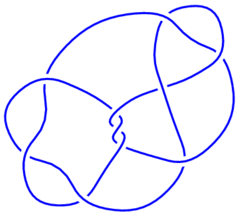
10_{68} $(K10a_{67})$



[1]

Arc Sequences

$$\to\downarrow\to\uparrow\to\uparrow\to\uparrow\to\downarrow\to\downarrow\to\uparrow\to\uparrow\to\uparrow\to\uparrow\to$$

6 9 8 10 7 2 1 3 5 4

Solving Sequence

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

Representation Ideals

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

$$\begin{aligned}
I_1^u &= \langle u^4 - u^2 + 1,\ -u^3 + b,\ -u^3 - u^2 + a + u + 1\rangle \\
I_2^u &= \langle b^{18} + b^{17} + \cdots - 6b + 1,\ 389b^{17} - 3339b^{16} + \cdots + 12107a + 6552, \\
&\quad 4802b^{17} + 12107u + \cdots + 19536b - 16224\rangle \\
I_3^u &= \langle u^{14} + 3u^{13} + u^{12} - 8u^{11} - 12u^{10} + u^9 + 19u^8 + 18u^7 - 2u^6 - 18u^5 - 13u^4 + 3u^3 + 11u^2 + 7u + 2, \\
&\quad - u^{13} - 2u^{12} + u^{11} + 7u^{10} + 5u^9 - 6u^8 - 13u^7 - 5u^6 + 8u^5 + 11u^4 + u^3 - 6u^2 + b - 5u - 1, \\
&\quad - 5u^{13} - 11u^{12} + 5u^{11} + 38u^{10} + 28u^9 - 35u^8 - 71u^7 - 26u^6 + 44u^5 + 58u^4 + 9u^3 - 33u^2 + 2a - 27u - 7\rangle
\end{aligned}$$

There are 3 irreducible components with 36 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. $I_1^u = \langle u^4 - u^2 + 1,\ -u^3 + b,\ -u^3 - u^2 + a + u + 1\rangle$

(i) Arc colorings

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

(ii) Obstruction class $= 1$

(iii) Cusp Shapes $= 4u^2 - 4$

(iv) Complex Volumes and Cusp Shapes

Solution to I_1^u	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.866025 - 0.500000I$ $a = 0.366025 + 0.366025I$ $b = -1.00000I$	$-3.28987 - 2.02988I$	$-2.00000 + 3.46410I$
$u = -0.866025 + 0.500000I$ $a = 0.366025 - 0.366025I$ $b = 1.00000I$	$-3.28987 + 2.02988I$	$-2.00000 - 3.46410I$
$u = 0.866025 - 0.500000I$ $a = -1.36603 - 1.36603I$ $b = -1.00000I$	$-3.28987 + 2.02988I$	$-2.00000 - 3.46410I$
$u = 0.866025 + 0.500000I$ $a = -1.36603 + 1.36603I$ $b = 1.00000I$	$-3.28987 - 2.02988I$	$-2.00000 + 3.46410I$

II. $\boldsymbol{I_2^u = \langle b^{18} + b^{17} + \cdots - 6b + 1,\ 389b^{17} - 3339b^{16} + \cdots + 12107a + 6552,\ 4802b^{17} + 12107u + \cdots + 19536b - 16224\rangle}$

(i) Arc colorings

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

$$a_9 = \begin{pmatrix} -0.0321302b^{17} + 0.275791b^{16} + \cdots + 3.26704b - 0.541175 \\ b \end{pmatrix}$$

$$a_3 = \begin{pmatrix} -0.307921b^{17} - 1.01247b^{16} + \cdots + 0.733956b + 0.967870 \\ -b^2 \end{pmatrix}$$

$$a_7 = \begin{pmatrix} 0 \\ -0.396630b^{17} - 0.682911b^{16} + \cdots - 1.61361b + 1.34005 \end{pmatrix}$$

$$a_6 = \begin{pmatrix} -0.396630b^{17} - 0.682911b^{16} + \cdots - 1.61361b + 1.34005 \\ -0.396630b^{17} - 0.682911b^{16} + \cdots - 1.61361b + 1.34005 \end{pmatrix}$$

$$a_1 = \begin{pmatrix} 0.579830b^{17} + 0.616833b^{16} + \cdots + 4.42265b - 0.550012 \\ 0.579830b^{17} + 0.616833b^{16} + \cdots + 4.42265b - 1.55001 \end{pmatrix}$$

$$a_5 = \begin{pmatrix} -0.396630b^{17} - 0.682911b^{16} + \cdots - 1.61361b + 1.34005 \\ 0.275791b^{17} + 0.288263b^{16} + \cdots + 1.53308b + 0.490956 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} -0.184439b^{17} + 0.0818535b^{16} + \cdots - 0.333443b - 0.0474106 \\ -0.521516b^{17} - 0.492690b^{16} + \cdots - 4.87387b + 1.79698 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} -0.606674b^{17} - 0.941687b^{16} + \cdots - 2.45147b + 1.64029 \\ -b^4 - 2b^2 \end{pmatrix}$$

$$a_8 = \begin{pmatrix} 0.672421b^{17} + 0.971174b^{16} + \cdots + 4.14669b - 0.849096 \\ b^3 + b \end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes $= -\frac{31900}{12107}b^{17} - \frac{61944}{12107}b^{16} + \cdots - \frac{168364}{12107}b + \frac{112870}{12107}$

(iv) Complex Volumes and Cusp Shapes

Solution to I_2^u	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 1.172473 - 0.500383I$ $a = -1.30737 + 0.64095I$ $b = -0.912264 - 0.491243I$	$-6.88799 + 7.08493I$	$-1.57680 - 5.91335I$
$u = 1.172473 + 0.500383I$ $a = -1.30737 - 0.64095I$ $b = -0.912264 + 0.491243I$	$-6.88799 - 7.08493I$	$-1.57680 + 5.91335I$
$u = -1.173911 - 0.391555I$ $a = -0.295022 - 0.527057I$ $b = -0.792965 - 0.741615I$	$-7.66122 - 1.33617I$	$-3.28409 + 0.70175I$
$u = -1.173911 + 0.391555I$ $a = -0.295022 + 0.527057I$ $b = -0.792965 + 0.741615I$	$-7.66122 + 1.33617I$	$-3.28409 - 0.70175I$
$u = 0.141484 + 0.739668I$ $a = -0.580256 - 0.436812I$ $b = -0.118400 - 1.390976I$	$-3.90681 + 2.45442I$	$1.67208 - 2.91298I$
$u = 0.141484 - 0.739668I$ $a = -0.580256 + 0.436812I$ $b = -0.118400 + 1.390976I$	$-3.90681 - 2.45442I$	$1.67208 + 2.91298I$
$u = 0.772920 - 0.510351I$ $a = -1.134685 - 0.621833I$ $b = -0.103396 - 1.069764I$	$-1.50643 + 2.09337I$	$4.51499 - 4.16283I$
$u = 0.772920 + 0.510351I$ $a = -1.134685 + 0.621833I$ $b = -0.103396 + 1.069764I$	$-1.50643 - 2.09337I$	$4.51499 + 4.16283I$
$u = -1.173911 + 0.391555I$ $a = -0.93744 + 1.09998I$ $b = -0.00304 - 1.47476I$	$-7.66122 + 1.33617I$	$-3.28409 - 0.70175I$
$u = -1.173911 - 0.391555I$ $a = -0.93744 - 1.09998I$ $b = -0.00304 + 1.47476I$	$-7.66122 - 1.33617I$	$-3.28409 + 0.70175I$

Solution to I_2^u		$\sqrt{-1}(\text{vol}+\sqrt{-1}CS)$	Cusp shape
$u =$	$1.172473 + 0.500383I$		
$a =$	$1.71906 + 0.77036I$	$-6.88799 - 7.08493I$	$-1.57680 + 5.91335I$
$b =$	$0.18330 - 1.47754I$		
$u =$	$1.172473 - 0.500383I$		
$a =$	$1.71906 - 0.77036I$	$-6.88799 + 7.08493I$	$-1.57680 - 5.91335I$
$b =$	$0.18330 + 1.47754I$		
$u =$	$0.772920 + 0.510351I$		
$a =$	$0.651119 - 0.926889I$	$-1.50643 - 2.09337I$	$4.51499 + 4.16283I$
$b =$	$0.243739 - 0.102909I$		
$u =$	$0.772920 - 0.510351I$		
$a =$	$0.651119 + 0.926889I$	$-1.50643 + 2.09337I$	$4.51499 - 4.16283I$
$b =$	$0.243739 + 0.102909I$		
$u =$	-0.825933		
$a =$	$1.78189 + 0.72543I$	-4.48831	-4.65235
$b =$	$0.256179 - 1.094021I$		
$u =$	-0.825933		
$a =$	$1.78189 - 0.72543I$	-4.48831	-4.65235
$b =$	$0.256179 + 1.094021I$		
$u =$	$0.141484 - 0.739668I$		
$a =$	$1.60270 - 0.68359I$	$-3.90681 - 2.45442I$	$1.67208 + 2.91298I$
$b =$	$0.746849 - 0.515863I$		
$u =$	$0.141484 + 0.739668I$		
$a =$	$1.60270 + 0.68359I$	$-3.90681 + 2.45442I$	$1.67208 - 2.91298I$
$b =$	$0.746849 + 0.515863I$		

III. $I_3^u = \langle u^{14}+3u^{13}+\cdots+7u+2,\ -u^{13}-2u^{12}+\cdots+b-1,\ -5u^{13}-11u^{12}+\cdots+2a-7\rangle$

(i) Arc colorings

$$a_2 = \begin{pmatrix}1\\0\end{pmatrix}$$
$$a_9 = \begin{pmatrix}\frac{5}{2}u^{13}+\frac{11}{2}u^{12}+\cdots+\frac{27}{2}u+\frac{7}{2}\\ u^{13}+2u^{12}+\cdots+5u+1\end{pmatrix}$$
$$a_3 = \begin{pmatrix}-\frac{1}{2}u^{13}-\frac{1}{2}u^{12}+\cdots-\frac{1}{2}u+\frac{1}{2}\\ u^{12}+u^{11}+\cdots+3u+1\end{pmatrix}$$
$$a_7 = \begin{pmatrix}0\\u\end{pmatrix}$$
$$a_6 = \begin{pmatrix}u\\u\end{pmatrix}$$
$$a_1 = \begin{pmatrix}-u^2+1\\-u^2\end{pmatrix}$$
$$a_5 = \begin{pmatrix}u\\-u^3+u\end{pmatrix}$$
$$a_{10} = \begin{pmatrix}\frac{3}{2}u^{13}+\frac{7}{2}u^{12}+\cdots+\frac{15}{2}u+\frac{3}{2}\\ u^{13}+2u^{12}+\cdots+4u+1\end{pmatrix}$$
$$a_4 = \begin{pmatrix}-\frac{1}{2}u^{13}-\frac{1}{2}u^{12}+\cdots+\frac{1}{2}u+\frac{1}{2}\\ u^{13}+3u^{12}+\cdots+9u+3\end{pmatrix}$$
$$a_8 = \begin{pmatrix}u^5-2u^3+u\\u^5-u^3+u\end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes
$= -2u^{13}-4u^{12}+4u^{11}+18u^{10}+6u^9-26u^8-30u^7+8u^6+32u^5+20u^4-16u^3-20u^2-6u+10$

(iv) Complex Volumes and Cusp Shapes

Solution to I_3^u	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -1.211205 - 0.579083I$ $a = -1.90400 - 0.21727I$ $b = -0.33038 + 1.55103I$	$-13.5268 - 11.6370I$	$-3.43423 + 6.31221I$
$u = -1.211205 + 0.579083I$ $a = -1.90400 + 0.21727I$ $b = -0.33038 - 1.55103I$	$-13.5268 + 11.6370I$	$-3.43423 - 6.31221I$
$u = -1.041837 - 0.481714I$ $a = 0.984465 + 0.702849I$ $b = 0.552436 - 0.381452I$	$-0.78724 - 4.41668I$	$3.49417 + 7.88625I$
$u = -1.041837 + 0.481714I$ $a = 0.984465 - 0.702849I$ $b = 0.552436 + 0.381452I$	$-0.78724 + 4.41668I$	$3.49417 - 7.88625I$
$u = -0.830389 - 0.784414I$ $a = 0.92687 - 1.26515I$ $b = 0.04509 - 1.43706I$	$-6.78342 - 2.90589I$	$-2.10855 + 2.91897I$
$u = -0.830389 + 0.784414I$ $a = 0.92687 + 1.26515I$ $b = 0.04509 + 1.43706I$	$-6.78342 + 2.90589I$	$-2.10855 - 2.91897I$
$u = -0.400528 - 0.482833I$ $a = -1.076986 - 0.113831I$ $b = -0.498731 - 0.157320I$	$1.035524 + 0.368514I$	$9.33320 - 2.06000I$
$u = -0.400528 + 0.482833I$ $a = -1.076986 + 0.113831I$ $b = -0.498731 + 0.157320I$	$1.035524 - 0.368514I$	$9.33320 + 2.06000I$
$u = -0.243278 - 0.917020I$ $a = 0.780413 + 1.135089I$ $b = 0.26550 + 1.53094I$	$-10.58651 + 6.18900I$	$-1.00936 - 2.90508I$
$u = -0.243278 + 0.917020I$ $a = 0.780413 - 1.135089I$ $b = 0.26550 - 1.53094I$	$-10.58651 - 6.18900I$	$-1.00936 + 2.90508I$

Solution to I_3^u	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u = \ \ 0.941064 - 0.407114I$ $a = -0.198597 + 0.140678I$ $b = \ \ 0.164790 - 0.466680I$	$-1.42730 + 1.54478I$	$1.163355 - 0.228482I$
$u = \ \ 0.941064 + 0.407114I$ $a = -0.198597 - 0.140678I$ $b = \ \ 0.164790 + 0.466680I$	$-1.42730 - 1.54478I$	$1.163355 + 0.228482I$
$u = \ \ 1.286173 - 0.280982I$ $a = \ \ 0.237831 - 0.480033I$ $b = -0.19870 + 1.61232I$	$-15.6273 - 2.2414I$	$-5.43859 + 0.46441I$
$u = \ \ 1.286173 + 0.280982I$ $a = \ \ 0.237831 + 0.480033I$ $b = -0.19870 - 1.61232I$	$-15.6273 + 2.2414I$	$-5.43859 - 0.46441I$

IV. u-Polynomials

Crossings	u-Polynomials at each crossings
c_1, c_6	$(u^4-u^2+1)(u^9-u^8-2u^7+3u^6+u^5-3u^4+2u^3-u+1)^2$ $(u^{14}+3u^{13}+\cdots+7u+2)$
c_2, c_3, c_4 c_8, c_9, c_{10}	$(u^2+1)^2(u^{14}+9u^{12}+\cdots+u^2+1)(u^{18}+u^{17}+\cdots-6u+1)$
c_5	$(u^2-u+1)^2$ $(u^9+5u^8+12u^7+15u^6+9u^5-u^4-4u^3-2u^2+u+1)^2$ $(u^{14}+7u^{13}+\cdots+5u+4)$
c_7	(u^4-u^2+1) $(u^9-3u^8+8u^7-13u^6+17u^5-17u^4+12u^3-6u^2+u+1)^2$ $(u^{14}+9u^{13}+\cdots+115u+26)$

V. Riley Polynomials

Crossings	Riley Polynomials at each crossings
c_1, c_6	$(y^2 - y + 1)^2$ $(y^9 - 5y^8 + 12y^7 - 15y^6 + 9y^5 + y^4 - 4y^3 + 2y^2 + y - 1)^2$ $(y^{14} - 7y^{13} + \cdots - 5y + 4)$
c_2, c_3, c_4 c_8, c_9, c_{10}	$(y+1)^4(y^{14} + 18y^{13} + \cdots + 2y + 1)(y^{18} + 15y^{17} + \cdots - 16y + 1)$
c_5	$(y^2 + y + 1)^2(y^9 - y^8 + 12y^7 - 7y^6 + 37y^5 + y^4 - 10y^2 + 5y - 1)^2$ $(y^{14} + y^{13} + \cdots + 191y + 16)$
c_7	$(y^2 - y + 1)^2$ $(y^9 + 7y^8 + 20y^7 + 25y^6 + 5y^5 - 15y^4 + 22y^2 + 13y - 1)^2$ $(y^{14} + 5y^{13} + \cdots - 69y + 676)$