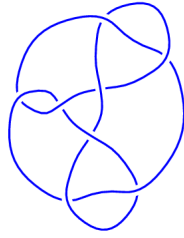
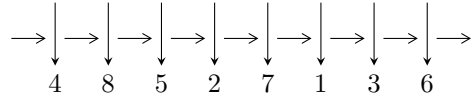


8₁₅ (K8a₂)

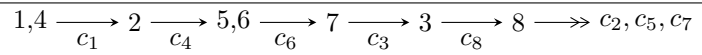


1

Arc Sequences



Solving Sequence



Representation Ideals

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

$$I_1^u = \langle u - 1, a + 2, b + 1 \rangle$$

$$I_2^u = \langle u^7 + u^6 - u^5 - 2u^4 + u^3 + 2u^2 + u - 1, b - u, u^5 + u^4 - u^2 + a + 1 \rangle$$

$$I_3^u = \langle u^{10} + u^9 - 2u^8 - 4u^7 + 4u^5 + 3u^4 - u^3 - 2u^2 + 1, -u^9 + 2u^7 + u^6 - 2u^5 - u^4 + u^3 + u^2 + b - 1, -2u^9 - u^8 + 4u^7 + 5u^6 - 2u^5 - 5u^4 - 2u^3 + 2u^2 + a + 2u - 1 \rangle$$

There are 3 irreducible components with 18 representations.

¹The knot diagram image is adapter from “C. Livingston and A. H. Moore, KnotInfo: Table of Knot Invariants, <http://www.indiana.edu/~knotinfo>”

$$\mathbf{I. } I_1^u = \langle u - 1, a + 2, b + 1 \rangle$$

(i) Arc colorings

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

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

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

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

$$a_6 = \begin{pmatrix} -2 \\ -1 \end{pmatrix}$$

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

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

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

(ii) Obstruction class = 1

(iii) Cusp Shapes = -12

(iv) Complex Volumes and Cusp Shapes

Solution to I_1^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 1.00000$		
$a = -2.00000$	-3.28987	-12.0000
$b = -1.00000$		

$$\text{II. } I_2^u = \langle u^7 + u^6 - u^5 - 2u^4 + u^3 + 2u^2 + u - 1, b - u, u^5 + u^4 - u^2 + a + 1 \rangle$$

(i) Arc colorings

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

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

$$a_2 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$

$$a_5 = \begin{pmatrix} -u \\ -u^3 + u \end{pmatrix}$$

$$a_6 = \begin{pmatrix} -u^5 - u^4 + u^2 - 1 \\ u \end{pmatrix}$$

$$a_7 = \begin{pmatrix} -u^5 - u^4 + u^2 - u - 1 \\ u \end{pmatrix}$$

$$a_3 = \begin{pmatrix} u^3 \\ u^5 - u^3 + u \end{pmatrix}$$

$$a_8 = \begin{pmatrix} u^6 + u^5 - u^3 + u + 1 \\ -u^2 \end{pmatrix}$$

(ii) Obstruction class = -1

(iii) Cusp Shapes = $-2u^5 + 2u^4 + 4u^3 + 2u^2 - 6u - 8$

(iv) Complex Volumes and Cusp Shapes

Solution to I_2^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -1.139458 - 0.630170I$ $a = -1.90433 + 1.00930I$ $b = -1.139458 - 0.630170I$	$0.36369 - 9.93065I$	$-8.46028 + 7.33664I$
$u = -1.139458 + 0.630170I$ $a = -1.90433 - 1.00930I$ $b = -1.139458 + 0.630170I$	$0.36369 + 9.93065I$	$-8.46028 - 7.33664I$
$u = -0.597306 - 0.773845I$ $a = -0.575186 + 0.488684I$ $b = -0.597306 - 0.773845I$	$3.85236 - 0.95540I$	$-3.31071 + 2.37083I$
$u = -0.597306 + 0.773845I$ $a = -0.575186 - 0.488684I$ $b = -0.597306 + 0.773845I$	$3.85236 + 0.95540I$	$-3.31071 - 2.37083I$
$u = 0.502855$ $a = -0.843229$ $b = 0.502855$	-0.951399	-9.93921
$u = 0.985336 - 0.506466I$ $a = 1.40113 + 1.58699I$ $b = 0.985336 - 0.506466I$	$-2.09542 + 3.93070I$	$-10.25941 - 4.87230I$
$u = 0.985336 + 0.506466I$ $a = 1.40113 - 1.58699I$ $b = 0.985336 + 0.506466I$	$-2.09542 - 3.93070I$	$-10.25941 + 4.87230I$

$$\text{III. } I_3^u = \langle u^{10} + u^9 - 2u^8 - 4u^7 + 4u^5 + 3u^4 - u^3 - 2u^2 + 1, -u^9 + 2u^7 + u^6 - 2u^5 - u^4 + u^3 + u^2 + b - 1, -2u^9 - u^8 + \dots + a - 1 \rangle$$

(i) Arc colorings

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

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

$$a_2 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$

$$a_5 = \begin{pmatrix} -u \\ -u^3 + u \end{pmatrix}$$

$$a_6 = \begin{pmatrix} 2u^9 + u^8 - 4u^7 - 5u^6 + 2u^5 + 5u^4 + 2u^3 - 2u^2 - 2u + 1 \\ u^9 - 2u^7 - u^6 + 2u^5 + u^4 - u^3 - u^2 + 1 \end{pmatrix}$$

$$a_7 = \begin{pmatrix} u^9 + u^8 - 2u^7 - 4u^6 + 4u^4 + 3u^3 - u^2 - 2u \\ u^9 - 2u^7 - u^6 + 2u^5 + u^4 - u^3 - u^2 + 1 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} u^3 \\ u^5 - u^3 + u \end{pmatrix}$$

$$a_8 = \begin{pmatrix} -2u^9 + 5u^7 + 4u^6 - 4u^5 - 6u^4 - 2u^3 + 3u^2 + 2u - 1 \\ -u^9 + 3u^7 + 2u^6 - 3u^5 - 4u^4 + 3u^2 + u - 2 \end{pmatrix}$$

(ii) Obstruction class = -1

(iii) Cusp Shapes = $-4u^9 + 8u^7 + 4u^6 - 8u^5 - 4u^4 + 4u^2 - 10$

(iv) Complex Volumes and Cusp Shapes

Solution to I_3^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -1.018496 - 0.644891I$ $a = 0.300568 + 0.420289I$ $b = -0.400287 + 0.864056I$	$2.58269 - 4.40083I$	$-5.25569 + 3.49859I$
$u = -1.018496 + 0.644891I$ $a = 0.300568 - 0.420289I$ $b = -0.400287 - 0.864056I$	$2.58269 + 4.40083I$	$-5.25569 - 3.49859I$
$u = -0.926127 - 0.393188I$ $a = 2.15091 - 0.54513I$ $b = 1.236043 - 0.156723I$	$-2.96077 - 1.53058I$	$-9.48489 + 4.43065I$
$u = -0.926127 + 0.393188I$ $a = 2.15091 + 0.54513I$ $b = 1.236043 + 0.156723I$	$-2.96077 + 1.53058I$	$-9.48489 - 4.43065I$
$u = -0.400287 - 0.864056I$ $a = -0.577079 - 0.307948I$ $b = -1.018496 + 0.644891I$	$2.58269 + 4.40083I$	$-5.25569 - 3.49859I$
$u = -0.400287 + 0.864056I$ $a = -0.577079 + 0.307948I$ $b = -1.018496 - 0.644891I$	$2.58269 - 4.40083I$	$-5.25569 + 3.49859I$
$u = 0.608868 - 0.334904I$ $a = -0.652039 - 0.358650I$ $b = 0.608868 + 0.334904I$	-0.888787	-8.51886
$u = 0.608868 + 0.334904I$ $a = -0.652039 + 0.358650I$ $b = 0.608868 - 0.334904I$	-0.888787	-8.51886
$u = 1.236043 - 0.156723I$ $a = -1.72236 - 0.49415I$ $b = -0.926127 - 0.393188I$	$-2.96077 - 1.53058I$	$-9.48489 + 4.43065I$
$u = 1.236043 + 0.156723I$ $a = -1.72236 + 0.49415I$ $b = -0.926127 + 0.393188I$	$-2.96077 + 1.53058I$	$-9.48489 - 4.43065I$

IV. u-Polynomials

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

V. Riley Polynomials

Crossings	Riley Polynomials at each crossings
c_1, c_4, c_6 c_8	$(y - 1)(y^7 - 3y^6 + 7y^5 - 8y^4 + 9y^3 - 6y^2 + 5y - 1)$ $(y^{10} - 5y^9 + \dots - 4y + 1)$
c_2, c_7	$y(y^5 + 3y^4 + 4y^3 + y^2 - y - 1)^2$ $(y^7 + 3y^6 + 4y^5 + y^4 - y^3 + 7y^2 + 8y - 4)$
c_3, c_5	$(y - 1)(y^7 + 5y^6 + 19y^5 + 36y^4 + 49y^3 + 38y^2 + 13y - 1)$ $(y^{10} - y^9 - 6y^7 + 22y^6 + 6y^5 + 45y^4 + 15y^3 + 22y^2 + 4y + 1)$