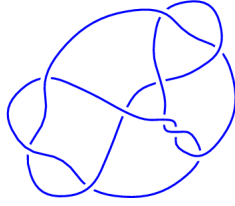
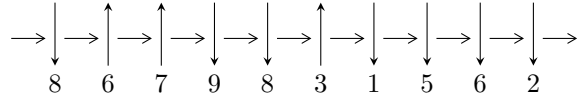


10<sub>140</sub> (K10n<sub>29</sub>)

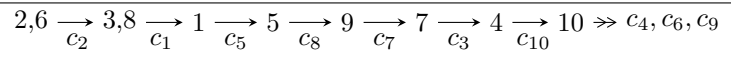


1

**Arc Sequences**



**Solving Sequence**



**Representation Ideals**

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

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

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

$$I_3^u = \langle u^7 - 2u^6 - 5u^5 + 9u^4 + 9u^3 - 14u^2 + 3u + 3, 2u^6 - 7u^5 - 14u^4 + 39u^3 + 32u^2 + 29b - 47u + 4, -25u^6 + 44u^5 + 146u^4 - 183u^3 - 255u^2 + 174a + 167u - 108 \rangle$$

There are 3 irreducible components with 10 representations.

---

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

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

(i) Arc colorings

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

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

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

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

$$a_1 = \begin{pmatrix} -a + 1 \\ -1 \end{pmatrix}$$

$$a_5 = \begin{pmatrix} -2 \\ a + 1 \end{pmatrix}$$

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

$$a_7 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

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

$$a_{10} = \begin{pmatrix} -a \\ -1 \end{pmatrix}$$

(ii) Obstruction class = 1

(iii) Cusp Shapes = 0

(iv) Complex Volumes and Cusp Shapes

Solution to $I_1^u$		$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u =$	1.00000		
$a =$	$-1.41421I$	4.93480	0
$b =$	1.00000		
$u =$	1.00000		
$a =$	$1.41421I$	4.93480	0
$b =$	1.00000		

$$\text{II. } I_2^u = \langle u + 1, a, b + 1 \rangle$$

(i) Arc colorings

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

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

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

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

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

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

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

$$a_7 = \begin{pmatrix} -1 \\ 0 \end{pmatrix}$$

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

$$a_{10} = \begin{pmatrix} 0 \\ -1 \end{pmatrix}$$

(ii) Obstruction class =  $-1$

(iii) Cusp Shapes =  $0$

(iv) Complex Volumes and Cusp Shapes

Solution to $I_2^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -1.00000$		
$a = 0$	0	0
$b = -1.00000$		

$$\text{III. } I_3^u = \langle u^7 - 2u^6 - 5u^5 + 9u^4 + 9u^3 - 14u^2 + 3u + 3, 2u^6 - 7u^5 + \dots + 29b + 4, -25u^6 + 44u^5 + \dots + 174a - 108 \rangle$$

(i) Arc colorings

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

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

$$a_3 = \begin{pmatrix} 1 \\ -u^2 \end{pmatrix}$$

$$a_8 = \begin{pmatrix} 0.143678u^6 - 0.252874u^5 + \dots - 0.959770u + 0.620690 \\ -0.0689655u^6 + 0.241379u^5 + \dots + 1.62069u - 0.137931 \end{pmatrix}$$

$$a_1 = \begin{pmatrix} 0.0804598u^6 - 0.281609u^5 + \dots - 1.55747u + 1.32759 \\ 0.103448u^6 + 0.137931u^5 + \dots + 0.0689655u - 0.793103 \end{pmatrix}$$

$$a_5 = \begin{pmatrix} 0.0632184u^6 + 0.0287356u^5 + \dots - 0.402299u - 0.706897 \\ 0.120690u^6 - 0.172414u^5 + \dots + 0.913793u + 0.241379 \end{pmatrix}$$

$$a_9 = \begin{pmatrix} 0.183908u^6 - 0.143678u^5 + \dots - 1.48851u + 0.534483 \\ -0.310345u^6 + 0.0862069u^5 + \dots + 1.29310u - 0.120690 \end{pmatrix}$$

$$a_7 = \begin{pmatrix} u \\ -u^3 + u \end{pmatrix}$$

$$a_4 = \begin{pmatrix} -u^2 + 1 \\ u^4 - 2u^2 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} 0.183908u^6 - 0.143678u^5 + \dots - 1.48851u + 0.534483 \\ 0.103448u^6 + 0.137931u^5 + \dots + 0.0689655u - 0.793103 \end{pmatrix}$$

(ii) Obstruction class = -1

$$\text{(iii) Cusp Shapes} = -\frac{43}{29}u^6 + \frac{78}{29}u^5 + \frac{214}{29}u^4 - \frac{331}{29}u^3 - \frac{369}{29}u^2 + \frac{445}{29}u - \frac{144}{29}$$

(iv) Complex Volumes and Cusp Shapes

Solution to $I_3^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -1.61248 - 0.50127I$ $a = -0.519526 - 0.799826I$ $b = 0.227371 + 1.297874I$	$8.76077 - 1.03782I$	$1.54723 + 0.70964I$
$u = -1.61248 + 0.50127I$ $a = -0.519526 + 0.799826I$ $b = 0.227371 - 1.297874I$	$8.76077 + 1.03782I$	$1.54723 - 0.70964I$
$u = -0.350429$ $a = 1.08068$ $b = -0.777623$	$-1.01758$	$-11.3198$
$u = 0.673944 - 0.445187I$ $a = 0.544144 - 0.706219I$ $b = 0.593853 + 0.464339I$	$1.22231 - 1.45738I$	$0.50826 + 4.10370I$
$u = 0.673944 + 0.445187I$ $a = 0.544144 + 0.706219I$ $b = 0.593853 - 0.464339I$	$1.22231 + 1.45738I$	$0.50826 - 4.10370I$
$u = 2.11375 - 0.36632I$ $a = -0.064957 + 0.921422I$ $b = -1.43241 - 1.36324I$	$-17.6990 - 5.2126I$	$0.60442 + 1.93466I$
$u = 2.11375 + 0.36632I$ $a = -0.064957 - 0.921422I$ $b = -1.43241 + 1.36324I$	$-17.6990 + 5.2126I$	$0.60442 - 1.93466I$

#### IV. u-Polynomials

Crossings	u-Polynomials at each crossings
$c_1$	$(u - 1)^2(u + 1)(u^7 + 2u^6 + 3u^5 + u^4 + 5u^3 - 2u^2 - u + 3)$
$c_2, c_3$	$(u - 1)^3(u^7 + 2u^6 - 5u^5 - 9u^4 + 9u^3 + 14u^2 + 3u - 3)$
$c_4, c_5, c_8$	$u(u^2 + 2)(u^7 + u^6 + 7u^5 + 3u^4 + 12u^3 - 2u^2 + 4u - 2)$
$c_6$	$(u - 1)(u + 1)^2(u^7 + 2u^6 - 5u^5 - 9u^4 + 9u^3 + 14u^2 + 3u - 3)$
$c_7$	$(u + 1)^3(u^7 + 2u^6 + 3u^5 + u^4 + 5u^3 - 2u^2 - u + 3)$
$c_9$	$u(u^2 + 2)(u^7 + 10u^6 + 70u^5 + 250u^4 + 410u^3 + 180u^2 + 56u + 16)$
$c_{10}$	$(u - 1)^3(u^7 + 2u^6 + 15u^5 + 35u^4 + 11u^3 - 20u^2 + 13u - 9)$



### V. Riley Polynomials

Crossings	Riley Polynomials at each crossings
$c_1, c_7$	$(y - 1)^3(y^7 + 2y^6 + 15y^5 + 35y^4 + 11y^3 - 20y^2 + 13y - 9)$
$c_2, c_3, c_6$	$(y - 1)^3(y^7 - 14y^6 + 79y^5 - 221y^4 + 315y^3 - 196y^2 + 93y - 9)$
$c_4, c_5, c_8$	$y(y + 2)^2(y^7 + 13y^6 + 67y^5 + 171y^4 + 216y^3 + 104y^2 + 8y - 4)$
$c_9$	$y(y + 2)^2$ $(y^7 + 40y^6 + 720y^5 - 8588y^4 + 85620y^3 + 5520y^2 - 2624y - 256)$
$c_{10}$	$(y - 1)^3(y^7 + 26y^6 + \dots - 191y - 81)$