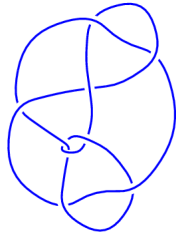
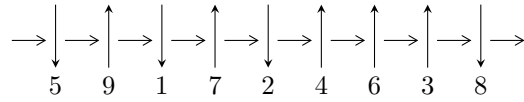


9₃₀ (K9a₁)

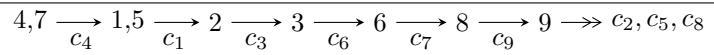


1

Arc Sequences



Solving Sequence



Representation Ideals

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

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

$$I_2^u = \langle u^{28} - 2u^{27} + \dots - 22u + 17, \\ - 1.10786 \times 10^{30}u^{27} + 1.56975 \times 10^{30}u^{26} + \dots + 5.64156 \times 10^{30}b + 1.84737 \times 10^{31}, \\ - 9.86099 \times 10^{30}u^{27} + 1.53334 \times 10^{31}u^{26} + \dots + 9.59066 \times 10^{31}a + 1.00203 \times 10^{32} \rangle$$

There are 2 irreducible components with 30 representations.

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

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

(i) Arc colorings

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

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

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

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

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

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

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

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

$$a_9 = \begin{pmatrix} 1 \\ -u + 1 \end{pmatrix}$$

$$a_9 = \begin{pmatrix} 1 \\ -u + 1 \end{pmatrix}$$

(ii) Obstruction class = 1

(iii) Cusp Shapes = $4u + 1$

(iv) Complex Volumes and Cusp Shapes

Solution to I_1^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 0.500000 - 0.866025I$	$1.64493 + 2.02988I$	$3.00000 - 3.46410I$
$a = 0.500000 + 0.866025I$		
$b = -0.500000 + 0.866025I$		
$u = 0.500000 + 0.866025I$	$1.64493 - 2.02988I$	$3.00000 + 3.46410I$
$a = 0.500000 - 0.866025I$		
$b = -0.500000 - 0.866025I$		

$$\text{II. } I_2^u = \langle u^{28} - 2u^{27} + \dots - 22u + 17, -1.11 \times 10^{30}u^{27} + 1.57 \times 10^{30}u^{26} + \dots + 5.64 \times 10^{30}b + 1.85 \times 10^{31}, -9.86 \times 10^{30}u^{27} + 1.53 \times 10^{31}u^{26} + \dots + 9.59 \times 10^{31}a + 1.00 \times 10^{32} \rangle$$

(i) Arc colorings

$$\begin{aligned} a_4 &= \begin{pmatrix} 0 \\ u \end{pmatrix} \\ a_7 &= \begin{pmatrix} 0.102819u^{27} - 0.159878u^{26} + \dots - 1.72157u - 1.04480 \\ 0.196374u^{27} - 0.278248u^{26} + \dots + 4.36028u - 3.27457 \end{pmatrix} \\ a_1 &= \begin{pmatrix} 1 \\ 0 \end{pmatrix} \\ a_5 &= \begin{pmatrix} -0.0289468u^{27} + 0.0511954u^{26} + \dots - 0.946887u + 3.10177 \\ -0.0660702u^{27} + 0.00650029u^{26} + \dots + 1.41339u + 0.622499 \end{pmatrix} \\ a_2 &= \begin{pmatrix} 0.247232u^{27} - 0.289355u^{26} + \dots - 0.803406u - 3.36355 \\ 0.0701438u^{27} - 0.0601191u^{26} + \dots + 1.45892u - 0.856112 \end{pmatrix} \\ a_3 &= \begin{pmatrix} u \\ u \end{pmatrix} \\ a_6 &= \begin{pmatrix} 0.102819u^{27} - 0.159878u^{26} + \dots - 1.72157u - 1.04480 \\ 0.149697u^{27} - 0.238519u^{26} + \dots + 3.61906u - 4.05247 \end{pmatrix} \\ a_8 &= \begin{pmatrix} -0.0503595u^{27} + 0.0305753u^{26} + \dots - 1.67757u - 0.351015 \\ 0.124940u^{27} - 0.197271u^{26} + \dots + 1.38849u - 3.01050 \end{pmatrix} \\ a_9 &= \begin{pmatrix} 0.0657848u^{27} - 0.0912517u^{26} + \dots - 1.95710u - 2.43782 \\ 0.241085u^{27} - 0.319098u^{26} + \dots + 1.10897u - 5.09730 \end{pmatrix} \\ a_9 &= \begin{pmatrix} 0.0657848u^{27} - 0.0912517u^{26} + \dots - 1.95710u - 2.43782 \\ 0.241085u^{27} - 0.319098u^{26} + \dots + 1.10897u - 5.09730 \end{pmatrix} \end{aligned}$$

(ii) Obstruction class = -1

(iii) Cusp Shapes = $0.0691432u^{27} - 0.164535u^{26} + \dots + 0.898606u - 12.0931$

(iv) Complex Volumes and Cusp Shapes

Solution to I_2^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -1.191128 - 0.619206I$		
$a = -0.446676 + 0.694630I$	$-0.41268 - 5.75423I$	$0.10698 + 5.96655I$
$b = -0.11783 + 1.66482I$		
$u = -1.191128 + 0.619206I$		
$a = -0.446676 - 0.694630I$	$-0.41268 + 5.75423I$	$0.10698 - 5.96655I$
$b = -0.11783 - 1.66482I$		
$u = -1.13985 - 0.88919I$		
$a = 0.336232 - 0.805130I$	$-0.59978 - 6.77427I$	$1.77406 + 4.95962I$
$b = -1.02430 - 1.92233I$		
$u = -1.13985 + 0.88919I$		
$a = 0.336232 + 0.805130I$	$-0.59978 + 6.77427I$	$1.77406 - 4.95962I$
$b = -1.02430 + 1.92233I$		
$u = -1.105364 - 0.510425I$		
$a = 0.609049 + 0.428795I$	$-2.52313 - 1.47542I$	$-1.29345 + 0.59666I$
$b = -0.138597 - 0.133720I$		
$u = -1.105364 + 0.510425I$		
$a = 0.609049 - 0.428795I$	$-2.52313 + 1.47542I$	$-1.29345 - 0.59666I$
$b = -0.138597 + 0.133720I$		
$u = -0.847077 - 0.345927I$		
$a = -0.893222 - 0.255924I$	$-1.32210 - 1.34593I$	$-1.91932 + 0.66126I$
$b = 0.319452 - 1.172605I$		
$u = -0.847077 + 0.345927I$		
$a = -0.893222 + 0.255924I$	$-1.32210 + 1.34593I$	$-1.91932 - 0.66126I$
$b = 0.319452 + 1.172605I$		
$u = -0.66840 - 1.28739I$		
$a = 0.499324 - 0.405264I$	$0.967687 - 0.906276I$	$-0.59768 - 1.67094I$
$b = -0.52286 - 1.56384I$		
$u = -0.66840 + 1.28739I$		
$a = 0.499324 + 0.405264I$	$0.967687 + 0.906276I$	$-0.59768 + 1.67094I$
$b = -0.52286 + 1.56384I$		

Solution to I_2^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.236722 - 0.655524I$ $a = -0.82244 + 1.42154I$ $b = 0.901799 + 0.826328I$	$2.40233 + 0.64414I$	$4.35398 + 1.30683I$
$u = -0.236722 + 0.655524I$ $a = -0.82244 - 1.42154I$ $b = 0.901799 - 0.826328I$	$2.40233 - 0.64414I$	$4.35398 - 1.30683I$
$u = -0.191038 - 0.606129I$ $a = 0.482592 + 0.293625I$ $b = -0.387987 - 0.437755I$	$-0.22315 - 1.43304I$	$-1.58225 + 4.97603I$
$u = -0.191038 + 0.606129I$ $a = 0.482592 - 0.293625I$ $b = -0.387987 + 0.437755I$	$-0.22315 + 1.43304I$	$-1.58225 - 4.97603I$
$u = 0.015157 - 1.395582I$ $a = -0.334699 - 0.686844I$ $b = -0.03901 - 1.87739I$	$1.56772 - 4.24816I$	$1.88645 + 6.97904I$
$u = 0.015157 + 1.395582I$ $a = -0.334699 + 0.686844I$ $b = -0.03901 + 1.87739I$	$1.56772 + 4.24816I$	$1.88645 - 6.97904I$
$u = 0.623667 - 0.562813I$ $a = 0.526785 + 1.121544I$ $b = 0.309747 + 1.323956I$	$1.85217 + 1.40144I$	$4.69947 - 1.74630I$
$u = 0.623667 + 0.562813I$ $a = 0.526785 - 1.121544I$ $b = 0.309747 - 1.323956I$	$1.85217 - 1.40144I$	$4.69947 + 1.74630I$
$u = 0.763781 - 0.287418I$ $a = -0.87066 - 1.23875I$ $b = 1.03249 - 1.42256I$	$-5.39487 + 3.62399I$	$-4.20871 - 2.76186I$
$u = 0.763781 + 0.287418I$ $a = -0.87066 + 1.23875I$ $b = 1.03249 + 1.42256I$	$-5.39487 - 3.62399I$	$-4.20871 + 2.76186I$

Solution to I_2^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 0.991759 - 0.593054I$ $a = 1.002081 + 0.480415I$ $b = -1.53289 + 0.52019I$	$0.65193 + 3.28147I$	$-1.23266 - 4.99392I$
$u = 0.991759 + 0.593054I$ $a = 1.002081 - 0.480415I$ $b = -1.53289 - 0.52019I$	$0.65193 - 3.28147I$	$-1.23266 + 4.99392I$
$u = 1.019474 - 0.068324I$ $a = -0.659580 + 0.779415I$ $b = -0.250962 - 0.164029I$	$-6.61232 - 2.08114I$	$-5.79595 + 2.78862I$
$u = 1.019474 + 0.068324I$ $a = -0.659580 - 0.779415I$ $b = -0.250962 + 0.164029I$	$-6.61232 + 2.08114I$	$-5.79595 - 2.78862I$
$u = 1.43260 - 0.55257I$ $a = -0.468429 + 0.450927I$ $b = 0.155652 + 0.114978I$	$-5.32101 + 6.23266I$	$-4.14975 - 4.30079I$
$u = 1.43260 + 0.55257I$ $a = -0.468429 - 0.450927I$ $b = 0.155652 - 0.114978I$	$-5.32101 - 6.23266I$	$-4.14975 + 4.30079I$
$u = 1.53314 - 0.75996I$ $a = -0.430947 - 0.639054I$ $b = 1.29528 - 1.97686I$	$-3.12706 + 11.95453I$	$-1.04116 - 8.32221I$
$u = 1.53314 + 0.75996I$ $a = -0.430947 + 0.639054I$ $b = 1.29528 + 1.97686I$	$-3.12706 - 11.95453I$	$-1.04116 + 8.32221I$

III. u-Polynomials

Crossings	u-Polynomials at each crossings
c_1, c_5	$u^2(u^{28} + u^{27} + \dots + 8u + 4)$
c_2	$(u^2 - u + 1)(u^{28} + 2u^{27} + \dots + 2u + 1)$
c_3	$(u^2 + u + 1)(u^{28} + 2u^{27} + \dots + 22u + 17)$
c_4	$(u + 1)^2(u^{28} + 3u^{27} + \dots + u + 1)$
c_6	$(u - 1)^2(u^{28} + 3u^{27} + \dots + u + 1)$
c_7	$(u - 1)^2(u^{28} + 13u^{27} + \dots - 7u + 1)$
c_8	$(u^2 + u + 1)(u^{28} + 2u^{27} + \dots + 2u + 1)$
c_9	$(u^2 + u + 1)(u^{28} + 14u^{27} + \dots + 2u + 1)$

IV. Riley Polynomials

Crossings	Riley Polynomials at each crossings
c_1, c_5	$y^2(y^{28} - 15y^{27} + \dots - 88y + 16)$
c_2, c_8	$(y^2 + y + 1)(y^{28} + 14y^{27} + \dots + 2y + 1)$
c_3	$(y^2 + y + 1)(y^{28} - 10y^{27} + \dots - 246y + 289)$
c_4, c_6	$(y - 1)^2(y^{28} - 13y^{27} + \dots + 7y + 1)$
c_7	$(y - 1)^2(y^{28} + 7y^{27} + \dots - 61y + 1)$
c_9	$(y^2 + y + 1)(y^{28} + 2y^{27} + \dots + 14y + 1)$