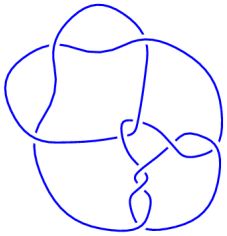
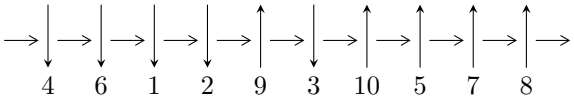
10_{79} $(K10a_{78})$



1

Arc Sequences



Solving Sequence

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

Representation Ideals

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

$I_1^u = \langle a^2 + a - 1,\ b + 1,\ u - 1 \rangle$
$I_2^u = \langle u^2 + u - 1,\ a,\ b - u - 1 \rangle$
$I_3^u = \langle u^{34} + 4u^{33} + \cdots - 10u + 1,$
$\quad - 31935176321u^{33} - 74364467657u^{32} + \cdots + 30391121282a - 203377185805,$
$\quad - 60060636254u^{33} - 166547195468u^{32} + \cdots + 151955606 41b - 28560826968 \rangle$

There are 3 irreducible components with 38 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. $I_1^u = \langle a^2 + a - 1,\ b + 1,\ u - 1 \rangle$

(i) Arc colorings

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

(ii) Obstruction class $= 1$

(iii) Cusp Shapes $= 9$

(iv) Complex Volumes and Cusp Shapes

Solution to I_1^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u = \quad 1.00000$ $a = -1.61803$ $b = -1.00000$	7.23771	9.00000
$u = \quad 1.00000$ $a = \quad 0.618034$ $b = -1.00000$	-0.657974	9.00000

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

(i) Arc colorings

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

(ii) Obstruction class $= 1$

(iii) Cusp Shapes $= -9$

(iv) Complex Volumes and Cusp Shapes

Solution to I_2^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u = -1.61803$ $a = 0$ $b = -0.618034$	-7.23771	-9.00000
$u = 0.618034$ $a = 0$ $b = 1.61803$	0.657974	-9.00000

III. $I_3^u =$
$\langle u^{34}+4u^{33}+\cdots-10u+1,\ -3.19\times10^{10}u^{33}-7.44\times10^{10}u^{32}+\cdots+3.04\times10^{10}a-2.03\times10^{11},\ -6.01\times10^{10}u^{33}-1.67\times10^{11}u^{32}+\cdots+1.52\times10^{10}b-2.86\times10^{10}\rangle$

(i) Arc colorings

$$a_5 = \begin{pmatrix}0\\u\end{pmatrix}$$
$$a_8 = \begin{pmatrix}1.05081u^{33}+2.44691u^{32}+\cdots-29.7773u+6.69199\\3.95251u^{33}+10.9603u^{32}+\cdots-29.3864u+1.87955\end{pmatrix}$$
$$a_9 = \begin{pmatrix}1.05081u^{33}+2.44691u^{32}+\cdots-29.7773u+6.69199\\2.06399u^{33}+5.45348u^{32}+\cdots-10.7725u+0.123240\end{pmatrix}$$
$$a_2 = \begin{pmatrix}1\\0\end{pmatrix}$$
$$a_6 = \begin{pmatrix}0.639337u^{33}+2.22914u^{32}+\cdots-16.5390u+3.60819\\3.16596u^{33}+8.26862u^{32}+\cdots-19.9982u+1.54038\end{pmatrix}$$
$$a_4 = \begin{pmatrix}u\\u\end{pmatrix}$$
$$a_1 = \begin{pmatrix}-u^2+1\\-u^2\end{pmatrix}$$
$$a_3 = \begin{pmatrix}-u^3+2u\\-u^3+u\end{pmatrix}$$
$$a_{10} = \begin{pmatrix}0.0508061u^{33}+0.446914u^{32}+\cdots+12.2227u-3.30801\\-4.22519u^{33}-11.7411u^{32}+\cdots+31.7364u-2.27171\end{pmatrix}$$
$$a_7 = \begin{pmatrix}-0.0508061u^{33}-0.446914u^{32}+\cdots-12.2227u+3.30801\\-1.91940u^{33}-5.35619u^{32}+\cdots+17.5180u-1.92576\end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes
$$= -\frac{38606058414}{15195560641}u^{33}-\frac{165788948728}{15195560641}u^{32}+\cdots-\frac{342510791983}{15195560641}u+\frac{192325963699}{15195560641}$$

(iv) Complex Volumes and Cusp Shapes

Solution to I_3^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u=-1.68937$ $a=-0.384788$ $b=-1.22184$	-6.73970	7.32001
$u=-1.48399-0.10913I$ $a=\ \ 0.270223+0.612932I$ $b=\ \ 0.45631+1.61066I$	$-8.19540-1.89242I$	$-7.34522+1.79557I$
$u=-1.48399+0.10913I$ $a=\ \ 0.270223-0.612932I$ $b=\ \ 0.45631-1.61066I$	$-8.19540+1.89242I$	$-7.34522-1.79557I$
$u=-1.45235-0.38829I$ $a=-0.673261+0.728901I$ $b=-1.02810+2.31194I$	$-12.5403I$	$7.07308I$
$u=-1.45235+0.38829I$ $a=-0.673261-0.728901I$ $b=-1.02810-2.31194I$	$12.5403I$	$-7.07308I$
$u=-1.42687-0.28990I$ $a=\ \ 0.724994-0.602347I$ $b=\ \ 0.52369-2.05753I$	$-5.53452-7.73594I$	$-3.53535+5.97450I$
$u=-1.42687+0.28990I$ $a=\ \ 0.724994+0.602347I$ $b=\ \ 0.52369+2.05753I$	$-5.53452+7.73594I$	$-3.53535-5.97450I$
$u=-1.375647-0.249131I$ $a=-0.550357-0.818342I$ $b=-0.54763-2.12753I$	$-2.34523-5.26340I$	$-1.79194+3.97493I$
$u=-1.375647+0.249131I$ $a=-0.550357+0.818342I$ $b=-0.54763+2.12753I$	$-2.34523+5.26340I$	$-1.79194-3.97493I$
$u=-1.364701-0.178295I$ $a=-0.863439+0.421454I$ $b=-0.159625+1.337518I$	$-3.39729-2.12414I$	$-2.18234+2.03948I$

Solution to I_3^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u=-1.364701+0.178295I$ $a=-0.863439-0.421454I$ $b=-0.159625-1.337518I$	$-3.39729+2.12414I$	$-2.18234-2.03948I$
$u=-1.16708$ $a=\ \ 1.51640$ $b=\ \ 1.03868$	6.73970	-7.32001
$u=-0.371871-0.634956I$ $a=\ \ 0.64909-1.72302I$ $b=\ \ 0.810314-0.386903I$	$8.19540-1.89242I$	$7.34522+1.79557I$
$u=-0.371871+0.634956I$ $a=\ \ 0.64909+1.72302I$ $b=\ \ 0.810314+0.386903I$	$8.19540+1.89242I$	$7.34522-1.79557I$
$u=\ \ 0.068600-0.405768I$ $a=\ \ 0.25617+2.04103I$ $b=-0.601672+0.680306I$	$1.359855-0.095322I$	$5.80027-0.42636I$
$u=\ \ 0.068600+0.405768I$ $a=\ \ 0.25617-2.04103I$ $b=-0.601672-0.680306I$	$1.359855+0.095322I$	$5.80027+0.42636I$
$u=\ \ 0.141038$ $a=\ \ 3.70736$ $b=-0.907044$	1.14323	10.3340
$u=\ \ 0.189645-0.628851I$ $a=\ \ 1.54546-0.01054I$ $b=-0.507802+0.258078I$	$2.64192+2.05432I$	$2.87162-3.29014I$
$u=\ \ 0.189645+0.628851I$ $a=\ \ 1.54546+0.01054I$ $b=-0.507802-0.258078I$	$2.64192-2.05432I$	$2.87162+3.29014I$
$u=\ \ 0.287260-0.949397I$ $a=-0.223246+1.347799I$ $b=\ \ 0.449099+0.564537I$	$5.53452+7.73594I$	$3.53535-5.97450I$

Solution to I_3^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u = \ 0.287260 + 0.949397I$ $a = -0.223246 - 1.347799I$ $b = \ 0.449099 - 0.564537I$	$5.53452 - 7.73594I$	$3.53535 + 5.97450I$
$u = \ 0.304871 - 0.736652I$ $a = \ 0.064237 - 1.378241I$ $b = -0.042960 - 0.902464I$	$4.00435I$	$-\ 6.49701I$
$u = \ 0.304871 + 0.736652I$ $a = \ 0.064237 + 1.378241I$ $b = -0.042960 + 0.902464I$	$-\ 4.00435I$	$6.49701I$
$u = \ 0.663124 - 0.414913I$ $a = -0.877548 + 0.104551I$ $b = \ 0.025935 - 0.162985I$	$-1.359855 + 0.095322I$	$-5.80027 + 0.42636I$
$u = \ 0.663124 + 0.414913I$ $a = -0.877548 - 0.104551I$ $b = \ 0.025935 + 0.162985I$	$-1.359855 - 0.095322I$	$-5.80027 - 0.42636I$
$u = \ 0.815255$ $a = -0.456050$ $b = \ 0.483276$	-1.14323	-10.3340
$u = \ 1.002247 - 0.681949I$ $a = \ 0.915743 + 0.250999I$ $b = \ 0.733083 - 0.138976I$	$3.39729 - 2.12414I$	$2.18234 + 2.03948I$
$u = \ 1.002247 + 0.681949I$ $a = \ 0.915743 - 0.250999I$ $b = \ 0.733083 + 0.138976I$	$3.39729 + 2.12414I$	$2.18234 - 2.03948I$
$u = \ 1.149778 - 0.131368I$ $a = -0.324048 + 0.515533I$ $b = -0.01878 + 2.94100I$	$0.739532I$	$4.35806I$
$u = \ 1.149778 + 0.131368I$ $a = -0.324048 - 0.515533I$ $b = -0.01878 - 2.94100I$	$-\ 0.739532I$	$-\ 4.35806I$

Solution to I_3^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u = 1.309997 - 0.135095I$ $a = 0.573428 + 0.440347I$ $b = 0.82506 + 2.10013I$	$-2.64192 + 2.05432I$	$-2.87162 - 3.29014I$
$u = 1.309997 + 0.135095I$ $a = 0.573428 - 0.440347I$ $b = 0.82506 - 2.10013I$	$-2.64192 - 2.05432I$	$-2.87162 + 3.29014I$
$u = 1.44998 - 0.26685I$ $a = -0.678906 - 0.481229I$ $b = -1.61346 - 1.89078I$	$2.34523 + 5.26340I$	$1.79194 - 3.97493I$
$u = 1.44998 + 0.26685I$ $a = -0.678906 + 0.481229I$ $b = -1.61346 + 1.89078I$	$2.34523 - 5.26340I$	$1.79194 + 3.97493I$

IV. u-Polynomials

Crossings	u-Polynomials at each crossings
c_1, c_9, c_{10}	$(u-1)^2(u^2+u-1)(u^{34}+4u^{33}+\cdots-10u+1)$
c_2, c_8	$u^2(u^2+u-1)(u^{34}+2u^{33}+\cdots+4u+4)$
c_3, c_4, c_7	$(u+1)^2(u^2-u-1)(u^{34}+4u^{33}+\cdots-10u+1)$
c_5, c_6	$u^2(u^2-u-1)(u^{34}+2u^{33}+\cdots+4u+4)$

V. Riley Polynomials

Crossings	Riley Polynomials at each crossings
c_1, c_3, c_4 c_7, c_9, c_{10}	$(y-1)^2(y^2-3y+1)(y^{34}-32y^{33}+\cdots-42y+1)$
c_2, c_5, c_6 c_8	$y^2(y^2-3y+1)(y^{34}-18y^{33}+\cdots-296y+16)$