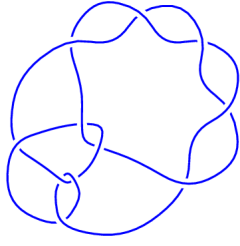
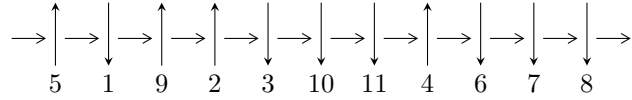


11a₉ (K11a₉)

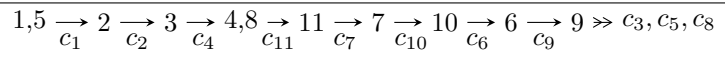


1

Arc Sequences



Solving Sequence



Representation Ideals

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

$$I_1^u = \langle a^4 + a^3 + 2a^2 - a + 1, -a^3 + 2b + 1, -a^3 - 2a^2 - 2a + 2u + 1 \rangle$$

$$I_2^u = \langle u^{36} + 3u^{35} + \dots + 2u + 1, 2u^{35} + 3u^{34} + \dots + 2a - 1, -3u^{35} - 8u^{34} + \dots + 2b - 3u \rangle$$

There are 2 irreducible components with 40 representations.

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

$$\text{I. } I_1^u = \langle a^4 + a^3 + 2a^2 - a + 1, -a^3 + 2b + 1, -a^3 - 2a^2 - 2a + 2u + 1 \rangle$$

(i) Arc colorings

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

$$a_5 = \begin{pmatrix} 0 \\ \frac{1}{2}a^3 + a^2 + a - \frac{1}{2} \end{pmatrix}$$

$$a_2 = \begin{pmatrix} 1 \\ \frac{1}{2}a^3 + a^2 + a + \frac{1}{2} \end{pmatrix}$$

$$a_3 = \begin{pmatrix} -\frac{1}{2}a^3 - a^2 - a + \frac{1}{2} \\ \frac{1}{2}a^3 + a^2 + a + \frac{1}{2} \end{pmatrix}$$

$$a_4 = \begin{pmatrix} -\frac{1}{2}a^3 - a^2 - a + \frac{1}{2} \\ \frac{1}{2}a^3 + a^2 + a + \frac{1}{2} \end{pmatrix}$$

$$a_8 = \begin{pmatrix} a \\ \frac{1}{2}a^3 - \frac{1}{2} \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} \frac{1}{2}a^3 + a^2 + \frac{3}{2} \\ -\frac{1}{2}a^3 - \frac{1}{2} \end{pmatrix}$$

$$a_7 = \begin{pmatrix} a^3 + a^2 \\ -\frac{1}{2}a^3 - \frac{1}{2} \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} -\frac{1}{2}a^3 + a + \frac{1}{2} \\ \frac{1}{2}a^3 - \frac{1}{2} \end{pmatrix}$$

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

$$a_9 = \begin{pmatrix} a \\ \frac{1}{2}a^3 - \frac{1}{2} \end{pmatrix}$$

$$a_9 = \begin{pmatrix} a \\ \frac{1}{2}a^3 - \frac{1}{2} \end{pmatrix}$$

(ii) Obstruction class = 1

(iii) Cusp Shapes = $a^3 + 3a^2 + a - 6$

(iv) Complex Volumes and Cusp Shapes

| Solution to I_1^u | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|--|---------------------------------------|-----------------------|
| $u = -0.500000 + 0.866025I$ $a = -0.80902 - 1.40126I$ $b = 1.61803$ | $-8.88264 - 2.02988I$ | $-6.50000 + 5.40059I$ |
| $u = -0.500000 - 0.866025I$ $a = -0.80902 + 1.40126I$ $b = 1.61803$ | $-8.88264 + 2.02988I$ | $-6.50000 - 5.40059I$ |
| $u = -0.500000 - 0.866025I$ $a = 0.309017 - 0.535233I$ $b = -0.618034$ | $-0.98696 + 2.02988I$ | $-6.50000 - 1.52761I$ |
| $u = -0.500000 + 0.866025I$ $a = 0.309017 + 0.535233I$ $b = -0.618034$ | $-0.98696 - 2.02988I$ | $-6.50000 + 1.52761I$ |

$$\langle u^{36} + 3u^{35} + \dots + 2u + 1, 2u^{35} + 3u^{34} + \dots + 2a - 1, -3u^{35} - 8u^{34} + \dots + 2b - 3u \rangle$$

II. $I_2^u =$

(i) Arc colorings

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

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

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

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

$$a_4 = \begin{pmatrix} -u \\ u^3 + u \end{pmatrix}$$

$$a_8 = \begin{pmatrix} -u^{35} - \frac{3}{2}u^{34} + \dots + \frac{5}{2}u + \frac{1}{2} \\ \frac{3}{2}u^{35} + 4u^{34} + \dots + \frac{5}{2}u^2 + \frac{3}{2}u \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} -\frac{1}{2}u^{34} - u^{33} + \dots + \frac{1}{2}u - \frac{1}{2} \\ -\frac{1}{2}u^{35} - u^{34} + \dots - \frac{1}{2}u^2 - \frac{3}{2}u \end{pmatrix}$$

$$a_7 = \begin{pmatrix} \frac{1}{2}u^{35} + \frac{1}{2}u^{34} + \dots - \frac{7}{2}u^3 - \frac{3}{2} \\ -\frac{1}{2}u^{35} - u^{34} + \dots - \frac{1}{2}u^2 - \frac{1}{2}u \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} -\frac{3}{2}u^{35} - \frac{3}{2}u^{34} + \dots + 3u + \frac{3}{2} \\ \frac{5}{2}u^{35} + 7u^{34} + \dots + \frac{5}{2}u + 1 \end{pmatrix}$$

$$a_6 = \begin{pmatrix} -u^5 - 2u^3 - u \\ u^5 + u^3 + u \end{pmatrix}$$

$$a_9 = \begin{pmatrix} -3u^{35} - \frac{9}{2}u^{34} + \dots + \frac{3}{2}u + \frac{1}{2} \\ \frac{9}{2}u^{35} + 13u^{34} + \dots + \frac{13}{2}u + 3 \end{pmatrix}$$

$$a_9 = \begin{pmatrix} -3u^{35} - \frac{9}{2}u^{34} + \dots + \frac{3}{2}u + \frac{1}{2} \\ \frac{9}{2}u^{35} + 13u^{34} + \dots + \frac{13}{2}u + 3 \end{pmatrix}$$

(ii) Obstruction class = -1

(iii) Cusp Shapes = $-\frac{1}{2}u^{35} - u^{34} + \dots - \frac{5}{2}u - 9$

(iv) Complex Volumes and Cusp Shapes

| Solution to I_2^u | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|--|---------------------------------------|------------------------|
| $u = -0.905583 - 0.245919I$ $a = 1.062586 + 0.682349I$ $b = -1.74040 - 0.07931I$ | $-15.1592 - 5.9753I$ | $-8.78509 + 2.65518I$ |
| $u = -0.905583 + 0.245919I$ $a = 1.062586 - 0.682349I$ $b = -1.74040 + 0.07931I$ | $-15.1592 + 5.9753I$ | $-8.78509 - 2.65518I$ |
| $u = -0.817908 - 0.214743I$ $a = -0.799629 - 0.967348I$ $b = 1.065993 + 0.299185I$ | $-5.13782 - 4.39791I$ | $-8.11131 + 3.98843I$ |
| $u = -0.817908 + 0.214743I$ $a = -0.799629 + 0.967348I$ $b = 1.065993 - 0.299185I$ | $-5.13782 + 4.39791I$ | $-8.11131 - 3.98843I$ |
| $u = -0.653983 - 0.139386I$ $a = 0.39433 + 1.40270I$ $b = -0.300828 - 0.511616I$ | $-0.88449 - 1.61128I$ | $-3.96504 + 4.05315I$ |
| $u = -0.653983 + 0.139386I$ $a = 0.39433 - 1.40270I$ $b = -0.300828 + 0.511616I$ | $-0.88449 + 1.61128I$ | $-3.96504 - 4.05315I$ |
| $u = -0.577297 - 1.205693I$ $a = -0.24753 - 2.08983I$ $b = -1.74533 + 0.09973I$ | $-18.0669 + 11.3850I$ | $-11.29148 - 6.01867I$ |
| $u = -0.577297 + 1.205693I$ $a = -0.24753 + 2.08983I$ $b = -1.74533 - 0.09973I$ | $-18.0669 - 11.3850I$ | $-11.29148 + 6.01867I$ |
| $u = -0.539638 - 1.180631I$ $a = 0.38024 + 1.69381I$ $b = 1.082363 - 0.370781I$ | $-8.00799 + 9.41273I$ | $-10.73207 - 7.33022I$ |
| $u = -0.539638 + 1.180631I$ $a = 0.38024 - 1.69381I$ $b = 1.082363 + 0.370781I$ | $-8.00799 - 9.41273I$ | $-10.73207 + 7.33022I$ |

| Solution to I_2^u | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---------------------------------------|------------------------|
| $u = -0.486215 - 1.149412I$ $a = -0.526090 - 1.133108I$ $b = -0.294050 + 0.635512I$ | $-3.72424 + 5.98943I$ | $-7.50022 - 6.65502I$ |
| $u = -0.486215 + 1.149412I$ $a = -0.526090 + 1.133108I$ $b = -0.294050 - 0.635512I$ | $-3.72424 - 5.98943I$ | $-7.50022 + 6.65502I$ |
| $u = -0.413101 - 1.140843I$ $a = 0.375755 + 0.474536I$ $b = -0.465838 - 0.569982I$ | $-4.25762 + 2.03075I$ | $-9.39588 - 0.30706I$ |
| $u = -0.413101 + 1.140843I$ $a = 0.375755 - 0.474536I$ $b = -0.465838 + 0.569982I$ | $-4.25762 - 2.03075I$ | $-9.39588 + 0.30706I$ |
| $u = -0.317022 - 1.199247I$ $a = 0.313021 + 0.077240I$ $b = 1.178869 + 0.253014I$ | $-9.53106 - 0.77090I$ | $-13.03537 + 0.66876I$ |
| $u = -0.317022 + 1.199247I$ $a = 0.313021 - 0.077240I$ $b = 1.178869 - 0.253014I$ | $-9.53106 + 0.77090I$ | $-13.03537 - 0.66876I$ |
| $u = -0.284782 - 0.804600I$ $a = -0.43758 + 1.99824I$ $b = 1.60354 - 0.03866I$ | $-9.29333 + 1.36083I$ | $-12.52063 + 2.74378I$ |
| $u = -0.284782 + 0.804600I$ $a = -0.43758 - 1.99824I$ $b = 1.60354 + 0.03866I$ | $-9.29333 - 1.36083I$ | $-12.52063 - 2.74378I$ |
| $u = -0.279880 - 1.276574I$ $a = -0.890864 - 0.237695I$ $b = -1.76676 - 0.06022I$ | $19.3219 - 2.0938I$ | $-13.35461 + 0.27772I$ |
| $u = -0.279880 + 1.276574I$ $a = -0.890864 + 0.237695I$ $b = -1.76676 + 0.06022I$ | $19.3219 + 2.0938I$ | $-13.35461 - 0.27772I$ |

| Solution to I_2^u | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---------------------------------------|------------------------|
| $u = -0.053119 - 0.623073I$ $a = -0.27084 - 1.65819I$ $b = -0.680312 + 0.218264I$ | $-1.43730 + 0.46103I$ | $-9.15571 - 0.89205I$ |
| $u = -0.053119 + 0.623073I$ $a = -0.27084 + 1.65819I$ $b = -0.680312 - 0.218264I$ | $-1.43730 - 0.46103I$ | $-9.15571 + 0.89205I$ |
| $u = 0.441446 - 1.094686I$ $a = -1.04156 + 1.26928I$ $b = -1.025522 - 0.116463I$ | $-4.16025 - 3.63915I$ | $-10.15018 + 4.27650I$ |
| $u = 0.441446 + 1.094686I$ $a = -1.04156 - 1.26928I$ $b = -1.025522 + 0.116463I$ | $-4.16025 + 3.63915I$ | $-10.15018 - 4.27650I$ |
| $u = 0.445230 - 0.659652I$ $a = 0.359592 + 0.934078I$ $b = 0.003501 - 0.334247I$ | $0.57956 - 1.37320I$ | $1.27470 + 4.45868I$ |
| $u = 0.445230 + 0.659652I$ $a = 0.359592 - 0.934078I$ $b = 0.003501 + 0.334247I$ | $0.57956 + 1.37320I$ | $1.27470 - 4.45868I$ |
| $u = 0.447430$ $a = -0.677196$ $b = -0.852163$ | -1.51344 | -5.97065 |
| $u = 0.450721 - 1.175939I$ $a = 1.29049 - 1.63090I$ $b = 1.73373 + 0.02857I$ | $-14.0947 - 4.2255I$ | $-10.81592 + 3.15047I$ |
| $u = 0.450721 + 1.175939I$ $a = 1.29049 + 1.63090I$ $b = 1.73373 - 0.02857I$ | $-14.0947 + 4.2255I$ | $-10.81592 - 3.15047I$ |
| $u = 0.470000 - 0.941962I$ $a = 0.593358 - 0.603822I$ $b = 0.220883 + 0.210533I$ | $-0.27564 - 2.47765I$ | $1.24066 + 5.09366I$ |

| Solution to I_2^u | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---------------------------------------|------------------------|
| $u = 0.470000 + 0.941962I$ $a = 0.593358 + 0.603822I$ $b = 0.220883 - 0.210533I$ | $-0.27564 + 2.47765I$ | $1.24066 - 5.09366I$ |
| $u = 0.672209 - 0.801566I$ $a = -0.954704 - 0.790256I$ $b = 0.917325 + 0.063901I$ | $-2.00047 - 2.57631I$ | $-10.63302 + 4.45192I$ |
| $u = 0.672209 + 0.801566I$ $a = -0.954704 + 0.790256I$ $b = 0.917325 - 0.063901I$ | $-2.00047 + 2.57631I$ | $-10.63302 - 4.45192I$ |
| $u = 0.711614$ $a = -0.0874139$ $b = 1.70560$ | -10.7808 | -6.60636 |
| $u = 0.769401 - 0.824326I$ $a = 1.28172 + 1.08224I$ $b = -1.71389 - 0.01340I$ | $-11.48465 - 2.85990I$ | $-9.78035 + 2.97773I$ |
| $u = 0.769401 + 0.824326I$ $a = 1.28172 - 1.08224I$ $b = -1.71389 + 0.01340I$ | $-11.48465 + 2.85990I$ | $-9.78035 - 2.97773I$ |

III. u-Polynomials

| Crossings | u-Polynomials at each crossings |
|-----------------------|---|
| c_1 | $(u^2 + u + 1)^2(u^{36} + 3u^{35} + \dots + 2u + 1)$ |
| c_2 | $(u^2 + u + 1)^2(u^{36} + 19u^{35} + \dots + 2u + 1)$ |
| c_3, c_8 | $u^4(u^{36} + u^{35} + \dots - 32u - 16)$ |
| c_4 | $(u^2 - u + 1)^2(u^{36} + 3u^{35} + \dots + 2u + 1)$ |
| c_5 | $(u^2 + u + 1)^2(u^{36} + 3u^{35} + \dots + 156u + 41)$ |
| c_6, c_7 | $(u^2 + u - 1)^2(u^{36} + 3u^{35} + \dots - 3u^2 - 1)$ |
| c_9, c_{10}, c_{11} | $(u^2 - u - 1)^2(u^{36} + 3u^{35} + \dots - 3u^2 - 1)$ |

IV. Riley Polynomials

| Crossings | Riley Polynomials at each crossings |
|-----------------|---|
| c_1, c_4 | $(y^2 + y + 1)^2(y^{36} + 19y^{35} + \dots + 2y + 1)$ |
| c_2 | $(y^2 + y + 1)^2(y^{36} - y^{35} + \dots - 46y + 1)$ |
| c_3, c_8 | $y^4(y^{36} + 25y^{35} + \dots + 896y + 256)$ |
| c_5 | $(y^2 + y + 1)^2(y^{36} - 21y^{35} + \dots + 12482y + 1681)$ |
| c_6, c_7, c_9 | $(y^2 - 3y + 1)^2(y^{36} - 49y^{35} + \dots + 6y + 1)$ |
| c_{10} | $(y^2 - 3y + 1)^2(y^{36} - 49y^{35} + \dots + 6y + 1)$ |
| c_{11} | $(y - 1)(y^2 - 3y + 1)^2(y^{35} - 48y^{34} + \dots - 7y - 1)$ |