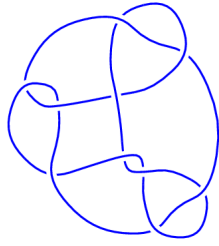
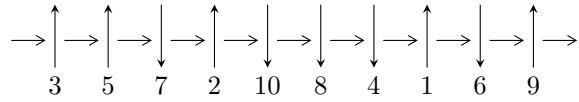


10<sub>71</sub> (K10a<sub>10</sub>)

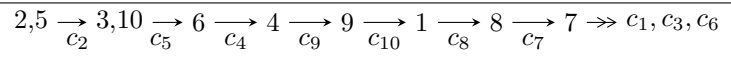


1

**Arc Sequences**



**Solving Sequence**



**Representation Ideals**

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

$$I_1^u = \langle b^2 + 3, u + 1, b + 2a - 1 \rangle$$

$$I_2^u = \langle u^{40} + 3u^{39} + \dots + 3u + 1, -u^{39} - 2u^{38} + \dots + 2a - 1, u^{39} + 2u^{38} + \dots + b + 1 \rangle$$

There are 2 irreducible components with 42 representations.

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<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>”

$$\text{I. } I_1^u = \langle b^2 + 3, u + 1, b + 2a - 1 \rangle$$

(i) Arc colorings

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

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

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

$$a_{10} = \begin{pmatrix} -\frac{1}{2}b + \frac{1}{2} \\ b \end{pmatrix}$$

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

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

$$a_9 = \begin{pmatrix} -\frac{1}{2}b - \frac{1}{2} \\ b + 1 \end{pmatrix}$$

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

$$a_8 = \begin{pmatrix} -\frac{1}{2}b - \frac{1}{2} \\ \frac{1}{2}b + \frac{1}{2} \end{pmatrix}$$

$$a_7 = \begin{pmatrix} -\frac{1}{2}b - \frac{1}{2} \\ \frac{1}{2}b + \frac{1}{2} \end{pmatrix}$$

(ii) Obstruction class = 1

(iii) Cusp Shapes =  $-2b + 3$

(iv) Complex Volumes and Cusp Shapes

Solution to $I_1^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -1.00000$		
$a = 0.500000 + 0.866025I$	$1.64493 - 2.02988I$	$3.00000 + 3.46410I$
$b = -1.73205I$		
$u = -1.00000$		
$a = 0.500000 - 0.866025I$	$1.64493 + 2.02988I$	$3.00000 - 3.46410I$
$b = 1.73205I$		

**II.**

$$I_2^u = \langle u^{40} + 3u^{39} + \dots + 3u + 1, -u^{39} - 2u^{38} + \dots + 2a - 1, u^{39} + 2u^{38} + \dots + b + 1 \rangle$$

**(i) Arc colorings**

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

$$a_5 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$

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

$$a_{10} = \begin{pmatrix} \frac{1}{2}u^{39} + u^{38} + \dots + u + \frac{1}{2} \\ -u^{39} - 2u^{38} + \dots - 3u - 1 \end{pmatrix}$$

$$a_6 = \begin{pmatrix} -\frac{5}{2}u^{39} - 6u^{38} + \dots - 6u - \frac{7}{2} \\ \frac{5}{2}u^{39} + 7u^{38} + \dots + 8u + \frac{9}{2} \end{pmatrix}$$

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

$$a_9 = \begin{pmatrix} -\frac{7}{2}u^{39} - 8u^{38} + \dots - 8u - \frac{7}{2} \\ 2u^{39} + 5u^{38} + \dots + 5u + 3 \end{pmatrix}$$

$$a_1 = \begin{pmatrix} -u^2 + 1 \\ u^4 \end{pmatrix}$$

$$a_8 = \begin{pmatrix} -\frac{11}{2}u^{39} - 12u^{38} + \dots - 12u - \frac{11}{2} \\ \frac{9}{2}u^{39} + 9u^{38} + \dots + 9u + \frac{9}{2} \end{pmatrix}$$

$$a_7 = \begin{pmatrix} -\frac{9}{2}u^{39} - 10u^{38} + \dots - 11u - \frac{11}{2} \\ \frac{7}{2}u^{39} + 7u^{38} + \dots + 8u + \frac{9}{2} \end{pmatrix}$$

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

**(iii) Cusp Shapes =  $11u^{39} + 27u^{38} + \dots + 31u + 8$**

(iv) Complex Volumes and Cusp Shapes

Solution to $I_2^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -1.182532 - 0.574885I$ $a = -0.134690 + 0.947345I$ $b = -0.33275 - 3.29714I$	$0.05370 + 13.38523I$	$0.42075 - 9.35928I$
$u = -1.182532 + 0.574885I$ $a = -0.134690 - 0.947345I$ $b = -0.33275 + 3.29714I$	$0.05370 - 13.38523I$	$0.42075 + 9.35928I$
$u = -1.153696 - 0.496328I$ $a = -0.281375 - 0.846655I$ $b = -0.18379 + 3.15325I$	$5.21580 + 6.90989I$	$5.24227 - 6.39245I$
$u = -1.153696 + 0.496328I$ $a = -0.281375 + 0.846655I$ $b = -0.18379 - 3.15325I$	$5.21580 - 6.90989I$	$5.24227 + 6.39245I$
$u = -1.152910 - 0.576867I$ $a = -0.789619 - 0.148475I$ $b = 1.040260 + 0.012851I$	$-1.20323 + 7.65538I$	$-1.63964 - 4.86252I$
$u = -1.152910 + 0.576867I$ $a = -0.789619 + 0.148475I$ $b = 1.040260 - 0.012851I$	$-1.20323 - 7.65538I$	$-1.63964 + 4.86252I$
$u = -1.070513 - 0.405845I$ $a = 0.780179 + 0.679209I$ $b = 0.34963 - 2.03038I$	$2.37466 + 0.03317I$	$2.30074 - 1.92960I$
$u = -1.070513 + 0.405845I$ $a = 0.780179 - 0.679209I$ $b = 0.34963 + 2.03038I$	$2.37466 - 0.03317I$	$2.30074 + 1.92960I$
$u = -1.060109 - 0.493550I$ $a = 0.428684 - 0.518252I$ $b = -0.468283 + 0.760309I$	$0.39800 + 4.72692I$	$-1.63267 - 6.05913I$
$u = -1.060109 + 0.493550I$ $a = 0.428684 + 0.518252I$ $b = -0.468283 - 0.760309I$	$0.39800 - 4.72692I$	$-1.63267 + 6.05913I$

Solution to $I_2^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.823561 - 0.701523I$		
$a = 0.002358 + 1.090112I$	$-6.02457 + 5.56367I$	$-5.18066 - 6.01609I$
$b = -0.47944 - 1.65555I$		
$u = -0.823561 + 0.701523I$		
$a = 0.002358 - 1.090112I$	$-6.02457 - 5.56367I$	$-5.18066 + 6.01609I$
$b = -0.47944 + 1.65555I$		
$u = -0.759310 - 0.715307I$		
$a = -1.093061 - 0.073821I$	$-6.21108 - 0.22925I$	$-5.84725 - 0.24543I$
$b = -0.007252 - 0.353745I$		
$u = -0.759310 + 0.715307I$		
$a = -1.093061 + 0.073821I$	$-6.21108 + 0.22925I$	$-5.84725 + 0.24543I$
$b = -0.007252 + 0.353745I$		
$u = -0.695195 - 0.270902I$		
$a = 0.012548 - 1.393236I$	$0.74845 + 2.81821I$	$-1.95524 - 6.55211I$
$b = -0.28495 + 1.73971I$		
$u = -0.695195 + 0.270902I$		
$a = 0.012548 + 1.393236I$	$0.74845 - 2.81821I$	$-1.95524 + 6.55211I$
$b = -0.28495 - 1.73971I$		
$u = -0.412657 - 0.535700I$		
$a = 0.718698 - 0.502951I$	$-1.47568 - 0.52119I$	$-6.28438 + 0.91978I$
$b = -0.148875 + 0.060490I$		
$u = -0.412657 + 0.535700I$		
$a = 0.718698 + 0.502951I$	$-1.47568 + 0.52119I$	$-6.28438 - 0.91978I$
$b = -0.148875 - 0.060490I$		
$u = -0.308532 - 0.828965I$		
$a = 0.404339 + 1.102772I$	$-3.72005 - 2.44717I$	$-4.96365 + 1.04542I$
$b = -0.138835 - 0.360604I$		
$u = -0.308532 + 0.828965I$		
$a = 0.404339 - 1.102772I$	$-3.72005 + 2.44717I$	$-4.96365 - 1.04542I$
$b = -0.138835 + 0.360604I$		

Solution to $I_2^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.261280 - 0.867465I$		
$a = -1.292565 + 0.423506I$	$-2.70648 - 8.09252I$	$-2.94350 + 6.08172I$
$b = -0.928329 - 0.594777I$		
$u = -0.261280 + 0.867465I$		
$a = -1.292565 - 0.423506I$	$-2.70648 + 8.09252I$	$-2.94350 - 6.08172I$
$b = -0.928329 + 0.594777I$		
$u = -0.129708 - 0.704300I$		
$a = 1.43620 + 0.12766I$	$2.32493 - 2.41163I$	$2.33571 + 3.34704I$
$b = 0.960054 - 0.315198I$		
$u = -0.129708 + 0.704300I$		
$a = 1.43620 - 0.12766I$	$2.32493 + 2.41163I$	$2.33571 - 3.34704I$
$b = 0.960054 + 0.315198I$		
$u = 0.283071 - 0.547471I$		
$a = -1.82389 - 0.22572I$	$-0.60920 + 2.86826I$	$-1.22261 - 1.95241I$
$b = -0.674246 + 0.886942I$		
$u = 0.283071 + 0.547471I$		
$a = -1.82389 + 0.22572I$	$-0.60920 - 2.86826I$	$-1.22261 + 1.95241I$
$b = -0.674246 - 0.886942I$		
$u = 0.467744 - 0.454035I$		
$a = 0.11763 - 1.56846I$	$-1.07354 - 2.17702I$	$-2.16670 + 4.43587I$
$b = -0.956048 + 0.303178I$		
$u = 0.467744 + 0.454035I$		
$a = 0.11763 + 1.56846I$	$-1.07354 + 2.17702I$	$-2.16670 - 4.43587I$
$b = -0.956048 - 0.303178I$		
$u = 0.978018 - 0.193176I$		
$a = 0.148963 + 0.397208I$	$1.75548 - 0.68997I$	$4.17661 - 0.16492I$
$b = 0.574759 - 0.833284I$		
$u = 0.978018 + 0.193176I$		
$a = 0.148963 - 0.397208I$	$1.75548 + 0.68997I$	$4.17661 + 0.16492I$
$b = 0.574759 + 0.833284I$		

Solution to $I_2^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 1.045402 - 0.468373I$ $a = -0.811525 + 0.261280I$ $b = 1.115032 + 0.433573I$	$0.63968 - 1.74616I$	$0.044303 + 1.257582I$
$u = 1.045402 + 0.468373I$ $a = -0.811525 - 0.261280I$ $b = 1.115032 - 0.433573I$	$0.63968 + 1.74616I$	$0.044303 - 1.257582I$
$u = 1.098051 - 0.496688I$ $a = -0.166755 - 0.989201I$ $b = -0.92580 + 3.22127I$	$1.68055 - 7.12390I$	$1.84913 + 6.13601I$
$u = 1.098051 + 0.496688I$ $a = -0.166755 + 0.989201I$ $b = -0.92580 - 3.22127I$	$1.68055 + 7.12390I$	$1.84913 - 6.13601I$
$u = 1.169535 - 0.383434I$ $a = -0.245456 + 0.810272I$ $b = 0.31764 - 3.17797I$	$6.00686 - 1.32070I$	$7.28134 + 0.72610I$
$u = 1.169535 + 0.383434I$ $a = -0.245456 - 0.810272I$ $b = 0.31764 + 3.17797I$	$6.00686 + 1.32070I$	$7.28134 - 0.72610I$
$u = 1.211641 - 0.200716I$ $a = 0.433230 + 0.626819I$ $b = -0.35003 - 1.51378I$	$1.25887 - 0.68759I$	$-0.543601 - 0.759704I$
$u = 1.211641 + 0.200716I$ $a = 0.433230 - 0.626819I$ $b = -0.35003 + 1.51378I$	$1.25887 + 0.68759I$	$-0.543601 + 0.759704I$
$u = 1.256542 - 0.267461I$ $a = 0.656103 - 0.646617I$ $b = 0.02126 + 2.16902I$	$2.21178 + 4.43619I$	$1.72906 - 5.48285I$
$u = 1.256542 + 0.267461I$ $a = 0.656103 + 0.646617I$ $b = 0.02126 - 2.16902I$	$2.21178 - 4.43619I$	$1.72906 + 5.48285I$



### III. u-Polynomials

Crossings	u-Polynomials at each crossings
$c_1$	$(u + 1)^2(u^{40} + 21u^{39} + \dots + 3u + 1)$
$c_2$	$(u + 1)^2(u^{40} + 3u^{39} + \dots + 3u + 1)$
$c_3, c_7$	$u^2(u^{40} + u^{39} + \dots - 8u + 4)$
$c_4$	$(u - 1)^2(u^{40} + 3u^{39} + \dots + 3u + 1)$
$c_5$	$(u^2 - u + 1)(u^{40} + 2u^{39} + \dots + 4u^2 + 1)$
$c_6$	$u^2(u^{40} + 15u^{39} + \dots + 120u + 16)$
$c_8$	$(u^2 + u + 1)(u^{40} + 14u^{39} + \dots + 8u + 1)$
$c_9$	$(u^2 + u + 1)(u^{40} + 2u^{39} + \dots + 4u^2 + 1)$
$c_{10}$	$(u^2 + 1)(u^2 - u + 1)(u^{38} + 14u^{37} + \dots + 8u + 1)$

#### IV. Riley Polynomials

Crossings	Riley Polynomials at each crossings
$c_1$	$(y - 1)^2(y^{40} - y^{39} + \dots + 17y + 1)$
$c_2, c_4$	$(y - 1)^2(y^{40} - 21y^{39} + \dots - 3y + 1)$
$c_3, c_7$	$y^2(y^{40} - 15y^{39} + \dots - 120y + 16)$
$c_5$	$(y^2 + y + 1)(y^{40} + 14y^{39} + \dots + 8y + 1)$
$c_6$	$y^2(y^{40} + 17y^{39} + \dots + 2016y + 256)$
$c_8$	$(y^2 + y + 1)(y^{40} + 26y^{39} + \dots + 44y + 1)$
$c_9$	$(y^2 + y + 1)(y^{40} + 14y^{39} + \dots + 8y + 1)$
$c_{10}$	$(y^2 + y + 1)(y^{40} + 26y^{39} + \dots + 44y + 1)$