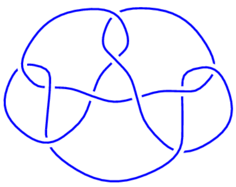
10_{138} $(K10n_1)$



[1]

Arc Sequences

$$\to \underset{8}{\downarrow} \to \underset{4}{\downarrow} \to \underset{10}{\uparrow} \to \underset{6}{\downarrow} \to \underset{8}{\uparrow} \to \underset{9}{\downarrow} \to \underset{2}{\downarrow} \to \underset{5}{\uparrow} \to \underset{2}{\downarrow} \to \underset{3}{\uparrow} \to$$

Solving Sequence

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

Representation Ideals

$$I = \bigcap_{i=1}^{4} I_i^u$$

$$\begin{aligned}
I_1^u &= \langle b^2 + b + 1,\ b + a,\ u - 1\rangle \\
I_2^u &= \langle u^2 + u + 1,\ a + 1,\ b + u + 1\rangle \\
I_3^u &= \langle u^7 - u^6 + 9u^5 - 14u^4 + 23u^3 - 14u^2 + 8u - 1, \\
&\quad - 115u^6 + 86u^5 - 982u^4 + 1372u^3 - 2128u^2 + 277b + 859u - 542, \\
&\quad 285u^6 - 177u^5 + 2530u^4 - 3075u^3 + 5623u^2 + 277a - 2454u + 1837\rangle \\
I_4^u &= \langle u^{14} + u^{13} + \cdots + 2u + 1, \\
&\quad - 1205138480001u^{13} + 3533853013940u^{12} + \cdots + 511325507094026 + 88002408176841, \\
&\quad - 40546748429631u^{13} - 51692838289772u^{12} + \cdots + 51132550709402a - 37861651496541\rangle
\end{aligned}$$

There are 4 irreducible components with 25 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. $I_1^u = \langle b^2 + b + 1,\ b + a,\ u - 1 \rangle$

(i) Arc colorings

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

(ii) Obstruction class $= 1$

(iii) Cusp Shapes $= -3$

(iv) Complex Volumes and Cusp Shapes

Solution to I_1^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 1.00000$ $a = 0.500000 + 0.866025I$ $b = -0.500000 - 0.866025I$	0	-3.00000
$u = 1.00000$ $a = 0.500000 - 0.866025I$ $b = -0.500000 + 0.866025I$	0	-3.00000

II. $I_2^u = \langle u^2 + u + 1,\ a + 1,\ b + u + 1\rangle$

(i) Arc colorings

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

(ii) Obstruction class $= 1$

(iii) Cusp Shapes $= 8u + 4$

(iv) Complex Volumes and Cusp Shapes

Solution to I_2^u	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.500000 - 0.866025I$ $a = -1.00000$ $b = -0.500000 + 0.866025I$	$4.05977I$	$-6.92820I$
$u = -0.500000 + 0.866025I$ $a = -1.00000$ $b = -0.500000 - 0.866025I$	$-4.05977I$	$6.92820I$

III. $\boldsymbol{I_3^u = \langle u^7 - u^6 + 9u^5 - 14u^4 + 23u^3 - 14u^2 + 8u - 1,\ -115u^6 + 86u^5 + \cdots + 277b - 542,\ 285u^6 - 177u^5 + \cdots + 277a + 1837\rangle}$

(i) Arc colorings

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

$$a_9 = \begin{pmatrix} -1.02888u^6 + 0.638989u^5 + \cdots + 8.85921u - 6.63177 \\ 0.415162u^6 - 0.310469u^5 + \cdots - 3.10108u + 1.95668 \end{pmatrix}$$

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

$$a_{10} = \begin{pmatrix} -1.44404u^6 + 0.949458u^5 + \cdots + 11.9603u - 8.58845 \\ 0.415162u^6 - 0.310469u^5 + \cdots - 3.10108u + 1.95668 \end{pmatrix}$$

$$a_8 = \begin{pmatrix} -1.02888u^6 + 0.638989u^5 + \cdots + 8.85921u - 6.63177 \\ 0.151625u^6 - 0.104693u^5 + \cdots - 1.01083u + 1.56679 \end{pmatrix}$$

$$a_6 = \begin{pmatrix} 1.07942u^6 - 1.00722u^5 + \cdots - 11.8628u + 6.48736 \\ -0.440433u^6 + 0.494585u^5 + \cdots + 5.60289u - 1.88448 \end{pmatrix}$$

$$a_1 = \begin{pmatrix} 1.88448u^6 - 1.44404u^5 + \cdots - 17.5632u + 11.4729 \\ -0.541516u^6 + 0.231047u^5 + \cdots + 3.61011u - 2.59567 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} 0.877256u^6 - 0.534296u^5 + \cdots - 7.84838u + 5.06498 \\ -0.0722022u^6 + 0.0974729u^5 + \cdots + 2.14801u - 1.07942 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} -0.617329u^6 + 0.783394u^5 + \cdots + 8.11552u - 3.37906 \\ 0.342960u^6 - 0.212996u^5 + \cdots - 1.95307u + 0.877256 \end{pmatrix}$$

$$a_7 = \begin{pmatrix} -0.877256u^6 + 0.534296u^5 + \cdots + 7.84838u - 5.06498 \\ 0.151625u^6 - 0.104693u^5 + \cdots - 1.01083u + 1.56679 \end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes $= \frac{218}{277}u^6 + \frac{232}{277}u^5 + \frac{1770}{277}u^4 + \frac{622}{277}u^3 + \frac{946}{277}u^2 + \frac{2240}{277}u - \frac{702}{277}$

(iv) Complex Volumes and Cusp Shapes

Solution to I_3^u	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.46632 - 2.74126I$ $a = -0.422265 - 0.273313I$ $b = -2.01513 - 0.33917I$	$-11.0685 - 10.4672I$	$-6.45679 + 5.97165I$
$u = -0.46632 + 2.74126I$ $a = -0.422265 + 0.273313I$ $b = -2.01513 + 0.33917I$	$-11.0685 + 10.4672I$	$-6.45679 - 5.97165I$
$u = 0.158515$ $a = -5.69902$ $b = 1.64063$	-3.61413	-1.15355
$u = 0.260920 - 0.655876I$ $a = -0.614097 + 0.651143I$ $b = -0.023311 - 0.507189I$	$-0.184850 + 1.357363I$	$-2.08591 - 4.58406I$
$u = 0.260920 + 0.655876I$ $a = -0.614097 - 0.651143I$ $b = -0.023311 + 0.507189I$	$-0.184850 - 1.357363I$	$-2.08591 + 4.58406I$
$u = 0.626141 - 1.116013I$ $a = 0.885874 - 0.284512I$ $b = 0.718123 - 0.224799I$	$-4.21141 - 3.35522I$	$-7.88053 + 3.75965I$
$u = 0.626141 + 1.116013I$ $a = 0.885874 + 0.284512I$ $b = 0.718123 + 0.224799I$	$-4.21141 + 3.35522I$	$-7.88053 - 3.75965I$

IV. $\boldsymbol{I^u_4 =}$
$\boldsymbol{\langle u^{14}+u^{13}+\cdots+2u+1,\ -1.21\times 10^{12}u^{13}+3.53\times 10^{12}u^{12}+\cdots+5.11\times 10^{13}b+ 8.80\times 10^{13},\ -4.05\times 10^{13}u^{13}-5.17\times 10^{13}u^{12}+\cdots+5.11\times 10^{13}a-3.79\times 10^{13}\rangle}$

(i) Arc colorings

$$a_2 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} 0.792973u^{13} + 1.01096u^{12} + \cdots + 26.6378u + 0.740461 \\ 0.0235689u^{13} - 0.0691116u^{12} + \cdots - 0.915315u - 1.72106 \end{pmatrix}$$
$$a_5 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} 0.769404u^{13} + 1.08007u^{12} + \cdots + 27.5531u + 2.46153 \\ 0.0235689u^{13} - 0.0691116u^{12} + \cdots - 0.915315u - 1.72106 \end{pmatrix}$$
$$a_8 = \begin{pmatrix} 0.792973u^{13} + 1.01096u^{12} + \cdots + 26.6378u + 0.740461 \\ -0.166089u^{13} - 0.178205u^{12} + \cdots - 2.14426u - 1.93905 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} -1.31222u^{13} - 1.03317u^{12} + \cdots - 26.4352u - 0.994374 \\ -0.128536u^{13} + 0.0552761u^{12} + \cdots + 3.66944u + 1.44202 \end{pmatrix}$$
$$a_1 = \begin{pmatrix} 1.44202u^{13} + 1.57055u^{12} + \cdots + 44.8024u + 1.21459 \\ -0.274408u^{13} - 0.288127u^{12} + \cdots - 6.04501u - 3.23784 \end{pmatrix}$$
$$a_4 = \begin{pmatrix} -0.626884u^{13} - 0.832752u^{12} + \cdots - 24.4935u + 1.19859 \\ 0.184867u^{13} + 0.262200u^{12} + \cdots + 6.69113u + 1.58682 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} -0.829049u^{13} - 0.665834u^{12} + \cdots - 22.3564u + 8.44585 \\ 0.585885u^{13} + 0.660074u^{12} + \cdots + 17.9742u + 1.02851 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} 0.626884u^{13} + 0.832752u^{12} + \cdots + 24.4935u - 1.19859 \\ -0.166089u^{13} - 0.178205u^{12} + \cdots - 2.14426u - 1.93905 \end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes
$= -\frac{3838300796474}{25566275354701}u^{13} + \frac{3851477719173}{25566275354701}u^{12} + \cdots + \frac{391630963996580}{25566275354701}u - \frac{108530281491461}{25566275354701}$

(iv) Complex Volumes and Cusp Shapes

Solution to I_4^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u=-0.684697-0.025265I$ $a=-0.86141+1.42487I$ $b=-0.306521-0.195372I$	$-1.11654-3.28492I$	$-6.60141+2.44171I$
$u=-0.684697+0.025265I$ $a=-0.86141-1.42487I$ $b=-0.306521+0.195372I$	$-1.11654+3.28492I$	$-6.60141-2.44171I$
$u=-0.51639-2.58562I$ $a=-0.468436-0.254302I$ $b=-1.75993-0.38141I$	-12.1121	-7.77053
$u=-0.51639+2.58562I$ $a=-0.468436+0.254302I$ $b=-1.75993+0.38141I$	-12.1121	-7.77053
$u=-0.46039-1.77594I$ $a=\ \ 0.524911+0.031807I$ $b=\ \ 0.83720-1.20669I$	$-1.11654+3.28492I$	$-6.60141-2.44171I$
$u=-0.46039+1.77594I$ $a=\ \ 0.524911-0.031807I$ $b=\ \ 0.83720+1.20669I$	$-1.11654-3.28492I$	$-6.60141+2.44171I$
$u=-0.026394-0.197164I$ $a=\ \ 0.09255-5.01567I$ $b=-1.73502+0.09983I$	$-7.46645+4.93043I$	$-4.23989-2.98386I$
$u=-0.026394+0.197164I$ $a=\ \ 0.09255+5.01567I$ $b=-1.73502-0.09983I$	$-7.46645-4.93043I$	$-4.23989+2.98386I$
$u=\ \ 0.251357-0.560891I$ $a=-0.670116+1.116089I$ $b=-0.000704-0.384496I$	$-0.165382+1.372838I$	$-2.77344-4.48022I$
$u=\ \ 0.251357+0.560891I$ $a=-0.670116-1.116089I$ $b=-0.000704+0.384496I$	$-0.165382-1.372838I$	$-2.77344+4.48022I$

Solution to I_4^u	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 0.43046 - 2.68133I$ $a = 0.433855 - 0.248841I$ $b = 1.92690 - 0.44916I$	$-7.46645 + 4.93043I$	$-4.23989 - 2.98386I$
$u = 0.43046 + 2.68133I$ $a = 0.433855 + 0.248841I$ $b = 1.92690 + 0.44916I$	$-7.46645 - 4.93043I$	$-4.23989 + 2.98386I$
$u = 0.506054 - 0.754738I$ $a = -0.551357 + 0.355463I$ $b = 0.038076 - 0.785867I$	$-0.165382 + 1.372838I$	$-2.77344 - 4.48022I$
$u = 0.506054 + 0.754738I$ $a = -0.551357 - 0.355463I$ $b = 0.038076 + 0.785867I$	$-0.165382 - 1.372838I$	$-2.77344 + 4.48022I$

V. u-Polynomials

Crossings	u-Polynomials at each crossings
c_1, c_7	$u^4(u^7 - 2u^6 - 3u^5 + 8u^4 - 2u^3 - 2u^2 - u + 2)^2$ $(u^7 + 5u^6 + 10u^5 + 13u^4 + 18u^3 + 20u^2 + 12u + 4)$
c_2, c_4	$(u^2 - u + 1)^2(u^7 + 5u^6 + 11u^5 + 10u^4 - u^3 - 8u^2 - 4u - 1)$ $(u^{14} + 8u^{13} + \cdots + 9u + 1)$
c_3, c_8	$(u^2 - u + 1)^2(u^7 + u^6 + 3u^5 + 2u^4 + 3u^3 + 2u^2 + 1)$ $(u^{14} + 2u^{13} + \cdots + u + 1)$
c_5, c_{10}	$(u^2 + u + 1)^2(u^7 + u^6 + 3u^5 + 2u^4 + 3u^3 + 2u^2 + 1)$ $(u^{14} + 2u^{13} + \cdots + u + 1)$
c_6, c_9	$(u^2 - u + 1)^2(u^7 + u^6 - 5u^5 - 2u^4 + 7u^3 - 4u^2 + 2u - 1)$ $(u^{14} + 2u^{13} + \cdots + 5u + 1)$

VI. Riley Polynomials

Crossings	Riley Polynomials at each crossings
c_1, c_7	$y^4(y^7 - 10y^6 + 37y^5 - 62y^4 + 50y^3 - 32y^2 + 9y - 4)^2$ $(y^7 - 5y^6 + 6y^5 + 15y^4 + 4y^3 - 72y^2 - 16y - 16)$
c_2, c_4	$(y^2 + y + 1)^2(y^7 - 3y^6 + 19y^5 - 50y^4 + 83y^3 - 36y^2 - 1)$ $(y^{14} - 4y^{13} + \cdots - 15y + 1)$
c_3, c_5, c_8 c_{10}	$(y^2 + y + 1)^2(y^7 + 5y^6 + 11y^5 + 10y^4 - y^3 - 8y^2 - 4y - 1)$ $(y^{14} + 8y^{13} + \cdots + 9y + 1)$
c_6, c_9	$(y^2 + y + 1)^2(y^7 - 11y^6 + 43y^5 - 62y^4 + 15y^3 + 8y^2 - 4y - 1)$ $(y^{14} - 16y^{13} + \cdots + 9y + 1)$