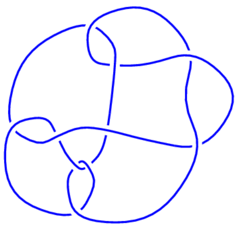
10_{133} $(K10n_4)$



[1]

Arc Sequences

$$\to \underset{8}{\downarrow} \to \underset{1}{\downarrow} \to \underset{6}{\downarrow} \to \underset{3}{\downarrow} \to \underset{10}{\uparrow} \to \underset{4}{\downarrow} \to \underset{10}{\downarrow} \to \underset{2}{\downarrow} \to \underset{5}{\uparrow} \to \underset{3}{\downarrow} \to$$

Solving Sequence

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

Representation Ideals

$$I = \bigcap_{i=1}^{2} I_i^u$$

$$\begin{aligned}
I_1^u &= \langle b^3 + b^2 + 2b + 1,\ a,\ u - 1\rangle \\
I_2^u &= \langle u^{12} + 4u^{11} + 8u^{10} + 5u^9 - 5u^8 - 15u^7 - 9u^6 + 8u^4 + 2u^3 - 2u^2 - 4u - 1, \\
&\quad u^{11} + 5u^{10} + 9u^9 + 2u^8 - 15u^7 - 18u^6 + u^5 + 13u^4 + 5u^3 - u^2 + 4b - 7u + 1, \\
&\quad - u^{11} - 5u^{10} - 11u^9 - 8u^8 + 9u^7 + 24u^6 + 13u^5 - 7u^4 - 13u^3 - 3u^2 + 2a + 5u + 5\rangle
\end{aligned}$$

There are 2 irreducible components with 15 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. $I_1^u = \langle b^3 + b^2 + 2b + 1,\ a,\ u - 1 \rangle$

(i) Arc colorings

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

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

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

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

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

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

$$a_1 = \begin{pmatrix} -b \\ b \end{pmatrix}$$

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

$$a_9 = \begin{pmatrix} 0 \\ b \end{pmatrix}$$

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

(ii) Obstruction class $= -1$

(iii) Cusp Shapes $= -7b^2 - 5b - 17$

(iv) Complex Volumes and Cusp Shapes

Solution to I_1^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 1.00000$ $a = 0$ $b = -0.569840$	-2.75839	-16.4238
$u = 1.00000$ $a = 0$ $b = -0.215080 - 1.307141I$	$1.37919 - 2.82812I$	$-4.28809 + 2.59975I$
$u = 1.00000$ $a = 0$ $b = -0.215080 + 1.307141I$	$1.37919 + 2.82812I$	$-4.28809 - 2.59975I$

II.
$$\boldsymbol{I_2^u = \langle u^{12}+4u^{11}+\cdots-4u-1,\ u^{11}+5u^{10}+\cdots+4b+1,\ -u^{11}-5u^{10}+\cdots+2a+5\rangle}$$

(i) Arc colorings

$$a_3 = \begin{pmatrix}1\\0\end{pmatrix}$$
$$a_6 = \begin{pmatrix}0\\u\end{pmatrix}$$
$$a_4 = \begin{pmatrix}1\\u^2\end{pmatrix}$$
$$a_7 = \begin{pmatrix}-u\\-u^3+u\end{pmatrix}$$
$$a_{10} = \begin{pmatrix}\frac{1}{2}u^{11}+\frac{5}{2}u^{10}+\cdots-\frac{5}{2}u-\frac{5}{2}\\-\frac{1}{4}u^{11}-\frac{5}{4}u^{10}+\cdots+\frac{7}{4}u-\frac{1}{4}\end{pmatrix}$$
$$a_8 = \begin{pmatrix}u^4-u^2-2u+1\\-\frac{1}{4}u^{11}-\frac{3}{4}u^{10}+\cdots+\frac{3}{4}u+\frac{1}{4}\end{pmatrix}$$
$$a_1 = \begin{pmatrix}\frac{3}{4}u^{11}+\frac{15}{4}u^{10}+\cdots-\frac{17}{4}u-\frac{9}{4}\\-\frac{1}{4}u^{11}-\frac{5}{4}u^{10}+\cdots+\frac{7}{4}u-\frac{1}{4}\end{pmatrix}$$
$$a_2 = \begin{pmatrix}-\frac{1}{4}u^{11}-\frac{3}{4}u^{10}+\cdots+\frac{3}{4}u+\frac{1}{4}\\\frac{1}{4}u^{11}+\frac{3}{4}u^{10}+\cdots+\frac{1}{4}u-\frac{1}{4}\end{pmatrix}$$
$$a_9 = \begin{pmatrix}-\frac{3}{2}u^{11}-\frac{9}{2}u^{10}+\cdots+\frac{3}{2}u+\frac{3}{2}\\\frac{3}{4}u^{11}+\frac{7}{4}u^{10}+\cdots-\frac{1}{4}u+\frac{3}{4}\end{pmatrix}$$
$$a_5 = \begin{pmatrix}-u^2+1\\u^2\end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes
$$= 2u^{11}+\frac{17}{2}u^{10}+16u^9+\frac{13}{2}u^8-\frac{39}{2}u^7-34u^6-9u^5+\frac{35}{2}u^4+19u^3+\frac{3}{2}u^2-12u-\frac{19}{2}$$

(iv) Complex Volumes and Cusp Shapes

Solution to I_2^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u=-1.18067-1.13803I$ $a=-0.702429+1.111313I$ $b=-0.15451-1.86459I$	$14.0447-7.7983I$	$-3.16952+4.22102I$
$u=-1.18067+1.13803I$ $a=-0.702429-1.111313I$ $b=-0.15451+1.86459I$	$14.0447+7.7983I$	$-3.16952-4.22102I$
$u=-1.10559-1.21488I$ $a=0.744589-1.118153I$ $b=0.11602+1.80584I$	$14.3370-0.8045I$	$-2.71291-0.16086I$
$u=-1.10559+1.21488I$ $a=0.744589+1.118153I$ $b=0.11602-1.80584I$	$14.3370+0.8045I$	$-2.71291+0.16086I$
$u=-0.561933-0.696285I$ $a=-0.925264+0.846250I$ $b=-0.544421-1.250457I$	$2.66318-4.39533I$	$-2.94428+5.22312I$
$u=-0.561933+0.696285I$ $a=-0.925264-0.846250I$ $b=-0.544421+1.250457I$	$2.66318+4.39533I$	$-2.94428-5.22312I$
$u=-0.291129$ $a=-1.77307$ $b=-0.728189$	-1.41716	-6.22072
$u=-0.267707-0.884422I$ $a=0.991606-0.968229I$ $b=0.208639+1.095629I$	$3.72986+1.03019I$	$-1.27943-1.44119I$
$u=-0.267707+0.884422I$ $a=0.991606+0.968229I$ $b=0.208639-1.095629I$	$3.72986-1.03019I$	$-1.27943+1.44119I$
$u=0.703419-0.354505I$ $a=0.543453-0.851824I$ $b=-0.137910+0.436156I$	$-0.87372+1.32529I$	$-6.28742-4.78445I$

Solution to I_2^u	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 0.703419 + 0.354505I$ $a = 0.543453 + 0.851824I$ $b = -0.137910 - 0.436156I$	$-0.87372 - 1.32529I$	$-6.28742 + 4.78445I$
$u = 1.11609$ $a = 0.469158$ $b = -0.247448$	-2.23241	0.00782211

III. u-Polynomials

Crossings	u-Polynomials at each crossings
c_1, c_8	(u^3+u^2-1) $(u^{12}+2u^{11}+u^{10}-2u^9+u^8+6u^7+4u^6-3u^5+6u^3+3u^2-u-1)$
c_2, c_{10}	$(u^3+u^2+2u+1)(u^{12}+2u^{11}+\cdots+7u+1)$
c_3, c_6	$(u-1)^3$ $(u^{12}+4u^{11}+8u^{10}+5u^9-5u^8-15u^7-9u^6+8u^4+2u^3-2u^2-4u-1)$
c_4	$(u+1)^3(u^{12}+14u^{10}+\cdots+12u+1)$
c_5, c_9	$u^3(u^{12}+u^{11}+\cdots+36u+8)$
c_7	$(u^3+u^2+2u+1)(u^{12}+2u^{11}+\cdots+175u-49)$

IV. Riley Polynomials

Crossings	Riley Polynomials at each crossings
c_1, c_8	$(y^3 - y^2 + 2y - 1)(y^{12} - 2y^{11} + \cdots - 7y + 1)$
c_2, c_{10}	$(y^3 + 3y^2 + 2y - 1)(y^{12} + 18y^{11} + \cdots - 7y + 1)$
c_3, c_6	$(y-1)^3(y^{12} + 14y^{10} + \cdots - 12y + 1)$
c_4	$(y-1)^3(y^{12} + 28y^{11} + \cdots - 136y + 1)$
c_5, c_9	$y^3(y^{12} - 21y^{11} + \cdots - 464y + 64)$
c_7	$(y^3 + 3y^2 + 2y - 1)(y^{12} + 54y^{11} + \cdots - 39739y + 2401)$