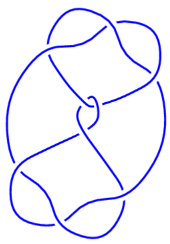
9_{16} $(K9a_{25})$



[1]

Arc Sequences

$$\rightarrow\downarrow_{5}\rightarrow\downarrow_{6}\rightarrow\downarrow_{8}\rightarrow\downarrow_{3}\rightarrow\downarrow_{2}\rightarrow\downarrow_{9}\rightarrow\downarrow_{1}\rightarrow\downarrow_{4}\rightarrow\downarrow_{7}\rightarrow$$

Solving Sequence

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

Representation Ideals

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

$$\begin{aligned}
I_1^u &= \langle u-1,\ b,\ a+1\rangle \\
I_2^u &= \langle u^8 - u^7 + 2u^6 + 5u^5 + u^4 - u^3 + 7u^2 + 3u - 1, \\
&\quad -3u^7 + 12u^6 - 26u^5 + 15u^4 + 16u^3 - 21u^2 + 40a - 46u + 73, \\
&\quad 3u^7 - 12u^6 + 26u^5 - 15u^4 - 16u^3 + 21u^2 + 40b + 46u - 33\rangle \\
I_3^u &= \langle u^{12} - 5u^{11} + 10u^{10} - 12u^9 + 29u^8 - 89u^7 + 159u^6 - 147u^5 + 53u^4 + 7u^3 + 4u^2 - 18u + 9, \\
&\quad 903311u^{11} - 4195622u^{10} + \cdots + 89754551b - 5924742, \\
&\quad 6114722u^{11} - 23293684u^{10} + \cdots + 26926353a - 34182915\rangle
\end{aligned}$$

There are 3 irreducible components with 21 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. $I^u_1 = \langle u - 1,\ b,\ a + 1 \rangle$

(i) Arc colorings

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

$$a_9 = \begin{pmatrix} -1 \\ 0 \end{pmatrix}$$

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

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

$$a_4 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

$$a_8 = \begin{pmatrix} -1 \\ 0 \end{pmatrix}$$

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

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

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

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

(ii) Obstruction class $= 1$

(iii) Cusp Shapes $= -12$

(iv) Complex Volumes and Cusp Shapes

Solution to I_1^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u = 1.00000$ $a = -1.00000$ $b = 0$	-3.28987	-12.0000

II. $I_2^u = \langle u^8 - u^7 + 2u^6 + 5u^5 + u^4 - u^3 + 7u^2 + 3u - 1,\ -3u^7 + 12u^6 + \cdots + 40a + 73,\ 3u^7 - 12u^6 + \cdots + 40b - 33\rangle$

(i) Arc colorings

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

$$a_9 = \begin{pmatrix} 0.0750000u^7 - 0.300000u^6 + \cdots + 1.15000u - 1.82500 \\ -0.0750000u^7 + 0.300000u^6 + \cdots - 1.15000u + 0.825000 \end{pmatrix}$$

$$a_7 = \begin{pmatrix} -\frac{3}{4}u^7 + \frac{6}{5}u^6 + \cdots - \frac{47}{10}u + \frac{9}{20} \\ \frac{21}{40}u^7 - \frac{7}{10}u^6 + \cdots + \frac{73}{20}u - \frac{3}{8} \end{pmatrix}$$

$$a_1 = \begin{pmatrix} -\frac{7}{10}u^7 + u^6 + \cdots - \frac{28}{5}u - \frac{1}{10} \\ \frac{21}{40}u^7 - \frac{7}{10}u^6 + \cdots + \frac{73}{20}u - \frac{3}{8} \end{pmatrix}$$

$$a_4 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

$$a_8 = \begin{pmatrix} -1 \\ -0.0750000u^7 + 0.300000u^6 + \cdots - 1.15000u + 0.825000 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} -0.0750000u^7 + 0.300000u^6 + \cdots - 1.15000u + 1.82500 \\ \frac{3}{10}u^7 - \frac{3}{5}u^6 + \cdots + 2u - \frac{7}{10} \end{pmatrix}$$

$$a_2 = \begin{pmatrix} -0.0750000u^7 + 0.300000u^6 + \cdots - 1.15000u + 1.82500 \\ \frac{23}{40}u^7 - \frac{9}{10}u^6 + \cdots + \frac{11}{4}u - \frac{37}{40} \end{pmatrix}$$

$$a_5 = \begin{pmatrix} \frac{3}{4}u^7 - \frac{6}{5}u^6 + \cdots + \frac{47}{10}u - \frac{9}{20} \\ -\frac{3}{5}u^7 + u^6 + \cdots - \frac{24}{5}u + \frac{6}{5} \end{pmatrix}$$

$$a_5 = \begin{pmatrix} \frac{3}{4}u^7 - \frac{6}{5}u^6 + \cdots + \frac{47}{10}u - \frac{9}{20} \\ -\frac{3}{5}u^7 + u^6 + \cdots - \frac{24}{5}u + \frac{6}{5} \end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes $= u^7 - 2u^6 + 4u^5 + u^4 - u^2 + 4u - 15$

(iv) Complex Volumes and Cusp Shapes

Solution to I_2^u	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -1.003721 - 0.582684I$ $a = -0.178387 - 0.567011I$ $b = -0.821613 + 0.567011I$	$1.48505 + 2.26376I$	$-5.94128 - 4.53378I$
$u = -1.003721 + 0.582684I$ $a = -0.178387 + 0.567011I$ $b = -0.821613 - 0.567011I$	$1.48505 - 2.26376I$	$-5.94128 + 4.53378I$
$u = -0.631839$ $a = -2.38845$ $b = 1.38845$	-13.4445	-18.3375
$u = 0.221111$ $a = -1.54996$ $b = 0.549965$	-0.719034	-14.1601
$u = 0.669498 - 0.907562I$ $a = -0.567656 - 1.079148I$ $b = -0.432344 + 1.079148I$	$-6.22518 - 3.55755I$	$-14.5274 + 2.6249I$
$u = 0.669498 + 0.907562I$ $a = -0.567656 + 1.079148I$ $b = -0.432344 - 1.079148I$	$-6.22518 + 3.55755I$	$-14.5274 - 2.6249I$
$u = 1.03959 - 1.75991I$ $a = 0.215252 + 0.684012I$ $b = -1.215252 - 0.684012I$	$-8.73978 - 9.88301I$	$-15.2825 + 6.0696I$
$u = 1.03959 + 1.75991I$ $a = 0.215252 - 0.684012I$ $b = -1.215252 + 0.684012I$	$-8.73978 + 9.88301I$	$-15.2825 - 6.0696I$

III.

$\boldsymbol{I_3^u = \langle u^{12} - 5u^{11} + \cdots - 18u + 9,\ 9.03 \times 10^5 u^{11} - 4.20 \times 10^6 u^{10} + \cdots + 8.98 \times 10^6 b - 5.92 \times 10^6,\ 6.11 \times 10^6 u^{11} - 2.33 \times 10^7 u^{10} + \cdots + 2.69 \times 10^7 a - 3.42 \times 10^7 \rangle}$

(i) Arc colorings

$$a_6 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_9 = \begin{pmatrix} -0.227091u^{11} + 0.865089u^{10} + \cdots - 3.11196u + 1.26950 \\ -0.100642u^{11} + 0.467455u^{10} + \cdots - 2.36989u + 0.660105 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} -0.214190u^{11} + 0.914563u^{10} + \cdots - 3.09508u + 2.07366 \\ -0.0943647u^{11} + 0.434381u^{10} + \cdots - 1.57801u + 0.800130 \end{pmatrix}$$
$$a_1 = \begin{pmatrix} -0.0785567u^{11} + 0.165798u^{10} + \cdots - 1.03587u - 0.914502 \\ -0.0943647u^{11} + 0.434381u^{10} + \cdots - 1.57801u + 0.800130 \end{pmatrix}$$
$$a_4 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_8 = \begin{pmatrix} -0.327733u^{11} + 1.33254u^{10} + \cdots - 5.48185u + 1.92960 \\ -0.100642u^{11} + 0.467455u^{10} + \cdots - 2.36989u + 0.660105 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} -0.315889u^{11} + 1.16664u^{10} + \cdots - 2.61859u + 0.729262 \\ -0.226986u^{11} + 0.816487u^{10} + \cdots - 2.32852u + 0.707010 \end{pmatrix}$$
$$a_2 = \begin{pmatrix} -0.315889u^{11} + 1.16664u^{10} + \cdots - 2.61859u + 0.729262 \\ 0.151084u^{11} - 0.801806u^{10} + \cdots + 2.25899u - 3.00825 \end{pmatrix}$$
$$a_5 = \begin{pmatrix} -0.191123u^{11} + 0.894945u^{10} + \cdots - 1.91215u + 4.12370 \\ -0.0252206u^{11} + 0.167175u^{10} + \cdots + 0.0554509u + 1.17407 \end{pmatrix}$$
$$a_5 = \begin{pmatrix} -0.191123u^{11} + 0.894945u^{10} + \cdots - 1.91215u + 4.12370 \\ -0.0252206u^{11} + 0.167175u^{10} + \cdots + 0.0554509u + 1.17407 \end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes $= -\frac{4222636}{2991817}u^{11} + \frac{52097752}{8975451}u^{10} + \cdots - \frac{55563596}{2991817}u + \frac{492894}{2991817}$

(iv) Complex Volumes and Cusp Shapes

Solution to I_3^u	$\sqrt{-1}(\text{vol}+\sqrt{-1}CS)$	Cusp shape
$u = -1.36462 - 1.50351I$ $a = -0.350390 + 0.583945I$ $b = 1.073950 - 0.558752I$	$-3.28987 + 5.69302I$	$-12.00000 - 5.51057I$
$u = -1.36462 + 1.50351I$ $a = -0.350390 - 0.583945I$ $b = 1.073950 + 0.558752I$	$-3.28987 - 5.69302I$	$-12.00000 + 5.51057I$
$u = -0.452270 - 0.361855I$ $a = 1.35006 - 1.50455I$ $b = 0.428243 + 0.664531I$	$-1.39926 + 0.92430I$	$-8.28328 - 0.79423I$
$u = -0.452270 + 0.361855I$ $a = 1.35006 + 1.50455I$ $b = 0.428243 - 0.664531I$	$-1.39926 - 0.92430I$	$-8.28328 + 0.79423I$
$u = 0.601198 - 0.542039I$ $a = -1.255408 - 0.259181I$ $b = -1.002193 - 0.295542I$	$-5.18047 - 0.92430I$	$-15.7167 + 0.7942I$
$u = 0.601198 + 0.542039I$ $a = -1.255408 + 0.259181I$ $b = -1.002193 + 0.295542I$	$-5.18047 + 0.92430I$	$-15.7167 - 0.7942I$
$u = 0.94950 - 1.12226I$ $a = 0.306433 - 0.510689I$ $b = 1.073950 + 0.558752I$	$-3.28987 - 5.69302I$	$-12.00000 + 5.51057I$
$u = 0.94950 + 1.12226I$ $a = 0.306433 + 0.510689I$ $b = 1.073950 - 0.558752I$	$-3.28987 + 5.69302I$	$-12.00000 - 5.51057I$
$u = 1.108238 - 0.263574I$ $a = 0.031505 + 0.447360I$ $b = 0.428243 - 0.664531I$	$-1.39926 - 0.92430I$	$-8.28328 + 0.79423I$
$u = 1.108238 + 0.263574I$ $a = 0.031505 - 0.447360I$ $b = 0.428243 + 0.664531I$	$-1.39926 + 0.92430I$	$-8.28328 - 0.79423I$

Solution to I_3^u	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 1.65795 - 0.89021I$ $a = 0.584465 + 0.398183I$ $b = -1.002193 - 0.295542I$	$-5.18047 - 0.92430I$	$-15.7167 + 0.7942I$
$u = 1.65795 + 0.89021I$ $a = 0.584465 - 0.398183I$ $b = -1.002193 + 0.295542I$	$-5.18047 + 0.92430I$	$-15.7167 - 0.7942I$

IV. u-Polynomials

Crossings	u-Polynomials at each crossings
c_1, c_2, c_6 c_7	$(u-1)(u^8+u^7-4u^6-3u^5+5u^4+u^3-u^2+3u-1)$ $(u^{12}+u^{11}-4u^{10}-2u^9+7u^8-u^7-5u^6+5u^5-u^4-3u^3+2u^2+1)$
c_3, c_8	$u(u^6-u^5-u^4+2u^3-u+1)^2$ $(u^8+3u^7+3u^6-2u^5-8u^4-9u^3-3u^2+2u+2)$
c_4	$u(u^6+3u^5+5u^4+4u^3+2u^2+u+1)^2$ $(u^8+3u^7+5u^6+4u^5+2u^4+13u^3+13u^2+16u+4)$
c_5, c_9	$(u+1)(u^8+u^7-4u^6-3u^5+5u^4+u^3-u^2+3u-1)$ $(u^{12}+u^{11}-4u^{10}-2u^9+7u^8-u^7-5u^6+5u^5-u^4-3u^3+2u^2+1)$

V. Riley Polynomials

Crossings	Riley Polynomials at each crossings
c_1, c_2, c_5 c_6, c_7, c_9	$(y-1)(y^8 - 9y^7 + 32y^6 - 53y^5 + 31y^4 + 15y^3 - 15y^2 - 7y + 1)$ $(y^{12} - 9y^{11} + \cdots + 4y + 1)$
c_3, c_8	$y(y^6 - 3y^5 + 5y^4 - 4y^3 + 2y^2 - y + 1)^2$ $(y^8 - 3y^7 + 5y^6 - 4y^5 + 2y^4 - 13y^3 + 13y^2 - 16y + 4)$
c_4	$y(y^6 + y^5 + 5y^4 + 6y^2 + 3y + 1)^2$ $(y^8 + y^7 + 5y^6 - 48y^5 - 58y^4 - 205y^3 - 231y^2 - 152y + 16)$