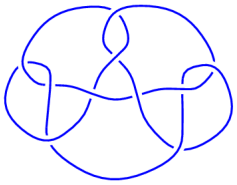
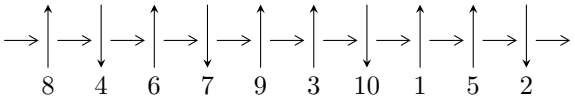
10_{60} $(K10a_1)$



[1]

Arc Sequences



Solving Sequence

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

Representation Ideals

$$I = \bigcap_{i=1}^{4} I_i^u$$

$I_1^u = \langle u^{12} - u^{11} + 4u^{10} - 3u^9 + 7u^8 - 5u^7 + 6u^6 - 4u^5 + 2u^4 - 2u^3 + u^2 + 1,\ -u^2 + a - 1,$
$\quad u^{10} - u^9 + 4u^8 - 3u^7 + 6u^6 - 4u^5 + 3u^4 - 2u^3 + b + 1\rangle$
$I_2^u = \langle u^{34} - 2u^{33} + \cdots - 3u + 1,\ -u^{33} - 6u^{31} + \cdots + b + u,\ u^{33} - u^{32} + \cdots + a - 2\rangle$
$I_3^u = \langle u^2 + u + 1,\ b + 1,\ a - 1\rangle$
$I_4^u = \langle u^2 + u + 1,\ a - u,\ b + u\rangle$

There are 4 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. $I_1^u = \langle u^{12} - u^{11} + \cdots + u^2 + 1,\ -u^2 + a - 1,\ u^{10} - u^9 + \cdots + b + 1 \rangle$

(i) Arc colorings

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

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

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

$$a_8 = \begin{pmatrix} -u^5 - 2u^3 - u \\ u^{11} - u^{10} + 3u^9 - 2u^8 + 3u^7 - 2u^6 + u^5 + u \end{pmatrix}$$

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

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

$$a_5 = \begin{pmatrix} u^2 + 1 \\ u^4 \end{pmatrix}$$

$$a_2 = \begin{pmatrix} u^4 + u^2 + 1 \\ -u^4 \end{pmatrix}$$

$$a_1 = \begin{pmatrix} -u^6 - u^4 + 1 \\ -u^{10} + u^9 - 4u^8 + 3u^7 - 5u^6 + 4u^5 - 3u^4 + 2u^3 - 1 \end{pmatrix}$$

$$a_9 = \begin{pmatrix} u^7 + 2u^5 + 2u^3 \\ u^9 - u^8 + 2u^7 - 2u^6 + 2u^5 - 2u^4 \end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes

$= 4u^{11} - 8u^{10} + 18u^9 - 26u^8 + 34u^7 - 40u^6 + 34u^5 - 24u^4 + 16u^3 - 4u^2 + 6u - 2$

(iv) Complex Volumes and Cusp Shapes

Solution to I_1^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u=-0.517537-0.434237I$ $a=\ 1.079283+0.449467I$ $b=\ 0.498959+0.227148I$	$1.31194+0.92364I$	$6.23895-2.73595I$
$u=-0.517537+0.434237I$ $a=\ 1.079283-0.449467I$ $b=\ 0.498959-0.227148I$	$1.31194-0.92364I$	$6.23895+2.73595I$
$u=-0.496677-1.117042I$ $a=-0.001095+1.109619I$ $b=-0.55524-3.23218I$	$-2.98532+7.52709I$	$-1.88445-6.81034I$
$u=-0.496677+1.117042I$ $a=-0.001095-1.109619I$ $b=-0.55524+3.23218I$	$-2.98532-7.52709I$	$-1.88445+6.81034I$
$u=-0.178968-0.877941I$ $a=\ 0.261250+0.314247I$ $b=-1.43769+0.11203I$	$-1.87720+1.89052I$	$-4.24850-3.95054I$
$u=-0.178968+0.877941I$ $a=\ 0.261250-0.314247I$ $b=-1.43769-0.11203I$	$-1.87720-1.89052I$	$-4.24850+3.95054I$
$u=\ 0.335900-1.207597I$ $a=-0.345462-0.811263I$ $b=-0.39054+1.75205I$	$-9.48086-3.21477I$	$-6.88179+3.24710I$
$u=\ 0.335900+1.207597I$ $a=-0.345462+0.811263I$ $b=-0.39054-1.75205I$	$-9.48086+3.21477I$	$-6.88179-3.24710I$
$u=\ 0.577185-1.164539I$ $a=-0.023007-1.344310I$ $b=\ 0.18279+3.26758I$	$-5.9276-13.9800I$	$-2.44387+9.26853I$
$u=\ 0.577185+1.164539I$ $a=-0.023007+1.344310I$ $b=\ 0.18279-3.26758I$	$-5.9276+13.9800I$	$-2.44387-9.26853I$

	Solution to I_1^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u=$	$0.780097-0.281995I$		
$a=$	$1.52903-0.43997I$	$-0.78013+3.73206I$	$3.21966-2.51013I$
$b=$	$0.201720+0.304853I$		
$u=$	$0.780097+0.281995I$		
$a=$	$1.52903+0.43997I$	$-0.78013-3.73206I$	$3.21966+2.51013I$
$b=$	$0.201720-0.304853I$		

II.

$\boldsymbol{I_2^u = \langle u^{34}-2u^{33}+\cdots-3u+1,\ -u^{33}-6u^{31}+\cdots+b+u,\ u^{33}-u^{32}+\cdots+a-2\rangle}$

(i) Arc colorings

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

$$a_{10} = \begin{pmatrix} -u^{33}+u^{32}+\cdots-2u+2 \\ u^{33}+6u^{31}+\cdots+u^2-u \end{pmatrix}$$

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

$$a_8 = \begin{pmatrix} u^{33}-u^{32}+\cdots+u+1 \\ -u^{33}+u^{32}+\cdots+2u^2-u \end{pmatrix}$$

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

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

$$a_5 = \begin{pmatrix} u^2+1 \\ u^4 \end{pmatrix}$$

$$a_2 = \begin{pmatrix} u^4+u^2+1 \\ -u^4 \end{pmatrix}$$

$$a_1 = \begin{pmatrix} u^{33}-3u^{32}+\cdots+3u+1 \\ -u^{33}+6u^{32}+\cdots-9u+3 \end{pmatrix}$$

$$a_9 = \begin{pmatrix} u^{33}-3u^{32}+\cdots-6u^2+4u \\ -u^{33}+5u^{32}+\cdots-7u+2 \end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes $= -3u^{33}+8u^{32}-27u^{31}+61u^{30}-117u^{29}+247u^{28}-346u^{27}+669u^{26}-778u^{25}+1328u^{24}-1416u^{23}+2034u^{22}-2108u^{21}+2492u^{20}-2552u^{19}+2536u^{18}-2457u^{17}+2183u^{16}-1857u^{15}+1579u^{14}-1103u^{13}+889u^{12}-533u^{11}+364u^{10}-219u^9+98u^8-68u^7+38u^6-24u^5+20u^4-6u^3+14u^2-7u+7$

(iv) Complex Volumes and Cusp Shapes

Solution to I_2^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u=-0.723313-0.731528I$ $a=\ \ 0.328455-1.178852I$ $b=-0.176589+0.524506I$	$-0.85292+6.04614I$	$-0.59802-7.72564I$
$u=-0.723313+0.731528I$ $a=\ \ 0.328455+1.178852I$ $b=-0.176589-0.524506I$	$-0.85292-6.04614I$	$-0.59802+7.72564I$
$u=-0.678441-0.881986I$ $a=\ \ 0.871920-0.390394I$ $b=-1.141003+0.442039I$	$-1.29776-0.72905I$	$-2.79971+1.68011I$
$u=-0.678441+0.881986I$ $a=\ \ 0.871920+0.390394I$ $b=-1.141003-0.442039I$	$-1.29776+0.72905I$	$-2.79971-1.68011I$
$u=-0.624264-0.668207I$ $a=\ \ 0.166445+0.822713I$ $b=\ \ 0.309113-0.125576I$	$1.18281+1.86595I$	$4.34837-4.33037I$
$u=-0.624264+0.668207I$ $a=\ \ 0.166445-0.822713I$ $b=\ \ 0.309113+0.125576I$	$1.18281-1.86595I$	$4.34837+4.33037I$
$u=-0.596010-0.210045I$ $a=-1.83557-0.41307I$ $b=-0.741127-0.310698I$	$-0.47242-3.20284I$	$2.38038+3.25895I$
$u=-0.596010+0.210045I$ $a=-1.83557+0.41307I$ $b=-0.741127+0.310698I$	$-0.47242+3.20284I$	$2.38038-3.25895I$
$u=-0.575012-0.946029I$ $a=-0.514761-0.206309I$ $b=\ \ 1.002864+0.628667I$	$0.36198+2.83643I$	$1.96538-0.68566I$
$u=-0.575012+0.946029I$ $a=-0.514761+0.206309I$ $b=\ \ 1.002864-0.628667I$	$0.36198-2.83643I$	$1.96538+0.68566I$

Solution to I_2^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u=-0.484889-1.050778I$ $a=-0.069271-0.725588I$ $b=\ \ 0.33138+2.16339I$	$-0.47242+3.20284I$	$2.38038-3.25895I$
$u=-0.484889+1.050778I$ $a=-0.069271+0.725588I$ $b=\ \ 0.33138-2.16339I$	$-0.47242-3.20284I$	$2.38038+3.25895I$
$u=-0.387508-1.102146I$ $a=-0.484211+0.706637I$ $b=\ \ 1.16510-2.64321I$	-3.76357	-3.71974
$u=-0.387508+1.102146I$ $a=-0.484211-0.706637I$ $b=\ \ 1.16510+2.64321I$	-3.76357	-3.71974
$u=\ \ 0.242359-1.211257I$ $a=-0.637177-1.117123I$ $b=\ \ 0.76286+2.68052I$	$-8.21063+5.43973I$	$-5.49430-3.57628I$
$u=\ \ 0.242359+1.211257I$ $a=-0.637177+1.117123I$ $b=\ \ 0.76286-2.68052I$	$-8.21063-5.43973I$	$-5.49430+3.57628I$
$u=\ \ 0.276836-1.167189I$ $a=\ \ 0.646960+0.924485I$ $b=-0.64285-1.93748I$	$-5.23887+0.57053I$	$-2.63434+0.09683I$
$u=\ \ 0.276836+1.167189I$ $a=\ \ 0.646960-0.924485I$ $b=-0.64285+1.93748I$	$-5.23887-0.57053I$	$-2.63434-0.09683I$
$u=\ \ 0.372098-0.537745I$ $a=-0.62737+1.88224I$ $b=-0.155242-1.119602I$	$0.36198-2.83643I$	$1.96538+0.68566I$
$u=\ \ 0.372098+0.537745I$ $a=-0.62737-1.88224I$ $b=-0.155242+1.119602I$	$0.36198+2.83643I$	$1.96538-0.68566I$

Solution to I_2^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u = 0.441434 - 1.051178I$ $a = 1.344556 - 0.000926I$ $b = -1.43068 + 0.25409I$	$-1.29776 - 0.72905I$	$-2.79971 + 1.68011I$
$u = 0.441434 + 1.051178I$ $a = 1.344556 + 0.000926I$ $b = -1.43068 - 0.25409I$	$-1.29776 + 0.72905I$	$-2.79971 - 1.68011I$
$u = 0.492477 - 1.076416I$ $a = -1.122366 + 0.568747I$ $b = 1.19377 - 1.14815I$	$-0.85292 - 6.04614I$	$-0.59802 + 7.72564I$
$u = 0.492477 + 1.076416I$ $a = -1.122366 - 0.568747I$ $b = 1.19377 + 1.14815I$	$-0.85292 + 6.04614I$	$-0.59802 - 7.72564I$
$u = 0.520828 - 1.178386I$ $a = -0.004030 - 0.685712I$ $b = 0.76870 + 1.98060I$	$-8.21063 - 5.43973I$	$-5.49430 + 3.57628I$
$u = 0.520828 + 1.178386I$ $a = -0.004030 + 0.685712I$ $b = 0.76870 - 1.98060I$	$-8.21063 + 5.43973I$	$-5.49430 - 3.57628I$
$u = 0.521356 - 0.372677I$ $a = 1.00471 - 1.48964I$ $b = -0.106974 + 0.687109I$	$1.18281 + 1.86595I$	$4.34837 - 4.33037I$
$u = 0.521356 + 0.372677I$ $a = 1.00471 + 1.48964I$ $b = -0.106974 - 0.687109I$	$1.18281 - 1.86595I$	$4.34837 + 4.33037I$
$u = 0.556877 - 1.148564I$ $a = -0.214681 + 1.159410I$ $b = 0.05655 - 2.69776I$	$-3.32961 - 8.73955I$	$0.19211 + 5.92158I$
$u = 0.556877 + 1.148564I$ $a = -0.214681 - 1.159410I$ $b = 0.05655 + 2.69776I$	$-3.32961 + 8.73955I$	$0.19211 - 5.92158I$

Solution to I_2^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u = \quad 0.805751 - 0.171048I$ $a = -1.028646 - 0.026551I$ $b = -0.302216 - 0.609958I$	$-5.23887 + 0.57053I$	$-2.63434 + 0.09683I$
$u = \quad 0.805751 + 0.171048I$ $a = -1.028646 + 0.026551I$ $b = -0.302216 + 0.609958I$	$-5.23887 - 0.57053I$	$-2.63434 - 0.09683I$
$u = \quad 0.839419 - 0.294756I$ $a = -1.82497 + 0.19539I$ $b = -0.393657 - 0.170260I$	$-3.32961 + 8.73955I$	$0.19211 - 5.92158I$
$u = \quad 0.839419 + 0.294756I$ $a = -1.82497 - 0.19539I$ $b = -0.393657 + 0.170260I$	$-3.32961 - 8.73955I$	$0.19211 + 5.92158I$

III. $I_3^u = \langle u^2+u+1,\ b+1,\ a-1\rangle$

(i) Arc colorings

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

(ii) Obstruction class $= 1$

(iii) Cusp Shapes $= 3$

(iv) Complex Volumes and Cusp Shapes

Solution to I_3^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u=-0.500000-0.866025I$ $a=\quad 1.00000$ $b=-1.00000$	0	3.00000
$u=-0.500000+0.866025I$ $a=\quad 1.00000$ $b=-1.00000$	0	3.00000

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

(i) Arc colorings

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

(ii) Obstruction class $= 1$

(iii) Cusp Shapes $= 8u + 4$

(iv) Complex Volumes and Cusp Shapes

Solution to I_4^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u=-0.500000-0.866025I$		
$a=-0.500000-0.866025I$	$4.05977I$	$-6.92820I$
$b=\ \ 0.500000+0.866025I$		
$u=-0.500000+0.866025I$		
$a=-0.500000+0.866025I$	$-4.05977I$	$6.92820I$
$b=\ \ 0.500000-0.866025I$		

V. u-Polynomials

Crossings	u-Polynomials at each crossings
c_1, c_6	$(u^2-u+1)^2$ $(u^{12}+u^{11}+4u^{10}+3u^9+7u^8+5u^7+6u^6+4u^5+2u^4+2u^3+u^2+1)$ $(u^{34}+2u^{33}+\cdots+3u+1)$
c_2, c_{10}	$(u^2-u+1)^2(u^{12}+7u^{11}+\cdots+2u+1)(u^{34}+16u^{33}+\cdots+u+1)$
c_3, c_8	$(u^2+u+1)^2$ $(u^{12}+u^{11}+4u^{10}+3u^9+7u^8+5u^7+6u^6+4u^5+2u^4+2u^3+u^2+1)$ $(u^{34}+2u^{33}+\cdots+3u+1)$
c_4, c_7	$(u^2-u+1)^2(u^{12}+u^{11}+\cdots-2u+1)(u^{34}+2u^{33}+\cdots+183u+73)$
c_5, c_9	$u^4(u^{12}+5u^{11}+\cdots+12u+4)$ $(2-5u+12u^2-18u^3+28u^4-32u^5+34u^6-28u^7+16u^8-u^9-12u^{10}+22u^{11}-20u^{12}+$

VI. Riley Polynomials

Crossings	Riley Polynomials at each crossings
c_1, c_3, c_6 c_8	$(y^2+y+1)^2(y^{12}+7y^{11}+\cdots+2y+1)(y^{34}+16y^{33}+\cdots+y+1)$
c_2, c_{10}	$(y^2+y+1)^2(y^{12}-y^{11}+\cdots+6y+1)(y^{34}+4y^{33}+\cdots+17y+1)$
c_4, c_7	$(y^2+y+1)^2(y^{12}-9y^{11}+\cdots+2y+1)$ $(y^{34}-8y^{33}+\cdots-12903y+5329)$
c_5, c_9	$y^4(y^{12}+5y^{11}+\cdots-16y+16)$ $(-4-23y-76y^2-164y^3-232y^4-198y^5-76y^6-30y^7-178y^8-357y^9-304y^{10}-34y^{11}$