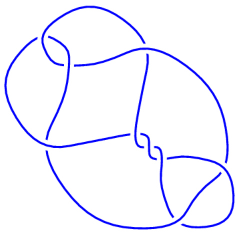
# $9_{15}$ $(K9a_{10})$



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**Arc Sequences**

$$\rightarrow \overset{\uparrow}{5} \rightarrow \overset{\uparrow}{4} \rightarrow \overset{\uparrow}{8} \rightarrow \overset{\uparrow}{2} \rightarrow \overset{\downarrow}{7} \rightarrow \overset{\uparrow}{9} \rightarrow \overset{\uparrow}{3} \rightarrow \overset{\downarrow}{1} \rightarrow \overset{\uparrow}{6} \rightarrow$$

**Solving Sequence**

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

**Representation Ideals**

$$I = I_1^u$$

$$I_1^u = \langle u^{19} - u^{18} + \cdots + 2u + 1 \rangle$$

There are 1 irreducible components with 19 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.** $\boldsymbol{I^u_1 = \langle u^{19} - u^{18} + 4u^{17} - 3u^{16} + 10u^{15} - 6u^{14} + 16u^{13} - 7u^{12} + 19u^{11} - 5u^{10} + 18u^{9} - 3u^{8} + 14u^{7} + 10u^{5} + 5u^{3} + u^{2} + 2u + 1\rangle}$

**(i) Arc colorings**

$$a_1 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_9 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} u \\ u^3 + u \end{pmatrix}$$
$$a_5 = \begin{pmatrix} u^3 \\ u^5 + u^3 + u \end{pmatrix}$$
$$a_2 = \begin{pmatrix} -u^8 - u^6 - u^4 + 1 \\ -u^{10} - 2u^8 - 3u^6 - 2u^4 - u^2 \end{pmatrix}$$
$$a_4 = \begin{pmatrix} u^{13} + 2u^{11} + 3u^9 + 2u^7 - u \\ u^{15} + 3u^{13} + 6u^{11} + 7u^9 + 6u^7 + 4u^5 + 2u^3 + u \end{pmatrix}$$
$$a_8 = \begin{pmatrix} u^2 + 1 \\ u^2 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} -u^{18} - 3u^{16} - 6u^{14} - 7u^{12} - 5u^{10} - 3u^8 + u^2 + 1 \\ -u^{18} + u^{17} + \cdots + 3u + 1 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} -u^{18} - 3u^{16} - 6u^{14} - 7u^{12} - 5u^{10} - 3u^8 + u^2 + 1 \\ -u^{18} + u^{17} + \cdots + 3u + 1 \end{pmatrix}$$


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

**(iii) Cusp Shapes** $= -4u^{17} + 4u^{16} - 12u^{15} + 12u^{14} - 28u^{13} + 24u^{12} - 36u^{11} + 32u^{10} - 36u^9 + 28u^8 - 28u^7 + 28u^6 - 12u^5 + 16u^4 - 12u^3 + 12u^2 + 4u + 10$

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

| Solution to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.745489 - 0.500016I$ | $-2.83381 + 1.53005I$ | $4.20605 - 2.54963I$ |
| $u = -0.745489 + 0.500016I$ | $-2.83381 - 1.53005I$ | $4.20605 + 2.54963I$ |
| $u = -0.636878 - 1.050557I$ | $-4.41408 + 3.71612I$ | $1.80100 - 2.45937I$ |
| $u = -0.636878 + 1.050557I$ | $-4.41408 - 3.71612I$ | $1.80100 + 2.45937I$ |
| $u = -0.588600 - 0.865037I$ | $0.46836 + 2.32534I$ | $2.27174 - 3.09456I$ |
| $u = -0.588600 + 0.865037I$ | $0.46836 - 2.32534I$ | $2.27174 + 3.09456I$ |
| $u = -0.381963$ | $0.907373$ | $11.4722$ |
| $u = -0.167515 - 0.839557I$ | $-1.41106 + 1.72326I$ | $0.18035 - 5.18112I$ |
| $u = -0.167515 + 0.839557I$ | $-1.41106 - 1.72326I$ | $0.18035 + 5.18112I$ |
| $u = -0.021471 - 1.128169I$ | $-8.30762 + 3.11880I$ | $-1.58624 - 2.69239I$ |
| $u = -0.021471 + 1.128169I$ | $-8.30762 - 3.11880I$ | $-1.58624 + 2.69239I$ |
| $u = 0.666721 - 1.052348I$ | $-3.89635 - 9.88550I$ | $2.86128 + 7.31129I$ |
| $u = 0.666721 + 1.052348I$ | $-3.89635 + 9.88550I$ | $2.86128 - 7.31129I$ |
| $u = 0.687512 - 0.928828I$ | $3.12958 - 5.52702I$ | $8.42794 + 7.00248I$ |
| $u = 0.687512 + 0.928828I$ | $3.12958 + 5.52702I$ | $8.42794 - 7.00248I$ |
| $u = 0.709462 - 0.766103I$ | $3.62212 + 0.16816I$ | $10.16829 - 0.91431I$ |
| $u = 0.709462 + 0.766103I$ | $3.62212 - 0.16816I$ | $10.16829 + 0.91431I$ |
| $u = 0.787239 - 0.559366I$ | $-2.43770 + 4.39903I$ | $4.93348 - 2.80289I$ |
| $u = 0.787239 + 0.559366I$ | $-2.43770 - 4.39903I$ | $4.93348 + 2.80289I$ |

## II. u-Polynomials

| Crossings | u-Polynomials at each crossings |
|---|---|
| $c_1, c_2, c_4$ | $(u^{19} + 5u^{18} + \cdots + 2u + 1)$ |
| $c_3, c_7$ | $(u^{19} + u^{18} + \cdots - u^2 + 1)$ |
| $c_5, c_8$ | $(u^{19} + 7u^{18} + \cdots + 2u - 1)$ |
| $c_6, c_9$ | $(u^{19} + u^{18} + \cdots + 2u - 1)$ |

## III. Riley Polynomials

| Crossings | Riley Polynomials at each crossings |
|---|---|
| $c_1, c_2, c_4$ | $(y^{19} + 19y^{18} + \cdots + 10y - 1)$ |
| $c_3, c_7$ | $(y^{19} - 5y^{18} + \cdots + 2y - 1)$ |
| $c_5, c_8$ | $(y^{19} + 11y^{18} + \cdots + 42y - 1)$ |
| $c_6, c_9$ | $(y^{19} + 7y^{18} + \cdots + 2y - 1)$ |