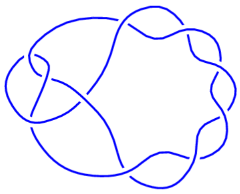
# $10_5$ $(K10a_{56})$



[1]

**Arc Sequences**

$\longrightarrow \uparrow_{7} \longrightarrow \uparrow_{9} \longrightarrow \downarrow_{8} \longrightarrow \downarrow_{3} \longrightarrow \uparrow_{10} \longrightarrow \uparrow_{1} \longrightarrow \uparrow_{2} \longrightarrow \downarrow_{4} \longrightarrow \uparrow_{5} \longrightarrow \uparrow_{6} \longrightarrow$

**Solving Sequence**

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

**Representation Ideals**

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

$I_1^u = \langle u - 1 \rangle$

$I_2^u = \langle u^{15} - 3u^{13} + u^{12} + 6u^{11} - 2u^{10} - 6u^9 + 4u^8 + 5u^7 - 3u^6 - 3u^5 + 3u^4 + 3u^3 - u^2 - u + 1 \rangle$

There are 2 irreducible components with 16 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. $I_1^u = \langle u - 1 \rangle$

**(i) Arc colorings**

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

**(ii) Obstruction class** $= -1$

**(iii) Cusp Shapes** $= 6$

**(iv) Complex Volumes and Cusp Shapes**

| Solution to $I_1^u$ | | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|---|
| $u =$ | 1.00000 | 1.64493 | 6.00000 |

## II. $I_2^u = \langle u^{15}-3u^{13}+u^{12}+6u^{11}-2u^{10}-6u^9+4u^8+5u^7-3u^6-3u^5+3u^4+3u^3-u^2-u+1\rangle$

**(i) Arc colorings**

$$a_3 = \begin{pmatrix}1\\0\end{pmatrix}$$
$$a_8 = \begin{pmatrix}0\\u\end{pmatrix}$$
$$a_4 = \begin{pmatrix}1\\u^2\end{pmatrix}$$
$$a_5 = \begin{pmatrix}-u^2+1\\u^2\end{pmatrix}$$
$$a_9 = \begin{pmatrix}-u\\-u^3+u\end{pmatrix}$$
$$a_{10} = \begin{pmatrix}-u^7+2u^5-2u^3\\u^7-u^5+u\end{pmatrix}$$
$$a_6 = \begin{pmatrix}u^{12}-3u^{10}+5u^8-4u^6+2u^4-u^2+1\\-u^{12}+2u^{10}-2u^8+u^4\end{pmatrix}$$
$$a_2 = \begin{pmatrix}u^4-u^2+1\\u^6-2u^4+u^2\end{pmatrix}$$
$$a_7 = \begin{pmatrix}-u^9+2u^7-3u^5+2u^3-u\\-u^{11}+3u^9-4u^7+3u^5-u^3+u\end{pmatrix}$$
$$a_1 = \begin{pmatrix}-u^{14}+3u^{12}-6u^{10}+7u^8-6u^6+4u^4-2u^2+1\\u^{14}+u^{13}+\cdots+u^2+u\end{pmatrix}$$

**(ii) Obstruction class** $= -1$

**(iii) Cusp Shapes**
$= -4u^{14}+12u^{12}-4u^{11}-20u^{10}+8u^9+16u^8-12u^7-8u^6+8u^5+8u^4-4u^3-8u^2+4u+10$

**(iv) Complex Volumes and Cusp Shapes**

| Solution to $I_2^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -1.16849$ | $11.7390$ | $6.35624$ |
| $u = -1.053774 - 0.600336I$ | $4.96865 - 6.29824I$ | $9.18075 + 5.76248I$ |
| $u = -1.053774 + 0.600336I$ | $4.96865 + 6.29824I$ | $9.18075 - 5.76248I$ |
| $u = -0.938536 - 0.379610I$ | $-1.44795 - 1.44538I$ | $0.924314 + 0.710077I$ |
| $u = -0.938536 + 0.379610I$ | $-1.44795 + 1.44538I$ | $0.924314 - 0.710077I$ |
| $u = -0.483842 - 0.722916I$ | $6.64012 + 1.24233I$ | $12.05713 - 0.59928I$ |
| $u = -0.483842 + 0.722916I$ | $6.64012 - 1.24233I$ | $12.05713 + 0.59928I$ |
| $u = 0.469738 - 0.412319I$ | $0.983732 - 0.215278I$ | $10.49328 + 1.71815I$ |
| $u = 0.469738 + 0.412319I$ | $0.983732 + 0.215278I$ | $10.49328 - 1.71815I$ |
| $u = 0.496009 - 0.834142I$ | $17.7129 - 1.8405I$ | $12.03822 + 0.10978I$ |
| $u = 0.496009 + 0.834142I$ | $17.7129 + 1.8405I$ | $12.03822 - 0.10978I$ |
| $u = 1.004358 - 0.506467I$ | $-0.48193 + 4.24481I$ | $5.44692 - 7.82705I$ |
| $u = 1.004358 + 0.506467I$ | $-0.48193 - 4.24481I$ | $5.44692 + 7.82705I$ |
| $u = 1.090289 - 0.650224I$ | $15.9255 + 7.3739I$ | $9.68126 - 4.56542I$ |
| $u = 1.090289 + 0.650224I$ | $15.9255 - 7.3739I$ | $9.68126 + 4.56542I$ |

## III. u-Polynomials

| Crossings | u-Polynomials at each crossings |
|---|---|
| $c_1, c_5, c_6$<br>$c_7, c_9, c_{10}$ | $(u-1)(u^{15}+2u^{14}+\cdots+u+1)$ |
| $c_2$ | $(u)(u^{15}+3u^{14}+\cdots+21u+5)$ |
| $c_3, c_8$ | $(u+1)(u^{15}-3u^{13}+\cdots-u-1)$ |
| $c_4$ | $(u+1)(u^{15}+6u^{14}+\cdots+3u+1)$ |

## IV. Riley Polynomials

| Crossings | Riley Polynomials at each crossings |
|---|---|
| $c_1, c_5, c_6$<br>$c_7, c_9, c_{10}$ | $(y-1)(y^{15}-22y^{14}+\cdots+3y-1)$ |
| $c_2$ | $(y)(y^{15}-3y^{14}+\cdots+241y-25)$ |
| $c_3, c_8$ | $(y-1)(y^{15}-6y^{14}+\cdots+3y-1)$ |
| $c_4$ | $(y-1)(y^{15}+6y^{14}+\cdots-17y-1)$ |