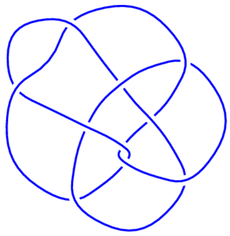
10_{165} $(K10n_{37})$



1

Arc Sequences

$$\rightarrow \underset{5}{\uparrow} \rightarrow \underset{7}{\uparrow} \rightarrow \underset{9}{\uparrow} \rightarrow \underset{2}{\uparrow} \rightarrow \underset{8}{\uparrow} \rightarrow \underset{9}{\downarrow} \rightarrow \underset{4}{\uparrow} \rightarrow \underset{1}{\uparrow} \rightarrow \underset{4}{\uparrow} \rightarrow \underset{6}{\downarrow} \rightarrow$$

Solving Sequence

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

Representation Ideals

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

$$\begin{aligned}
I_1^u = \langle & b^{12} + 5b^{11} + 12b^{10} + 18b^9 + 31b^8 + 47b^7 + 61b^6 + 51b^5 + 35b^4 + 13b^3 + 6b^2 + 1, \\
& -23591b^{11} + 75401u + \cdots - 25087b - 63852,\ -28590b^{11} - 114511b^{10} + \cdots + 75401a + 33445\rangle \\
I_2^u = \langle & u^6 + 2u^5 + 4u^4 + 5u^3 + 5u^2 + 4u + 2,\ -u^3 - u^2 + b - u - 1,\ u^5 + 2u^4 + 4u^3 + 3u^2 + 2a + 3u + 2\rangle \\
I_3^u = \langle & u^{13} + 5u^{12} + 17u^{11} + 39u^{10} + 68u^9 + 91u^8 + 90u^7 + 62u^6 + 15u^5 - 24u^4 - 37u^3 - 30u^2 - 12u - 2, \\
& u^{12} + 5u^{11} + 16u^{10} + 34u^9 + 53u^8 + 61u^7 + 48u^6 + 20u^5 - 9u^4 - 24u^3 - 20u^2 + b - 11u - 3, \\
& -3u^{12} - 13u^{11} - 41u^{10} - 85u^9 - 136u^8 - 167u^7 - 148u^6 - 90u^5 - 5u^4 + 54u^3 + 63u^2 + 2a + 50u + 14\rangle
\end{aligned}$$

There are 3 irreducible components with 31 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. $\boldsymbol{I^u_1 = \langle b^{12} + 5b^{11} + \cdots + 6b^2 + 1,\ -23591b^{11} + 75401u + \cdots - 25087b - 63852,\ -2.86 \times 10^4 b^{11} - 1.15 \times 10^5 b^{10} + \cdots + 7.54 \times 10^4 a + 3.34 \times 10^4\rangle}$

(i) Arc colorings

$$a_1 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

$$a_5 = \begin{pmatrix} 0 \\ 0.312874b^{11} + 1.58680b^{10} + \cdots + 0.332714b + 0.846832 \end{pmatrix}$$

$$a_2 = \begin{pmatrix} 1 \\ 0.614687b^{11} + 2.93810b^{10} + \cdots + 0.579528b - 0.000636596 \end{pmatrix}$$

$$a_8 = \begin{pmatrix} 0.379173b^{11} + 1.51869b^{10} + \cdots + 0.527460b - 0.443562 \\ b \end{pmatrix}$$

$$a_6 = \begin{pmatrix} 0.110847b^{11} + 1.08658b^{10} + \cdots - 1.78662b + 1.78533 \\ 1 \end{pmatrix}$$

$$a_9 = \begin{pmatrix} 0.379173b^{11} + 1.51869b^{10} + \cdots + 1.52746b - 0.443562 \\ b \end{pmatrix}$$

$$a_4 = \begin{pmatrix} -0.312874b^{11} - 1.58680b^{10} + \cdots - 0.332714b - 0.846832 \\ -0.838689b^{11} - 3.85104b^{10} + \cdots - 0.765215b + 0.954178 \end{pmatrix}$$

$$a_7 = \begin{pmatrix} 0.690044b^{11} + 3.57844b^{10} + \cdots + 0.776276b + 0.226005 \\ 0.312874b^{11} + 1.58680b^{10} + \cdots + 0.332714b + 0.846832 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} -0.138751b^{11} - 1.50320b^{10} + \cdots + 0.253365b - 0.354650 \\ 0.758929b^{11} + 3.27043b^{10} + \cdots + 1.47672b - 1.27256 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} -0.110847b^{11} - 1.08658b^{10} + \cdots + 1.78662b - 0.785334 \\ -1 \end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes $= -\frac{31304}{75401}b^{11} - \frac{273008}{75401}b^{10} + \cdots + \frac{212548}{75401}b + \frac{16418}{75401}$

(iv) Complex Volumes and Cusp Shapes

Solution to I_1^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.138835 + 1.234445I$ $a = 0.576096 + 0.033593I$ $b = -1.96628 - 1.27394I$	$-9.53998 - 1.97241I$	$-3.42428 + 3.68478I$
$u = -0.138835 - 1.234445I$ $a = 0.576096 - 0.033593I$ $b = -1.96628 + 1.27394I$	$-9.53998 + 1.97241I$	$-3.42428 - 3.68478I$
$u = -0.413150$ $a = 2.13731 - 1.92634I$ $b = -0.883031 - 0.795869I$	-5.84089	5.41678
$u = -0.413150$ $a = 2.13731 + 1.92634I$ $b = -0.883031 + 0.795869I$	-5.84089	5.41678
$u = 0.408802 + 1.276377I$ $a = 1.089437 - 0.275882I$ $b = -0.511061 - 0.781659I$	$-2.88416 + 4.59213I$	$0.58114 - 3.20482I$
$u = 0.408802 - 1.276377I$ $a = 1.089437 + 0.275882I$ $b = -0.511061 + 0.781659I$	$-2.88416 - 4.59213I$	$0.58114 + 3.20482I$
$u = -0.138835 - 1.234445I$ $a = -0.84220 - 1.68756I$ $b = -0.121451 - 0.706495I$	$-9.53998 + 1.97241I$	$-3.42428 - 3.68478I$
$u = -0.138835 + 1.234445I$ $a = -0.84220 + 1.68756I$ $b = -0.121451 + 0.706495I$	$-9.53998 - 1.97241I$	$-3.42428 + 3.68478I$
$u = 0.873214$ $a = 0.211090 + 0.348879I$ $b = 0.184327 - 0.304646I$	1.08035	4.26950
$u = 0.873214$ $a = 0.211090 - 0.348879I$ $b = 0.184327 + 0.304646I$	1.08035	4.26950

Solution to I_1^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u = 0.408802 - 1.276377I$ $a = -0.671738 - 0.185253I$ $b = 0.79749 - 1.27775I$	$-2.88416 - 4.59213I$	$0.58114 + 3.20482I$
$u = 0.408802 + 1.276377I$ $a = -0.671738 + 0.185253I$ $b = 0.79749 + 1.27775I$	$-2.88416 + 4.59213I$	$0.58114 - 3.20482I$

II. $\boldsymbol{I_2^u = \langle u^6 + 2u^5 + 4u^4 + 5u^3 + 5u^2 + 4u + 2,\ -u^3 - u^2 + b - u - 1,\ u^5 + 2u^4 + 4u^3 + 3u^2 + 2a + 3u + 2\rangle}$

(i) Arc colorings

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

(ii) Obstruction class $= 1$

(iii) Cusp Shapes $= 5u^4 + 4u^3 + 9u^2 + 6u + 10$

(iv) Complex Volumes and Cusp Shapes

Solution to I_2^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.862023 - 0.412869I$ $a = -0.233003 + 0.750879I$ $b = 0.510869 - 0.551075I$	$1.44750 - 0.78507I$	$8.28869 + 4.60495I$
$u = -0.862023 + 0.412869I$ $a = -0.233003 - 0.750879I$ $b = 0.510869 + 0.551075I$	$1.44750 + 0.78507I$	$8.28869 - 4.60495I$
$u = -0.376961 - 1.214800I$ $a = -0.943602 + 0.451942I$ $b = 0.904720 + 0.975923I$	$-1.38689 + 5.20040I$	$6.89570 - 6.16090I$
$u = -0.376961 + 1.214800I$ $a = -0.943602 - 0.451942I$ $b = 0.904720 - 0.975923I$	$-1.38689 - 5.20040I$	$6.89570 + 6.16090I$
$u = 0.238984 - 1.138462I$ $a = 0.176605 - 0.841305I$ $b = -0.915589 - 0.402116I$	$-8.28528 - 1.18132I$	$2.81561 + 0.13577I$
$u = 0.238984 + 1.138462I$ $a = 0.176605 + 0.841305I$ $b = -0.915589 + 0.402116I$	$-8.28528 + 1.18132I$	$2.81561 - 0.13577I$

III. $I^u_3 =$
$\langle u^{13}+5u^{12}+\cdots-12u-2,\ u^{12}+5u^{11}+\cdots+b-3,\ -3u^{12}-13u^{11}+\cdots+2a+14\rangle$

(i) Arc colorings

$$a_1 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_5 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_2 = \begin{pmatrix} 1 \\ -u^2 \end{pmatrix}$$
$$a_8 = \begin{pmatrix} \frac{3}{2}u^{12} + \frac{13}{2}u^{11} + \cdots - 25u - 7 \\ -u^{12} - 5u^{11} + \cdots + 11u + 3 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} \frac{3}{2}u^{12} + \frac{13}{2}u^{11} + \cdots - 20u - 4 \\ -u^{12} - 5u^{11} + \cdots + 15u + 3 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} \frac{1}{2}u^{12} + \frac{3}{2}u^{11} + \cdots - 14u - 4 \\ -u^{12} - 5u^{11} + \cdots + 11u + 3 \end{pmatrix}$$
$$a_4 = \begin{pmatrix} -u \\ u^3 + u \end{pmatrix}$$
$$a_7 = \begin{pmatrix} \frac{1}{2}u^{12} + \frac{5}{2}u^{11} + \cdots - 26u - 7 \\ -u^{12} - 4u^{11} + \cdots + 2u + 1 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} -\frac{1}{2}u^{12} - \frac{5}{2}u^{11} + \cdots + 4u + 1 \\ -u^{12} - 4u^{11} + \cdots + 5u + 1 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} \frac{1}{2}u^{12} + \frac{3}{2}u^{11} + \cdots - 13u - 4 \\ -u^{12} - 5u^{11} + \cdots + 10u + 3 \end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes $=$
$5u^{12}+24u^{11}+78u^{10}+170u^9+277u^8+342u^7+296u^6+161u^5-15u^4-125u^3-126u^2-82u-16$

(iv) Complex Volumes and Cusp Shapes

Solution to I_3^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -1.152858 - 0.170520I$ $a = 0.717142 + 0.770562I$ $b = -0.695367 - 1.010635I$	$-6.75019 + 5.87953I$	$3.71309 - 4.79533I$
$u = -1.152858 + 0.170520I$ $a = 0.717142 - 0.770562I$ $b = -0.695367 + 1.010635I$	$-6.75019 - 5.87953I$	$3.71309 + 4.79533I$
$u = -0.67408 - 1.45370I$ $a = -0.500985 - 0.317553I$ $b = -0.123919 + 0.942337I$	$-10.56049 + 0.87235I$	$-1.56565 - 0.23907I$
$u = -0.67408 + 1.45370I$ $a = -0.500985 + 0.317553I$ $b = -0.123919 - 0.942337I$	$-10.56049 - 0.87235I$	$-1.56565 + 0.23907I$
$u = -0.48596 - 1.43258I$ $a = 1.058958 - 0.295073I$ $b = -0.93732 - 1.37365I$	$-11.8216 + 11.6031I$	$1.77641 - 5.73851I$
$u = -0.48596 + 1.43258I$ $a = 1.058958 + 0.295073I$ $b = -0.93732 + 1.37365I$	$-11.8216 - 11.6031I$	$1.77641 + 5.73851I$
$u = -0.363253 - 0.187651I$ $a = -0.56911 + 2.04054I$ $b = 0.589641 - 0.634441I$	$0.57483 - 1.68891I$	$3.43240 + 5.42565I$
$u = -0.363253 + 0.187651I$ $a = -0.56911 - 2.04054I$ $b = 0.589641 + 0.634441I$	$0.57483 + 1.68891I$	$3.43240 - 5.42565I$
$u = -0.175701 - 1.175029I$ $a = -1.067584 + 0.632688I$ $b = 0.93100 + 1.14328I$	$-2.32319 + 3.89550I$	$2.16216 - 1.95849I$
$u = -0.175701 + 1.175029I$ $a = -1.067584 - 0.632688I$ $b = 0.93100 - 1.14328I$	$-2.32319 - 3.89550I$	$2.16216 + 1.95849I$

Solution to I_3^u	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.034812 - 1.171404I$ $a = \quad 0.739139 - 0.284263I$ $b = -0.358718 - 0.855935I$	$-3.39029 - 0.96735I$	$2.31477 + 3.00161I$
$u = -0.034812 + 1.171404I$ $a = \quad 0.739139 + 0.284263I$ $b = -0.358718 + 0.855935I$	$-3.39029 + 0.96735I$	$2.31477 - 3.00161I$
$u = \quad 0.773330$ $a = \quad 0.244870$ $b = \quad 0.189365$	1.09959	6.33364

IV. u-Polynomials

Crossings	u-Polynomials at each crossings
c_1	$(u^6-u^5+3u^4-2u^3+2u^2-u-1)^2$ $(u^6+2u^5+\cdots+4u+2)(u^{13}+5u^{12}+\cdots-12u-2)$
c_2, c_3, c_9	$(u^6+2u^4-2u^2+1)(u^{12}+u^{11}+\cdots+2u+13)$ $(u^{13}+10u^{11}+\cdots+2u-1)$
c_4	$(u^6-2u^5+4u^4-5u^3+5u^2-4u+2)$ $(-1-u+2u^2-2u^3+3u^4-u^5+u^6)^2(u^{13}+5u^{12}+\cdots-12u-2)$
c_5, c_8	$(u^6+u^5-2u^3+u+1)(u^{12}+5u^{11}+\cdots+6u^2+1)$ $(u^{13}+u^{12}+\cdots+5u-1)$
c_6	$(u^6-5u^5+10u^4-12u^3+11u^2-6u+2)$ $(-1+3u-2u^2+7u^4+5u^5+u^6)^2(u^{13}-8u^{12}+\cdots+18u-10)$
c_7	$(u^6+u^5+\cdots-2u+1)(u^{12}+u^{11}+\cdots+18u+23)$ $(u^{13}+u^{12}+\cdots+20u+7)$
c_{10}	$(u+1)^{12}(u^6+u^5+\cdots+u+1)(u^{13}-12u^{12}+\cdots-288u+64)$

V. Riley Polynomials

Crossings	Riley Polynomials at each crossings
c_1, c_4	$(y^6+4y^5+6y^4+3y^3+y^2+4y+4)$ $(1-5y-6y^2+4y^3+9y^4+5y^5+y^6)^2(y^{13}+9y^{12}+\cdots+24y-4)$
c_2, c_3, c_9	$(y^3+2y^2-2y+1)^2(y^{12}+15y^{11}+\cdots+360y+169)$ $(y^{13}+20y^{12}+\cdots-10y-1)$
c_5, c_8	$(y^6-y^5+\cdots-y+1)(y^{12}-y^{11}+\cdots+12y+1)$ $(y^{13}+7y^{12}+\cdots+23y-1)$
c_6	$(y^6-11y^5+45y^4-60y^3-10y^2-5y+1)^2$ $(y^6-5y^5+2y^4+20y^3+17y^2+8y+4)$ $(y^{13}-16y^{12}+\cdots+1284y-100)$
c_7	$(y^6+5y^5+13y^4+11y^3+3y^2-2y+1)$ $(y^{12}+11y^{11}+\cdots-416y+529)(y^{13}+13y^{12}+\cdots+64y-49)$
c_{10}	$(y-1)^{12}(y^6-y^5+4y^4-4y^3+4y^2-y+1)$ $(y^{13}-2y^{12}+\cdots+1024y-4096)$