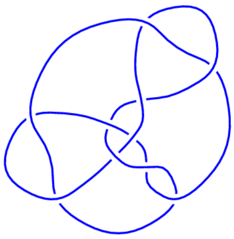
10_{161} $(K10n_{31})$



[1]

Arc Sequences

$$\to \downarrow_{7} \to \downarrow_{9} \to \downarrow_{7} \to \downarrow_{2} \to \downarrow_{9} \to \downarrow_{1} \to \downarrow_{3} \to \downarrow_{6} \to \downarrow_{4} \to \downarrow_{2} \to$$

Solving Sequence

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

Representation Ideals

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

$$\begin{aligned}
I_1^u &= \langle u^4 - 2u^2 + u + 1,\ u^2 + a - 2,\ u^3 + b - u + 1\rangle \\
I_2^u &= \langle u^6 + 6u^5 + 16u^4 + 21u^3 + 11u^2 - 2u - 4,\ -u^4 - 4u^3 - 6u^2 + 2a - u + 3, \\
&\quad - u^5 - 6u^4 - 14u^3 - 13u^2 + 2b - u + 4\rangle
\end{aligned}$$

There are 2 irreducible components with 10 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. $I_1^u = \langle u^4 - 2u^2 + u + 1,\ u^2 + a - 2,\ u^3 + b - u + 1\rangle$

(i) Arc colorings

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

(ii) Obstruction class $= 1$

(iii) Cusp Shapes $= 2u^3 - 2u^2 + 3u - 6$

(iv) Complex Volumes and Cusp Shapes

Solution to I_1^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -1.49022$ $a = -0.220744$ $b = 0.819173$	-8.36260	-21.5309
$u = -0.524889$ $a = 1.72449$ $b = -1.38028$	-4.29983	-8.41490
$u = 1.007552 - 0.513116I$ $a = 1.24813 + 1.03398I$ $b = -0.219447 + 0.914474I$	$3.04135 + 1.96274I$	$-4.02709 - 2.32656I$
$u = 1.007552 + 0.513116I$ $a = 1.24813 - 1.03398I$ $b = -0.219447 - 0.914474I$	$3.04135 - 1.96274I$	$-4.02709 + 2.32656I$

II. $\boldsymbol{I_2^u = \langle u^6 + 6u^5 + 16u^4 + 21u^3 + 11u^2 - 2u - 4,\ -u^4 - 4u^3 - 6u^2 + 2a - u + 3,\ -u^5 - 6u^4 - 14u^3 - 13u^2 + 2b - u + 4\rangle}$

(i) Arc colorings

$$a_2 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} \frac{1}{2}u^4 + 2u^3 + 3u^2 + \frac{1}{2}u - \frac{3}{2} \\ \frac{1}{2}u^5 + 3u^4 + 7u^3 + \frac{13}{2}u^2 + \frac{1}{2}u - 2 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} -\frac{1}{4}u^5 - u^4 - 2u^3 - \frac{5}{4}u^2 + \frac{3}{4}u + 1 \\ \frac{1}{2}u^5 + 2u^4 + 3u^3 + \frac{5}{2}u^2 + \frac{1}{2}u - 1 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_4 = \begin{pmatrix} -\frac{1}{4}u^5 - u^4 - 2u^3 - \frac{5}{4}u^2 + \frac{3}{4}u + 1 \\ -\frac{1}{2}u^5 - 2u^4 - 4u^3 - \frac{5}{2}u^2 + \frac{1}{2}u + 1 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} u^2 - 1 \\ u^2 \end{pmatrix}$$
$$a_1 = \begin{pmatrix} 1 \\ -u^2 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} u \\ -u^3 + u \end{pmatrix}$$
$$a_5 = \begin{pmatrix} \frac{1}{4}u^5 + u^4 + 2u^3 + \frac{5}{4}u^2 + \frac{1}{4}u \\ -\frac{1}{2}u^5 - 2u^4 - 4u^3 - \frac{5}{2}u^2 + \frac{1}{2}u + 1 \end{pmatrix}$$
$$a_8 = \begin{pmatrix} -\frac{1}{2}u^4 - 2u^3 - 2u^2 - \frac{1}{2}u + \frac{1}{2} \\ -\frac{3}{2}u^5 - 9u^4 - 17u^3 - \frac{23}{2}u^2 + \frac{3}{2}u + 4 \end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes $= u^5 + 6u^4 + 14u^3 + 13u^2 - 4u - 18$

(iv) Complex Volumes and Cusp Shapes

Solution to I_2^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -1.58486$ $a = \quad 0.435792$ $b = -0.403945$	-7.78420	-6.88359
$u = -1.55395 - 1.43504I$ $a = \quad 0.602692 - 0.633679I$ $b = -1.19447 - 2.58259I$	$13.6396 - 5.6388I$	$-8.61921 + 2.01004I$
$u = -1.55395 + 1.43504I$ $a = \quad 0.602692 + 0.633679I$ $b = -1.19447 + 2.58259I$	$13.6396 + 5.6388I$	$-8.61921 - 2.01004I$
$u = -0.878332 - 0.695514I$ $a = -0.586872 + 1.122636I$ $b = \quad 0.244201 + 0.971888I$	$2.08576 - 2.67800I$	$-9.11994 + 5.42135I$
$u = -0.878332 + 0.695514I$ $a = -0.586872 - 1.122636I$ $b = \quad 0.244201 - 0.971888I$	$2.08576 + 2.67800I$	$-9.11994 - 5.42135I$
$u = \quad 0.449415$ $a = -0.467432$ $b = \quad 0.304480$	-0.637429	-15.6381

III. u-Polynomials

Crossings	u-Polynomials at each crossings
c_1	$(u^4 - 2u^2 + u + 1)(u^6 + 6u^5 + 16u^4 + 21u^3 + 11u^2 - 2u - 4)$
c_2, c_8	$(u^4 + u^3 - 1)(u^6 + 2u^5 + 8u^4 - u^3 + 7u^2 + u - 1)$
c_3, c_9	$(u^4 + u - 1)(u^6 + u^5 + 9u^4 - 11u^3 - 4u^2 - 2u - 1)$
c_4	$(u^4 + 4u^3 + 4u^2 + u + 1)(u^6 + 3u^5 - 3u^4 - 15u^3 - 10u^2 + 1)$
c_5	$(u^4 - u^3 - 1)(u^6 + 2u^5 + 8u^4 - u^3 + 7u^2 + u - 1)$
c_6	$(u^4 - 2u^2 - u + 1)(u^6 + 6u^5 + 16u^4 + 21u^3 + 11u^2 - 2u - 4)$
c_7	$(u^4 - u - 1)(u^6 + u^5 + 9u^4 - 11u^3 - 4u^2 - 2u - 1)$
c_{10}	$(u^4 - 4u^3 + \cdots - 5u + 1)(u^6 + 4u^5 + \cdots + 92u + 16)$

IV. Riley Polynomials

Crossings	Riley Polynomials at each crossings
c_1, c_6	$(y^4 - 4y^3 + \cdots - 5y + 1)(y^6 - 4y^5 + \cdots - 92y + 16)$
c_2, c_5, c_8	$(y^4 - y^3 - 2y^2 + 1)(y^6 + 12y^5 + 82y^4 + 105y^3 + 35y^2 - 15y + 1)$
c_3, c_7, c_9	$(y^4 - 2y^2 - y + 1)(y^6 + 17y^5 + 95y^4 - 191y^3 - 46y^2 + 4y + 1)$
c_4	$(y^4 - 8y^3 + \cdots + 7y + 1)(y^6 - 15y^5 + \cdots - 20y + 1)$
c_{10}	$(y^4 - 4y^3 - 2y^2 - 13y + 1)$ $(y^6 + 36y^5 + 246y^4 - 2029y^3 - 6671y^2 - 6000y + 256)$