}1.17308u^{29}+7.69672u^{28}+\cdots+1.04052u+0.554590\\-0.359233u^{29}-1.60052u^{28}+\cdots+2.03342u+1.47316\end{pmatrix}$$
$$a_{10} = \begin{pmatrix}0.0621554u^{29}+0.342601u^{28}+\cdots-0.387269u+1.07763\\0.971851u^{29}+4.54161u^{28}+\cdots+1.19414u+0.632094\end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes
$= -\frac{241825288156456}{159364162472743}u^{29} - \frac{1016613996366752}{159364162472743}u^{28} + \cdots - \frac{589559109112076}{159364162472743}u + \frac{473153477104906}{159364162472743}$

(iv) Complex Volumes and Cusp Shapes

Solution to I_3^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -1.119758 - 0.096018I$ $a = \quad 0.621872 + 0.586830I$ $b = -0.594032 + 1.095617I$	$-2.26357 - 9.21780I$	$-0.14540 + 7.39135I$
$u = -1.119758 + 0.096018I$ $a = \quad 0.621872 - 0.586830I$ $b = -0.594032 - 1.095617I$	$-2.26357 + 9.21780I$	$-0.14540 - 7.39135I$
$u = -0.930770 - 0.153909I$ $a = \quad 0.678031 - 0.261213I$ $b = -0.758945 - 0.422629I$	$-0.27297 - 4.09199I$	$3.04427 + 3.15094I$
$u = -0.930770 + 0.153909I$ $a = \quad 0.678031 + 0.261213I$ $b = -0.758945 + 0.422629I$	$-0.27297 + 4.09199I$	$3.04427 - 3.15094I$
$u = -0.789375 - 0.319437I$ $a = \quad 0.731396 + 0.404404I$ $b = -0.146928 + 1.062740I$	$-5.11062 + 2.07402I$	$-3.82822 - 2.67122I$
$u = -0.789375 + 0.319437I$ $a = \quad 0.731396 - 0.404404I$ $b = -0.146928 - 1.062740I$	$-5.11062 - 2.07402I$	$-3.82822 + 2.67122I$
$u = -0.672463 - 1.225335I$ $a = \quad 1.22357 - 1.36414I$ $b = -0.426893 - 1.085665I$	$-7.49803 + 3.60340I$	$-6.16372 - 4.47672I$
$u = -0.672463 + 1.225335I$ $a = \quad 1.22357 + 1.36414I$ $b = -0.426893 + 1.085665I$	$-7.49803 - 3.60340I$	$-6.16372 + 4.47672I$
$u = -0.38528 - 1.46920I$ $a = -0.148143 + 1.352114I$ $b = -0.426893 + 1.085665I$	$-7.49803 - 3.60340I$	$-6.16372 + 4.47672I$
$u = -0.38528 + 1.46920I$ $a = -0.148143 - 1.352114I$ $b = -0.426893 - 1.085665I$	$-7.49803 + 3.60340I$	$-6.16372 - 4.47672I$

Solution to I_3^u	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.369866 - 1.187604I$ $a = 0.287595 - 0.558679I$ $b = -0.538411$	-4.71415	-2.56339
$u = -0.369866 + 1.187604I$ $a = 0.287595 + 0.558679I$ $b = -0.538411$	-4.71415	-2.56339
$u = -0.253544 - 0.465102I$ $a = 1.090124 + 0.266849I$ $b = 0.715401 - 0.518352I$	$0.24352 - 1.50523I$	$4.15133 + 2.74048I$
$u = -0.253544 + 0.465102I$ $a = 1.090124 - 0.266849I$ $b = 0.715401 + 0.518352I$	$0.24352 + 1.50523I$	$4.15133 - 2.74048I$
$u = -0.212345 - 0.992556I$ $a = -1.02194 + 2.08034I$ $b = 0.594997 + 1.040825I$	$-1.30682 + 3.51852I$	$1.71302 - 2.59027I$
$u = -0.212345 + 0.992556I$ $a = -1.02194 - 2.08034I$ $b = 0.594997 - 1.040825I$	$-1.30682 - 3.51852I$	$1.71302 + 2.59027I$
$u = 0.081650 - 1.113802I$ $a = 0.61498 - 3.97882I$ $b = 0.385605 - 0.867795I$	$-3.64104 - 1.66084I$	$1.51042 + 3.96405I$
$u = 0.081650 + 1.113802I$ $a = 0.61498 + 3.97882I$ $b = 0.385605 + 0.867795I$	$-3.64104 + 1.66084I$	$1.51042 - 3.96405I$
$u = 0.160281 - 0.896058I$ $a = 2.62197 - 1.43351I$ $b = 0.385605 + 0.867795I$	$-3.64104 + 1.66084I$	$1.51042 - 3.96405I$
$u = 0.160281 + 0.896058I$ $a = 2.62197 + 1.43351I$ $b = 0.385605 - 0.867795I$	$-3.64104 - 1.66084I$	$1.51042 + 3.96405I$

Solution to I_3^u	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 0.220274 - 0.713343I$ $a = 0.307764 - 0.377552I$ $b = 0.715401 - 0.518352I$	$0.24352 - 1.50523I$	$4.15133 + 2.74048I$
$u = 0.220274 + 0.713343I$ $a = 0.307764 + 0.377552I$ $b = 0.715401 + 0.518352I$	$0.24352 + 1.50523I$	$4.15133 - 2.74048I$
$u = 0.235764 - 1.349702I$ $a = 0.05776 - 1.78925I$ $b = -0.146928 - 1.062740I$	$-5.11062 - 2.07402I$	$-3.82822 + 2.67122I$
$u = 0.235764 + 1.349702I$ $a = 0.05776 + 1.78925I$ $b = -0.146928 + 1.062740I$	$-5.11062 + 2.07402I$	$-3.82822 - 2.67122I$
$u = 0.368301 - 0.106759I$ $a = 1.132776 + 0.082698I$ $b = 0.594997 + 1.040825I$	$-1.30682 + 3.51852I$	$1.71302 - 2.59027I$
$u = 0.368301 + 0.106759I$ $a = 1.132776 - 0.082698I$ $b = 0.594997 - 1.040825I$	$-1.30682 - 3.51852I$	$1.71302 + 2.59027I$
$u = 0.549307 - 1.203290I$ $a = -0.137497 + 0.109624I$ $b = -0.758945 - 0.422629I$	$-0.27297 - 4.09199I$	$3.04427 + 3.15094I$
$u = 0.549307 + 1.203290I$ $a = -0.137497 - 0.109624I$ $b = -0.758945 + 0.422629I$	$-0.27297 + 4.09199I$	$3.04427 - 3.15094I$
$u = 0.61782 - 1.34369I$ $a = 0.93974 + 1.58965I$ $b = -0.594032 + 1.095617I$	$-2.26357 - 9.21780I$	$-0.14540 + 7.39135I$
$u = 0.61782 + 1.34369I$ $a = 0.93974 - 1.58965I$ $b = -0.594032 - 1.095617I$	$-2.26357 + 9.21780I$	$-0.14540 - 7.39135I$

IV. u-Polynomials

Crossings	u-Polynomials at each crossings
c_1	(u^2-u+1) $(1+2u+2u^2+4u^3+4u^4+6u^5+6u^6+8u^7+7u^8+10u^9+6u^{10}+8u^{11}+3u^{12}+4u^{13}+u$ $(u^{18}+4u^{16}+\cdots-3u+4)$
c_2, c_4	$(u+1)^2(u^{18}-2u^{17}+\cdots-u+1)(u^{30}+5u^{29}+\cdots+2u+1)$
c_3	$(4u^2+2u+1)(4u^{18}+6u^{17}+\cdots-u+1)(u^{30}-u^{29}+\cdots+162u+29)$
c_5, c_7	$(u-1)^2(u^{18}-2u^{17}+\cdots-u+1)(u^{30}+5u^{29}+\cdots+2u+1)$
c_6	$(4u^2-2u+1)(4u^{18}+6u^{17}+\cdots-u+1)(u^{30}-u^{29}+\cdots+162u+29)$
c_8	(u^2+u+1) $(1+2u+2u^2+4u^3+4u^4+6u^5+6u^6+8u^7+7u^8+10u^9+6u^{10}+8u^{11}+3u^{12}+4u^{13}+u$ $(u^{18}+4u^{16}+\cdots-3u+4)$
c_9	(u^2+u+1) $(-1+4u^2+12u^3+26u^4+52u^5+86u^6+118u^7+143u^8+156u^9+146u^{10}+110u^{11}+63u^1$ $(u^{18}+8u^{17}+\cdots-u+16)$
c_{10}	u^2 $(-1+2u-2u^2-2u^3+6u^4-8u^6+2u^7+9u^8-4u^9-6u^{10}+4u^{11}+3u^{12}-2u^{13}-u^{14}+u$ $(u^{18}+3u^{17}+\cdots+120u+32)$

V. Riley Polynomials

Crossings	Riley Polynomials at each crossings
c_1, c_8	(y^2+y+1) $(-1+4y^2+12y^3+26y^4+52y^5+86y^6+118y^7+143y^8+156y^9+146y^{10}+110y^{11}+63y^{12}$ $(y^{18}+8y^{17}+\cdots-y+16)$
c_2, c_5	$(y-1)^2(y^{18}+8y^{17}+\cdots+17y+1)(y^{30}+19y^{29}+\cdots-20y^2+1)$
c_3, c_6	$(16y^2+4y+1)(16y^{18}-28y^{17}+\cdots+11y+1)$ $(y^{30}-13y^{29}+\cdots+21316y+841)$
c_4, c_7	$(y-1)^2(y+1)(y^{18}+8y^{17}+\cdots+17y+1)(y^{29}+18y^{28}+\cdots-y+1)$
c_9	(y^2+y+1) $(-1+8y+36y^2+108y^3+170y^4+212y^5+142y^6+110y^7-13y^8+68y^9+22y^{10}+50y^{11}+$ $(y^{18}+4y^{17}+\cdots+735y+256)$
c_{10}	y^2 $(-1+12y^3-42y^4+96y^5-158y^6+206y^7-221y^8+196y^9-146y^{10}+90y^{11}-45y^{12}+18y$ $(y^{18}-5y^{17}+\cdots-4288y+1024)$