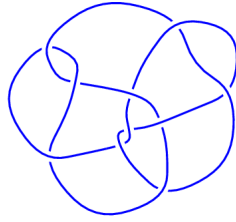
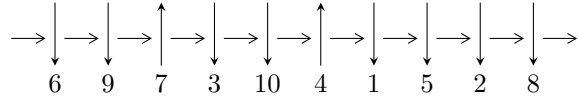


10₉₇ (K10a₁₂)

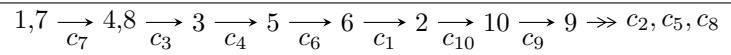


1

Arc Sequences



Solving Sequence



Representation Ideals

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

$$I_1^u = \langle 4u^2 - 2u + 7, b + 1, 21a + 8u + 10 \rangle$$

$$I_2^u = \langle 4u^{17} + 10u^{16} + \dots + 8u + 1, 6.30878 \times 10^{21}u^{16} + 1.29423 \times 10^{22}u^{15} + \dots + 2.07124 \times 10^{21}b + 3.73078 \times 10^{21}a + 8.35403 \times 10^{21}u^{16} + 1.68001 \times 10^{22}u^{15} + \dots + 2.07124 \times 10^{21}a + 3.93060 \times 10^{20} \rangle$$

$$I_3^u = \langle u^{28} - 7u^{27} + \dots - 1536u + 181, 1.82876 \times 10^{68}u^{27} - 1.21857 \times 10^{69}u^{26} + \dots + 3.01713 \times 10^{69}b - 8.69349 \times 10^{70}, -5.30558 \times 10^{70}u^{27} + 3.52385 \times 10^{71}u^{26} + \dots + 5.46100 \times 10^{71}a + 2.69444 \times 10^{73} \rangle$$

There are 3 irreducible components with 47 representations.

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

$$\text{I. } I_1^u = \langle 4u^2 - 2u + 7, b + 1, 21a + 8u + 10 \rangle$$

(i) Arc colorings

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

$$a_7 = \begin{pmatrix} -\frac{8}{21}u - \frac{10}{21} \\ -1 \end{pmatrix}$$

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

$$a_8 = \begin{pmatrix} -\frac{8}{21}u + \frac{11}{21} \\ -1 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} -\frac{4}{21}u + \frac{16}{21} \\ \frac{1}{3}u + \frac{2}{3} \end{pmatrix}$$

$$a_5 = \begin{pmatrix} -\frac{8}{21}u - \frac{10}{21} \\ \frac{1}{3}u + \frac{1}{6} \end{pmatrix}$$

$$a_6 = \begin{pmatrix} -\frac{8}{21}u - \frac{10}{21} \\ \frac{1}{3}u + \frac{1}{6} \end{pmatrix}$$

$$a_2 = \begin{pmatrix} -\frac{2}{7}u + \frac{8}{7} \\ \frac{1}{6}u - \frac{1}{6} \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} -\frac{8}{21}u + \frac{32}{21} \\ -1 \end{pmatrix}$$

$$a_9 = \begin{pmatrix} -\frac{2}{21}u + \frac{8}{21} \\ -\frac{1}{6}u - \frac{5}{6} \end{pmatrix}$$

(ii) Obstruction class = 1

(iii) Cusp Shapes = $\frac{1}{6}u - \frac{61}{6}$

(iv) Complex Volumes and Cusp Shapes

Solution to I_1^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 0.250000 - 1.299038I$ $a = -0.571429 + 0.494872I$ $b = -1.00000$	$-1.64493 + 2.02988I$	$-10.12500 - 0.21651I$
$u = 0.250000 + 1.299038I$ $a = -0.571429 - 0.494872I$ $b = -1.00000$	$-1.64493 - 2.02988I$	$-10.12500 + 0.21651I$

$$\text{II. } I_2^u = \langle 4u^{17} + 10u^{16} + \dots + 8u + 1, 6.31 \times 10^{21}u^{16} + 1.29 \times 10^{22}u^{15} + \dots + 2.07 \times 10^{21}b + 3.73 \times 10^{21}, 8.35 \times 10^{21}u^{16} + 1.68 \times 10^{22}u^{15} + \dots + 2.07 \times 10^{21}a + 3.93 \times 10^{20} \rangle$$

(i) Arc colorings

$$\begin{aligned} a_1 &= \begin{pmatrix} 1 \\ 0 \end{pmatrix} \\ a_7 &= \begin{pmatrix} -4.03334u^{16} - 8.11109u^{15} + \dots - 20.7218u - 0.189770 \\ -3.04589u^{16} - 6.24854u^{15} + \dots - 13.3678u - 1.80123 \end{pmatrix} \\ a_4 &= \begin{pmatrix} 0 \\ u \end{pmatrix} \\ a_8 &= \begin{pmatrix} -0.987453u^{16} - 1.86255u^{15} + \dots - 7.35404u + 1.61146 \\ -3.04589u^{16} - 6.24854u^{15} + \dots - 13.3678u - 1.80123 \end{pmatrix} \\ a_3 &= \begin{pmatrix} 1.79623u^{16} + 6.42424u^{15} + \dots + 23.2916u + 6.11933 \\ 1.88904u^{16} + 4.86116u^{15} + \dots + 16.0695u + 3.43817 \end{pmatrix} \\ a_5 &= \begin{pmatrix} 23.6377u^{16} + 54.6701u^{15} + \dots + 94.6543u + 18.6343 \\ 10.4065u^{16} + 23.3976u^{15} + \dots + 47.8604u + 8.11492 \end{pmatrix} \\ a_6 &= \begin{pmatrix} -4.03334u^{16} - 8.11109u^{15} + \dots - 20.7218u - 0.189770 \\ -4.11183u^{16} - 8.52313u^{15} + \dots - 16.3040u - 2.29429 \end{pmatrix} \\ a_2 &= \begin{pmatrix} 11.8190u^{16} + 28.5106u^{15} + \dots + 51.0010u + 13.8850 \\ 8.93179u^{16} + 20.5994u^{15} + \dots + 39.6256u + 8.98563 \end{pmatrix} \\ a_{10} &= \begin{pmatrix} -4.19505u^{16} - 10.7455u^{15} + \dots - 13.3615u - 3.18180 \\ -9.55765u^{16} - 21.7472u^{15} + \dots - 40.1665u - 8.25412 \end{pmatrix} \\ a_9 &= \begin{pmatrix} 30.8652u^{16} + 66.9842u^{15} + \dots + 133.258u + 23.7988 \\ 5.01280u^{16} + 9.77738u^{15} + \dots + 18.1671u + 1.67252 \end{pmatrix} \end{aligned}$$

(ii) Obstruction class = -1

$$\text{(iii) Cusp Shapes} = -\frac{100770932482863059622864}{2071244780912044787317}u^{16} - \frac{223891062239633335685016}{2071244780912044787317}u^{15} + \dots - \frac{406918332284594290206608}{2071244780912044787317}u - \frac{84787820149178858531002}{2071244780912044787317}$$

(iv) Complex Volumes and Cusp Shapes

Solution to I_2^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -1.18564 - 2.16518I$ $a = 0.540925 - 0.048152I$ $b = 0.53774 - 1.38258I$	$7.7059 + 14.8527I$	$-2.01529 - 8.44038I$
$u = -1.18564 + 2.16518I$ $a = 0.540925 + 0.048152I$ $b = 0.53774 + 1.38258I$	$7.7059 - 14.8527I$	$-2.01529 + 8.44038I$
$u = -0.778762 - 1.045725I$ $a = -1.130820 - 0.003261I$ $b = -0.161092 + 1.190926I$	$5.81019 + 5.32225I$	$2.45956 - 7.34338I$
$u = -0.778762 + 1.045725I$ $a = -1.130820 + 0.003261I$ $b = -0.161092 - 1.190926I$	$5.81019 - 5.32225I$	$2.45956 + 7.34338I$
$u = -0.34831 - 1.52104I$ $a = -0.457588 - 0.497688I$ $b = -1.335871 + 0.125893I$	$-1.15632 - 2.35456I$	$2.48228 + 6.50501I$
$u = -0.34831 + 1.52104I$ $a = -0.457588 + 0.497688I$ $b = -1.335871 - 0.125893I$	$-1.15632 + 2.35456I$	$2.48228 - 6.50501I$
$u = -0.293900 - 0.090615I$ $a = 2.47276 - 2.78652I$ $b = 0.44756 - 1.37873I$	$9.32990 + 8.56729I$	$0.17143 - 4.34513I$
$u = -0.293900 + 0.090615I$ $a = 2.47276 + 2.78652I$ $b = 0.44756 + 1.37873I$	$9.32990 - 8.56729I$	$0.17143 + 4.34513I$
$u = -0.271190$ $a = 1.01411$ $b = -0.531228$	-0.869406	-11.1450
$u = -0.02898 - 1.67997I$ $a = -0.531083 - 0.150112I$ $b = -0.840094 - 0.523489I$	$-2.94308 - 1.91475I$	$-12.50863 + 1.23884I$

Solution to I_2^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.02898 + 1.67997I$ $a = -0.531083 + 0.150112I$ $b = -0.840094 + 0.523489I$	$-2.94308 + 1.91475I$	$-12.50863 - 1.23884I$
$u = 0.102562 - 0.302615I$ $a = 2.64218 + 3.06507I$ $b = 0.047500 + 1.229644I$	$7.90214 - 1.97950I$	$6.13742 + 2.92595I$
$u = 0.102562 + 0.302615I$ $a = 2.64218 - 3.06507I$ $b = 0.047500 - 1.229644I$	$7.90214 + 1.97950I$	$6.13742 - 2.92595I$
$u = 0.137893 - 0.691342I$ $a = 1.347081 + 0.334810I$ $b = 0.222604 - 0.163997I$	$-0.34103 - 1.75255I$	$-2.16634 + 2.85736I$
$u = 0.137893 + 0.691342I$ $a = 1.347081 - 0.334810I$ $b = 0.222604 + 0.163997I$	$-0.34103 + 1.75255I$	$-2.16634 - 2.85736I$
$u = 1.28073 - 1.02818I$ $a = 0.609497 - 0.561008I$ $b = 0.347263 + 1.122362I$	$1.26847 - 6.54787I$	$-3.86293 + 7.90993I$
$u = 1.28073 + 1.02818I$ $a = 0.609497 + 0.561008I$ $b = 0.347263 - 1.122362I$	$1.26847 + 6.54787I$	$-3.86293 - 7.90993I$

$$\text{III. } I_3^u = \langle u^{28} - 7u^{27} + \dots - 1536u + 181, 1.83 \times 10^{68}u^{27} - 1.22 \times 10^{69}u^{26} + \dots + 3.02 \times 10^{69}b - 8.69 \times 10^{70}, -5.31 \times 10^{70}u^{27} + 3.52 \times 10^{71}u^{26} + \dots + 5.46 \times 10^{71}a + 2.69 \times 10^{73} \rangle$$

(i) Arc colorings

$$\begin{aligned} a_1 &= \begin{pmatrix} 1 \\ 0 \end{pmatrix} \\ a_7 &= \begin{pmatrix} 0.0971540u^{27} - 0.645276u^{26} + \dots + 293.200u - 49.3396 \\ -0.0606125u^{27} + 0.403883u^{26} + \dots - 170.263u + 28.8138 \end{pmatrix} \\ a_4 &= \begin{pmatrix} 0 \\ u \end{pmatrix} \\ a_8 &= \begin{pmatrix} 0.157766u^{27} - 1.04916u^{26} + \dots + 463.463u - 78.1534 \\ -0.0606125u^{27} + 0.403883u^{26} + \dots - 170.263u + 28.8138 \end{pmatrix} \\ a_3 &= \begin{pmatrix} 0.145588u^{27} - 0.962635u^{26} + \dots + 405.369u - 65.4714 \\ -0.0817127u^{27} + 0.535691u^{26} + \dots - 201.061u + 32.7618 \end{pmatrix} \\ a_5 &= \begin{pmatrix} -0.0587091u^{27} + 0.392847u^{26} + \dots - 192.785u + 35.6675 \\ 0.0369442u^{27} - 0.247182u^{26} + \dots + 115.799u - 19.7141 \end{pmatrix} \\ a_6 &= \begin{pmatrix} 0.0971540u^{27} - 0.645276u^{26} + \dots + 293.200u - 49.3396 \\ -0.0474153u^{27} + 0.316626u^{26} + \dots - 134.392u + 22.5146 \end{pmatrix} \\ a_2 &= \begin{pmatrix} 0.124522u^{27} - 0.811945u^{26} + \dots + 301.462u - 48.6103 \\ -0.00810095u^{27} + 0.0566235u^{26} + \dots - 37.6228u + 5.61253 \end{pmatrix} \\ a_{10} &= \begin{pmatrix} -0.253437u^{27} + 1.66276u^{26} + \dots - 659.161u + 108.172 \\ 0.0724330u^{27} - 0.477447u^{26} + \dots + 199.547u - 31.2100 \end{pmatrix} \\ a_9 &= \begin{pmatrix} 0.0139725u^{27} - 0.103776u^{26} + \dots + 73.7744u - 16.1551 \\ -0.0162406u^{27} + 0.111152u^{26} + \dots - 57.3670u + 11.1272 \end{pmatrix} \end{aligned}$$

(ii) Obstruction class = -1

$$\text{(iii) Cusp Shapes} = 0.153239u^{27} - 1.01293u^{26} + \dots + 399.774u - 66.2933$$

(iv) Complex Volumes and Cusp Shapes

Solution to I_3^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -1.32770 - 0.73882I$		
$a = -0.373478 - 0.603187I$	$-1.35286 + 2.76747I$	$-9.41762 - 3.21377I$
$b = -0.426047 + 1.000289I$		
$u = -1.32770 + 0.73882I$		
$a = -0.373478 + 0.603187I$	$-1.35286 - 2.76747I$	$-9.41762 + 3.21377I$
$b = -0.426047 - 1.000289I$		
$u = -1.01050 - 1.86446I$		
$a = 0.520349 - 0.108187I$	$7.93259 + 2.76747I$	$1.41762 - 3.21377I$
$b = 0.64484 - 1.35997I$		
$u = -1.01050 + 1.86446I$		
$a = 0.520349 + 0.108187I$	$7.93259 - 2.76747I$	$1.41762 + 3.21377I$
$b = 0.64484 + 1.35997I$		
$u = -0.985395 - 0.376228I$		
$a = -0.889621 - 0.676242I$	$2.09958 + 3.41271I$	$-6.10600 - 2.62516I$
$b = -0.340282 + 0.137082I$		
$u = -0.985395 + 0.376228I$		
$a = -0.889621 + 0.676242I$	$2.09958 - 3.41271I$	$-6.10600 + 2.62516I$
$b = -0.340282 - 0.137082I$		
$u = -0.049737 - 0.918300I$		
$a = 0.725699 - 0.801705I$	$4.48016 - 3.41271I$	$-1.89400 + 2.62516I$
$b = 1.027093 + 0.175615I$		
$u = -0.049737 + 0.918300I$		
$a = 0.725699 + 0.801705I$	$4.48016 + 3.41271I$	$-1.89400 - 2.62516I$
$b = 1.027093 - 0.175615I$		
$u = 0.005849 - 0.295784I$		
$a = 2.06578 - 2.65187I$	$4.48016 - 3.41271I$	$-1.89400 + 2.62516I$
$b = -0.41210 - 1.42136I$		
$u = 0.005849 + 0.295784I$		
$a = 2.06578 + 2.65187I$	$4.48016 + 3.41271I$	$-1.89400 - 2.62516I$
$b = -0.41210 + 1.42136I$		

Solution to I_3^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 0.00900 - 1.69198I$		
$a = 0.603983 - 0.407304I$	$3.28987 + 8.93586I$	$-4.00000 - 7.26077I$
$b = 1.148813 - 0.016311I$		
$u = 0.00900 + 1.69198I$		
$a = 0.603983 + 0.407304I$	$3.28987 - 8.93586I$	$-4.00000 + 7.26077I$
$b = 1.148813 + 0.016311I$		
$u = 0.34747 - 1.48466I$		
$a = 0.695117 - 0.128859I$	$-1.35286 - 2.76747I$	$-9.41762 + 3.21377I$
$b = 0.637817 - 0.252286I$		
$u = 0.34747 + 1.48466I$		
$a = 0.695117 + 0.128859I$	$-1.35286 + 2.76747I$	$-9.41762 - 3.21377I$
$b = 0.637817 + 0.252286I$		
$u = 0.401323 - 0.038356I$		
$a = -1.59325 - 2.29730I$	$7.93259 + 2.76747I$	$1.41762 - 3.21377I$
$b = 0.51211 + 1.46812I$		
$u = 0.401323 + 0.038356I$		
$a = -1.59325 + 2.29730I$	$7.93259 - 2.76747I$	$1.41762 + 3.21377I$
$b = 0.51211 - 1.46812I$		
$u = 0.695185 - 0.086492I$		
$a = 0.812530 - 0.552667I$	$3.31269 - 1.37770I$	$-3.11410 + 4.12207I$
$b = -0.015745 - 1.176089I$		
$u = 0.695185 + 0.086492I$		
$a = 0.812530 + 0.552667I$	$3.31269 + 1.37770I$	$-3.11410 - 4.12207I$
$b = -0.015745 + 1.176089I$		
$u = 0.76062 - 1.91607I$		
$a = 0.562695 + 0.101358I$	$2.09958 - 3.41271I$	$-6.10600 + 2.62516I$
$b = 0.136381 + 1.104827I$		
$u = 0.76062 + 1.91607I$		
$a = 0.562695 - 0.101358I$	$2.09958 + 3.41271I$	$-6.10600 - 2.62516I$
$b = 0.136381 - 1.104827I$		

Solution to I_3^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 1.030601 - 0.780526I$	$3.31269 + 1.37770I$	$-3.11410 - 4.12207I$
$a = 0.106586 + 0.521711I$		
$b = 0.212363 - 0.520130I$		
$u = 1.030601 + 0.780526I$	$3.31269 - 1.37770I$	$-3.11410 + 4.12207I$
$a = 0.106586 - 0.521711I$		
$b = 0.212363 + 0.520130I$		
$u = 1.05218 - 1.83263I$	$3.26705 + 1.37770I$	$-4.88590 - 4.12207I$
$a = -0.156030 + 0.359169I$		
$b = -0.053811 - 0.680241I$		
$u = 1.05218 + 1.83263I$	$3.26705 - 1.37770I$	$-4.88590 + 4.12207I$
$a = -0.156030 - 0.359169I$		
$b = -0.053811 + 0.680241I$		
$u = 1.06267 - 2.08438I$	$3.28987 - 8.93586I$	$-4.00000 + 7.26077I$
$a = -0.523262 - 0.061247I$		
$b = -0.56444 - 1.41873I$		
$u = 1.06267 + 2.08438I$	$3.28987 + 8.93586I$	$-4.00000 - 7.26077I$
$a = -0.523262 + 0.061247I$		
$b = -0.56444 + 1.41873I$		
$u = 1.50844 - 0.14479I$	$3.26705 + 1.37770I$	$-4.88590 - 4.12207I$
$a = 0.282676 + 0.467229I$		
$b = -0.006983 + 1.150228I$		
$u = 1.50844 + 0.14479I$	$3.26705 - 1.37770I$	$-4.88590 + 4.12207I$
$a = 0.282676 - 0.467229I$		
$b = -0.006983 - 1.150228I$		

IV. u-Polynomials

Crossings	u-Polynomials at each crossings
c_1	$(4u^2 - 2u + 1)(4u^{17} - 2u^{16} + \dots - u^2 - 1)$ $(u^{28} + 3u^{27} + \dots + 1254u + 653)$
c_2, c_{10}	$(u + 1)^2(u^{17} - 2u^{16} + \dots - 2u - 1)(u^{28} + 5u^{27} + \dots + 2u + 1)$
c_3	$(u^2 + u + 1)$ $(1 - u + 2u^2 + 4u^4 + 6u^6 + 2u^7 + 7u^8 + 3u^9 + 6u^{10} + 2u^{11} + 3u^{12} + u^{13} + u^{14})^2$ $(u^{17} + 3u^{15} + \dots + 17u + 4)$
c_4	$(u^2 + u + 1)$ $(1 + 3u + 12u^2 + 28u^3 + 58u^4 + 94u^5 + 126u^6 + 144u^7 + 137u^8 + 111u^9 + 74u^{10} + 40u^{11} + 1)$ $(u^{17} + 6u^{16} + \dots + 145u - 16)$
c_5	u^2 $(1 + u + 2u^2 + 4u^4 + 6u^6 - 2u^7 + 7u^8 - 3u^9 + 6u^{10} - 2u^{11} + 3u^{12} - u^{13} + u^{14})^2$ $(u^{17} + 3u^{16} + \dots - 24u - 32)$
c_6	$(u^2 - u + 1)$ $(1 - u + 2u^2 + 4u^4 + 6u^6 + 2u^7 + 7u^8 + 3u^9 + 6u^{10} + 2u^{11} + 3u^{12} + u^{13} + u^{14})^2$ $(u^{17} + 3u^{15} + \dots + 17u + 4)$
c_7, c_9	$(u - 1)^2(u^{17} - 2u^{16} + \dots - 2u - 1)(u^{28} + 5u^{27} + \dots + 2u + 1)$
c_8	$(4u^2 + 2u + 1)(4u^{17} - 2u^{16} + \dots - u^2 - 1)$ $(u^{28} + 3u^{27} + \dots + 1254u + 653)$

V. Riley Polynomials

Crossings	Riley Polynomials at each crossings
c_1, c_8	$(16y^2 + 4y + 1)(16y^{17} + 132y^{16} + \dots - 2y - 1)$ $(y^{28} + 15y^{27} + \dots + 3659320y + 426409)$
c_2, c_7, c_9 c_{10}	$(y - 1)^2(y^{17} + 10y^{16} + \dots + 8y - 1)(y^{28} + 19y^{27} + \dots - 10y^2 + 1)$
c_3, c_6	$(y^2 + y + 1)$ $(1 + 3y + 12y^2 + 28y^3 + 58y^4 + 94y^5 + 126y^6 + 144y^7 + 137y^8 + 111y^9 + 74y^{10} + 40y^{11} + 17y^{12} + 10y^{13} + 6y^{14} + 3y^{15} + 2y^{16} + y^{17} + 6y^{16} + \dots + 145y - 16)$
c_4	$(y^2 + y + 1)$ $(1 + 15y + 92y^2 + 296y^3 + 534y^4 + 486y^5 + 50y^6 - 356y^7 - 355y^8 - 105y^9 + 66y^{10} + 80y^{11} + 44y^{12} + 20y^{13} + 8y^{14} + 3y^{15} + 2y^{16} + y^{17} + 10y^{16} + \dots + 44449y - 256)$
c_5	$1y^2$ $(1.00 + 3.00y + 12.0y^2 + 28.0y^3 + 58.0y^4 + 94.0y^5 + 126.y^6 + 144.y^7 + 137.y^8 + 111.y^9 + 74.y^{10} + 40.y^{11} + 17.y^{12} + 10.y^{13} + 6.y^{14} + 3.y^{15} + 2.y^{16} + y^{17} + 5.00000000y^{16} + \dots - 6976.00000y - 1024.000000)$