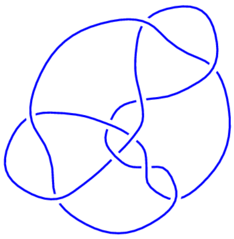
10_{160} $(K10n_{33})$



[1]

Arc Sequences

$$\to \underset{7}{\downarrow} \to \underset{9}{\downarrow} \to \underset{7}{\downarrow} \to \underset{2}{\downarrow} \to \underset{8}{\uparrow} \to \underset{1}{\downarrow} \to \underset{3}{\downarrow} \to \underset{5}{\uparrow} \to \underset{4}{\downarrow} \to \underset{2}{\downarrow} \to$$

Solving Sequence

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

Representation Ideals

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

$$\begin{aligned}
I_1^u &= \langle u^6 - 3u^5 + 6u^4 - 12u^3 + 10u^2 - 10u + 1,\ -u^5 + 2u^4 - 3u^3 + 9u^2 + 5b - 3u + 4, \\
&\quad - 13u^5 + 38u^4 - 74u^3 + 148u^2 + 5a - 115u + 111\rangle \\
I_2^u &= \langle u^5 + u^3 - 2u^2 - 1,\ a + 1,\ u^4 + b - 2u\rangle \\
I_3^u &= \langle u^9 + 6u^7 + 3u^6 + 14u^5 + 10u^4 + 13u^3 + 7u^2 - u - 1,\ a + 1, \\
&\quad 36u^8 - 22u^7 + 219u^6 - 18u^5 + 468u^4 + 74u^3 + 334u^2 + 47b + 27u - 76\rangle
\end{aligned}$$

There are 3 irreducible components with 20 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. $\boldsymbol{I_1^u = \langle u^6 - 3u^5 + 6u^4 - 12u^3 + 10u^2 - 10u + 1,\ -u^5 + 2u^4 - 3u^3 + 9u^2 + 5b - 3u + 4,\ -13u^5 + 38u^4 + \cdots + 5a + 111\rangle}$

(i) Arc colorings

$$a_3 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} \frac{13}{5}u^5 - \frac{38}{5}u^4 + \cdots + 23u - \frac{111}{5} \\ \frac{1}{5}u^5 - \frac{2}{5}u^4 + \cdots + \frac{3}{5}u - \frac{4}{5} \end{pmatrix}$$
$$a_2 = \begin{pmatrix} \frac{8}{5}u^5 - \frac{24}{5}u^4 + \cdots + \frac{78}{5}u - \frac{78}{5} \\ -\frac{2}{5}u^4 + u^3 + \cdots + \frac{11}{5}u - \frac{4}{5} \end{pmatrix}$$
$$a_5 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_4 = \begin{pmatrix} -\frac{13}{5}u^5 + \frac{38}{5}u^4 + \cdots - 23u + \frac{121}{5} \\ 1 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} 12u^5 - \frac{174}{5}u^4 + \cdots + \frac{522}{5}u - \frac{523}{5} \\ \frac{4}{5}u^5 - \frac{12}{5}u^4 + \cdots + \frac{34}{5}u - \frac{24}{5} \end{pmatrix}$$
$$a_1 = \begin{pmatrix} 4u^5 - \frac{57}{5}u^4 + \cdots + \frac{166}{5}u - \frac{169}{5} \\ \frac{1}{5}u^4 - \frac{2}{5}u^2 + \frac{2}{5}u - \frac{8}{5} \end{pmatrix}$$
$$a_8 = \begin{pmatrix} \frac{13}{5}u^5 - \frac{38}{5}u^4 + \cdots + 23u - \frac{111}{5} \\ -1 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} -5.60000u^5 + 15.8000u^4 + \cdots - 45.6000u + 48.6000 \\ -\frac{1}{5}u^5 + \frac{4}{5}u^4 + \cdots - \frac{14}{5}u + \frac{13}{5} \end{pmatrix}$$
$$a_7 = \begin{pmatrix} \frac{13}{5}u^5 - \frac{38}{5}u^4 + \cdots + 23u - \frac{116}{5} \\ -1 \end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes $= \frac{4}{5}u^5 - \frac{8}{5}u^4 + \frac{12}{5}u^3 - \frac{36}{5}u^2 + \frac{12}{5}u - \frac{86}{5}$

(iv) Complex Volumes and Cusp Shapes

Solution to I_1^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u = -0.06205 - 1.68872I$ $a = 0.674823 - 0.211887I$ $b = 0.877439 - 0.744862I$	$-3.55561 + 2.82812I$	$-10.49024 - 2.97945I$
$u = -0.06205 + 1.68872I$ $a = 0.674823 + 0.211887I$ $b = 0.877439 + 0.744862I$	$-3.55561 - 2.82812I$	$-10.49024 + 2.97945I$
$u = 0.110715$ $a = -19.9974$ $b = -0.754878$	-7.69319	-17.0195
$u = 0.399691 - 1.126439I$ $a = 1.348884 - 0.423535I$ $b = 0.877439 + 0.744862I$	$-3.55561 - 2.82812I$	$-10.49024 + 2.97945I$
$u = 0.399691 + 1.126439I$ $a = 1.348884 + 0.423535I$ $b = 0.877439 - 0.744862I$	$-3.55561 + 2.82812I$	$-10.49024 - 2.97945I$
$u = 2.21400$ $a = -0.0500065$ $b = -0.754878$	-7.69319	-17.0195

II. $\boldsymbol{I_2^u = \langle u^5 + u^3 - 2u^2 - 1,\ a + 1,\ u^4 + b - 2u \rangle}$

(i) Arc colorings

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

(ii) Obstruction class $= 1$

(iii) Cusp Shapes $= 3u^4 + u^3 - 2u - 10$

(iv) Complex Volumes and Cusp Shapes

Solution to I_2^u	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.517256 - 1.205545I$ $a = -1.00000$ $b = -0.885210 + 0.546617I$	$-1.44657 + 3.45949I$	$-7.29654 - 5.67761I$
$u = -0.517256 + 1.205545I$ $a = -1.00000$ $b = -0.885210 - 0.546617I$	$-1.44657 - 3.45949I$	$-7.29654 + 5.67761I$
$u = -0.064504 - 0.703751I$ $a = -1.00000$ $b = -0.361950 - 1.318329I$	$1.57933 - 1.42206I$	$-9.07660 + 1.47974I$
$u = -0.064504 + 0.703751I$ $a = -1.00000$ $b = -0.361950 + 1.318329I$	$1.57933 + 1.42206I$	$-9.07660 - 1.47974I$
$u = 1.16352$ $a = -1.00000$ $b = 0.494320$	-6.84525	-5.25373

III. $\boldsymbol{I^u_3 = \langle u^9 + 6u^7 + \cdots - u - 1,\ a + 1,\ 36u^8 - 22u^7 + \cdots + 47b - 76\rangle}$

(i) Arc colorings

$$a_3 = \begin{pmatrix}1\\0\end{pmatrix}$$
$$a_9 = \begin{pmatrix}-1\\-0.765957u^8 + 0.468085u^7 + \cdots - 0.574468u + 1.61702\end{pmatrix}$$
$$a_2 = \begin{pmatrix}-0.765957u^8 + 0.468085u^7 + \cdots - 0.574468u + 2.61702\\0.0425532u^8 + 0.0851064u^7 + \cdots - 1.46809u + 0.0212766\end{pmatrix}$$
$$a_5 = \begin{pmatrix}0\\u\end{pmatrix}$$
$$a_4 = \begin{pmatrix}0.851064u^8 - 0.297872u^7 + \cdots + 2.63830u - 1.57447\\0.0851064u^8 + 0.170213u^7 + \cdots + 2.06383u - 0.957447\end{pmatrix}$$
$$a_{10} = \begin{pmatrix}0.106383u^8 + 0.212766u^7 + \cdots - 1.17021u - 1.44681\\-0.127660u^8 + 0.744681u^7 + \cdots + 0.404255u - 0.0638298\end{pmatrix}$$
$$a_1 = \begin{pmatrix}0.808511u^8 - 0.382979u^7 + \cdots - 0.893617u - 2.59574\\0.468085u^8 - 0.0638298u^7 + \cdots + 1.85106u - 0.765957\end{pmatrix}$$
$$a_8 = \begin{pmatrix}-1\\-0.765957u^8 + 0.468085u^7 + \cdots - 0.574468u + 1.61702\end{pmatrix}$$
$$a_6 = \begin{pmatrix}u\\-0.468085u^8 + 0.0638298u^7 + \cdots + 0.148936u + 0.765957\end{pmatrix}$$
$$a_7 = \begin{pmatrix}-0.765957u^8 + 0.468085u^7 + \cdots - 0.574468u + 0.617021\\-0.765957u^8 + 0.468085u^7 + \cdots - 0.574468u + 1.61702\end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes
$= -\frac{213}{47}u^8 + \frac{44}{47}u^7 - \frac{1284}{47}u^6 - \frac{340}{47}u^5 - \frac{2910}{47}u^4 - \frac{1370}{47}u^3 - \frac{2454}{47}u^2 - \frac{853}{47}u + \frac{58}{47}$

(iv) Complex Volumes and Cusp Shapes

Solution to I_3^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u=-0.470631-0.112677I$ $a=-1.00000$ $b=\ \ 0.204797-1.087895I$	$2.64060+1.65275I$	$-0.59079-4.28210I$
$u=-0.470631+0.112677I$ $a=-1.00000$ $b=\ \ 0.204797+1.087895I$	$2.64060-1.65275I$	$-0.59079+4.28210I$
$u=-0.406410-1.188169I$ $a=-1.00000$ $b=-0.647333+0.135453I$	$-0.87559+2.35950I$	$-4.89060-1.18144I$
$u=-0.406410+1.188169I$ $a=-1.00000$ $b=-0.647333-0.135453I$	$-0.87559-2.35950I$	$-4.89060+1.18144I$
$u=\ \ 0.05862-1.56131I$ $a=-1.00000$ $b=-1.12278+1.21739I$	$-13.58819-0.68871I$	$-9.49454+0.10018I$
$u=\ \ 0.05862+1.56131I$ $a=-1.00000$ $b=-1.12278-1.21739I$	$-13.58819+0.68871I$	$-9.49454-0.10018I$
$u=\ \ 0.322071$ $a=-1.00000$ $b=\ \ 0.531326$	-0.846327	-11.7230
$u=\ \ 0.65739-1.73551I$ $a=-1.00000$ $b=-1.20035-1.05816I$	$-14.0726-9.2039I$	$-9.16258+4.28229I$
$u=\ \ 0.65739+1.73551I$ $a=-1.00000$ $b=-1.20035+1.05816I$	$-14.0726+9.2039I$	$-9.16258-4.28229I$

IV. u-Polynomials

Crossings	u-Polynomials at each crossings
c_1, c_4	$(u^5+u^4-2u^3-u^2+u+1)(u^6+u^5-4u^4-4u^3+4u^2+8u-7)$ $(u^9-u^8-7u^7+7u^6+13u^5-13u^4+2u^3+u^2+1)$
c_2	$(u^3-u^2+1)^2(u^5+2u^4+3u^3+2u^2-1)$ $(u^9+5u^8+13u^7+20u^6+22u^5+18u^4+11u^3-5u-2)$
c_3	$(u-1)^6(u^5+2u^3+u^2+1)$ $(u^9+7u^8+26u^7+61u^6+103u^5+129u^4+125u^3+86u^2+40u+8)$
c_5	$(u^5+u^3-2u^2-1)(u^6+3u^5+6u^4+12u^3+10u^2+10u+1)$ $(u^9+6u^7-3u^6+14u^5-10u^4+13u^3-7u^2-u+1)$
c_6	$(u^5-u^4-2u^3+u^2+u-1)(u^6+u^5-4u^4-4u^3+4u^2+8u-7)$ $(u^9-u^8-7u^7+7u^6+13u^5-13u^4+2u^3+u^2+1)$
c_7	$(u-1)^6(u^5+2u^3-u^2-1)$ $(u^9+7u^8+26u^7+61u^6+103u^5+129u^4+125u^3+86u^2+40u+8)$
c_8	$(u^5+u^3+2u^2+1)(u^6+3u^5+6u^4+12u^3+10u^2+10u+1)$ $(u^9+6u^7-3u^6+14u^5-10u^4+13u^3-7u^2-u+1)$
c_9	$(u^5-2u^3+3u^2-2u+1)(u^6+u^5-6u^4+8u^3+2u^2-6u-11)$ $(u^9-11u^7+2u^6+35u^5-32u^4+47u^3+8u^2+u+13)$
c_{10}	$(u^5-5u^4+8u^3-7u^2+3u-1)$ $(u^6+9u^5+32u^4+78u^3+136u^2+120u+49)$ $(u^9+15u^8+89u^7+253u^6+325u^5+129u^4+16u^3-25u^2-2u+1)$

V. Riley Polynomials

Crossings	Riley Polynomials at each crossings
c_1, c_4, c_6	$(y^5 - 5y^4 + 8y^3 - 7y^2 + 3y - 1)$ $(y^6 - 9y^5 + 32y^4 - 78y^3 + 136y^2 - 120y + 49)$ $(y^9 - 15y^8 + 89y^7 - 253y^6 + 325y^5 - 129y^4 + 16y^3 + 25y^2 - 2y - 1)$
c_2	$(y^3 - y^2 + 2y - 1)^2(y^5 + 2y^4 + y^3 + 4y - 1)$ $(y^9 + y^8 + 13y^7 + 14y^6 + 40y^5 + 50y^4 - 19y^3 - 38y^2 + 25y - 4)$
c_3, c_7	$(y-1)^6(y^5 + 4y^4 + \cdots - 2y - 1)(y^9 + 3y^8 + \cdots + 224y - 64)$
c_5, c_8	$(y^5 + 2y^4 + y^3 - 4y^2 - 4y - 1)$ $(y^6 + 3y^5 - 16y^4 - 82y^3 - 128y^2 - 80y + 1)$ $(y^9 + 12y^8 + 64y^7 + 185y^6 + 290y^5 + 210y^4 + 7y^3 - 55y^2 + 15y - 1)$
c_9	$(y^5 - 4y^4 - y^2 - 2y - 1)(y^6 - 13y^5 + \cdots - 80y + 121)$ $(y^9 - 22y^8 + \cdots - 207y - 169)$
c_{10}	$(y^5 - 9y^4 - 11y^2 - 5y - 1)$ $(y^6 - 17y^5 - 108y^4 + 558y^3 + 2912y^2 - 1072y + 2401)$ $(y^9 - 47y^8 + \cdots + 54y - 1)$