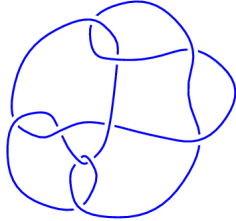
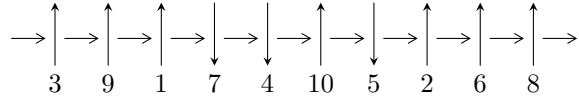


10₅₇ (K10a₆)

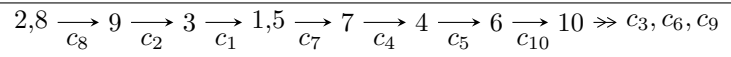


1

Arc Sequences



Solving Sequence



Representation Ideals

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

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

$$I_2^u = \langle u^{42} - 4u^{41} + \dots - 27870u - 3617,$$

$$8.16418 \times 10^{180}u^{41} - 3.75194 \times 10^{181}u^{40} + \dots + 7.71641 \times 10^{185}b - 8.55025 \times 10^{185},$$

$$8.88604 \times 10^{185}u^{41} - 3.70890 \times 10^{186}u^{40} + \dots + 2.79102 \times 10^{189}a - 2.06417 \times 10^{190} \rangle$$

There are 2 irreducible components with 45 representations.

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

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

(i) Arc colorings

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

$$a_8 = \begin{pmatrix} -u^2 + u - 2 \\ u^2 - u + 1 \end{pmatrix}$$

$$a_9 = \begin{pmatrix} -1 \\ u^2 - u + 1 \end{pmatrix}$$

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

$$a_1 = \begin{pmatrix} 0 \\ u^2 \end{pmatrix}$$

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

$$a_7 = \begin{pmatrix} -u^2 + u - 2 \\ u^2 + 1 \end{pmatrix}$$

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

$$a_6 = \begin{pmatrix} -u^2 + u - 2 \\ u^2 + 1 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} -1 \\ u^2 - u + 1 \end{pmatrix}$$

(ii) Obstruction class = 1

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

(iv) Complex Volumes and Cusp Shapes

| Solution to I_1^u | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|--|---------------------------------------|----------------------|
| $u = 0.215080 - 1.307141I$ $a = -0.122561 - 0.744862I$ $b = -0.877439 + 0.744862I$ | $-4.66906 - 2.82812I$ | $0.69240 + 3.35914I$ |
| $u = 0.215080 + 1.307141I$ $a = -0.122561 + 0.744862I$ $b = -0.877439 - 0.744862I$ | $-4.66906 + 2.82812I$ | $0.69240 - 3.35914I$ |
| $u = 0.569840$ $a = -1.75488$ $b = 0.754878$ | -0.531480 | 1.61520 |

$$\text{II. } I_2^u = \langle u^{42} - 4u^{41} + \dots - 27870u - 3617, 8.16 \times 10^{180}u^{41} - 3.75 \times 10^{181}u^{40} + \dots + 7.72 \times 10^{185}b - 8.55 \times 10^{185}, 8.89 \times 10^{185}u^{41} - 3.71 \times 10^{186}u^{40} + \dots + 2.79 \times 10^{189}a - 2.06 \times 10^{190} \rangle$$

(i) Arc colorings

$$\begin{aligned} a_2 &= \begin{pmatrix} 1 \\ 0 \end{pmatrix} \\ a_8 &= \begin{pmatrix} -0.000318379u^{41} + 0.00132887u^{40} + \dots + 8.00693u + 7.39573 \\ -0.0000105803u^{41} + 0.0000486228u^{40} + \dots + 2.41991u + 1.10806 \end{pmatrix} \\ a_9 &= \begin{pmatrix} -0.000328959u^{41} + 0.00137749u^{40} + \dots + 10.4268u + 8.50379 \\ -0.0000105803u^{41} + 0.0000486228u^{40} + \dots + 2.41991u + 1.10806 \end{pmatrix} \\ a_3 &= \begin{pmatrix} 0.000172078u^{41} - 0.000720713u^{40} + \dots - 14.6535u - 0.0141903 \\ -6.40387 \times 10^{-7}u^{41} - 7.67170 \times 10^{-6}u^{40} + \dots - 1.42594u - 0.282905 \end{pmatrix} \\ a_1 &= \begin{pmatrix} 0.0000919194u^{41} - 0.000411850u^{40} + \dots - 4.27659u - 2.53900 \\ -3.55866 \times 10^{-6}u^{41} + 0.0000148673u^{40} + \dots - 2.44205u - 0.583284 \end{pmatrix} \\ a_5 &= \begin{pmatrix} 0 \\ u \end{pmatrix} \\ a_7 &= \begin{pmatrix} -0.000318379u^{41} + 0.00132887u^{40} + \dots + 8.00693u + 7.39573 \\ -0.0000183744u^{41} + 0.0000741340u^{40} + \dots + 2.02882u + 0.907853 \end{pmatrix} \\ a_4 &= \begin{pmatrix} 0.000147967u^{41} - 0.000634862u^{40} + \dots - 19.9277u - 2.66820 \\ 0.0000150554u^{41} - 0.0000622188u^{40} + \dots - 2.41937u - 0.469219 \end{pmatrix} \\ a_6 &= \begin{pmatrix} 0.000158493u^{41} - 0.000669516u^{40} + \dots + 2.09100u - 5.33279 \\ 3.87193 \times 10^{-6}u^{41} - 0.0000150203u^{40} + \dots + 0.925577u - 0.454487 \end{pmatrix} \\ a_{10} &= \begin{pmatrix} -0.000141310u^{41} + 0.000587034u^{40} + \dots + 9.77229u + 2.46660 \\ -0.0000150554u^{41} + 0.0000622188u^{40} + \dots + 2.41937u + 0.469219 \end{pmatrix} \end{aligned}$$

(ii) Obstruction class = -1

(iii) Cusp Shapes = $6.51148 \times 10^{-6}u^{41} - 0.0000520169u^{40} + \dots - 0.984999u + 5.49711$

(iv) Complex Volumes and Cusp Shapes

| Solution to I_2^u | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---------------------------------------|------------------------|
| $u = -1.54139 - 2.28043I$ $a = -0.321367 + 0.153645I$ $b = 0.991138 - 0.067760I$ | $1.67988 - 2.03798I$ | $8.18964 + 3.67578I$ |
| $u = -1.54139 + 2.28043I$ $a = -0.321367 - 0.153645I$ $b = 0.991138 + 0.067760I$ | $1.67988 + 2.03798I$ | $8.18964 - 3.67578I$ |
| $u = -1.173455 - 0.376345I$ $a = -0.676218 + 0.632570I$ $b = -0.703889 + 0.756112I$ | $-3.91253 + 1.78828I$ | $0.036224 - 1.373729I$ |
| $u = -1.173455 + 0.376345I$ $a = -0.676218 - 0.632570I$ $b = -0.703889 - 0.756112I$ | $-3.91253 - 1.78828I$ | $0.036224 + 1.373729I$ |
| $u = -1.08775 - 2.33696I$ $a = 0.409600 - 0.273004I$ $b = -1.083348 + 0.141922I$ | $4.86295 - 7.53350I$ | $9.04295 + 6.51119I$ |
| $u = -1.08775 + 2.33696I$ $a = 0.409600 + 0.273004I$ $b = -1.083348 - 0.141922I$ | $4.86295 + 7.53350I$ | $9.04295 - 6.51119I$ |
| $u = -1.044483 - 0.234103I$ $a = 1.167396 + 0.320333I$ $b = 0.670918 + 0.832205I$ | $-1.77790 - 7.76497I$ | $1.88925 + 4.74518I$ |
| $u = -1.044483 + 0.234103I$ $a = 1.167396 - 0.320333I$ $b = 0.670918 - 0.832205I$ | $-1.77790 + 7.76497I$ | $1.88925 - 4.74518I$ |
| $u = -1.00012 - 1.83275I$ $a = 0.472585 - 0.020384I$ $b = -1.074440 - 0.080759I$ | $6.58974 + 1.93798I$ | $11.95326 - 1.38361I$ |
| $u = -1.00012 + 1.83275I$ $a = 0.472585 + 0.020384I$ $b = -1.074440 + 0.080759I$ | $6.58974 - 1.93798I$ | $11.95326 + 1.38361I$ |

| Solution to I_2^u | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---------------------------------------|----------------------|
| $u = -0.389947$ $a = 0.453072$ $b = 0.647067$ | 0.883120 | 11.7260 |
| $u = -0.16996 - 1.42099I$ $a = 0.014812 + 0.901777I$ $b = 0.962070 - 0.695356I$ | $-3.92956 - 4.75718I$ | $2.72048 + 5.86296I$ |
| $u = -0.16996 + 1.42099I$ $a = 0.014812 - 0.901777I$ $b = 0.962070 + 0.695356I$ | $-3.92956 + 4.75718I$ | $2.72048 - 5.86296I$ |
| $u = -0.1241943 - 0.0494556I$ $a = 2.05982 - 6.25586I$ $b = 0.368496 - 0.622797I$ | $2.03700 - 0.16365I$ | $5.74023 + 0.29295I$ |
| $u = -0.1241943 + 0.0494556I$ $a = 2.05982 + 6.25586I$ $b = 0.368496 + 0.622797I$ | $2.03700 + 0.16365I$ | $5.74023 - 0.29295I$ |
| $u = -0.009130 - 1.034780I$ $a = -0.325349 - 0.901866I$ $b = -0.923145 + 0.781924I$ | $-4.47229 - 1.63203I$ | $2.91298 - 2.62995I$ |
| $u = -0.009130 + 1.034780I$ $a = -0.325349 + 0.901866I$ $b = -0.923145 - 0.781924I$ | $-4.47229 + 1.63203I$ | $2.91298 + 2.62995I$ |
| $u = 0.197795 - 0.302435I$ $a = -2.47511 + 0.44500I$ $b = 0.645452 + 0.781684I$ | $0.56632 - 2.39851I$ | $5.00404 + 0.87866I$ |
| $u = 0.197795 + 0.302435I$ $a = -2.47511 - 0.44500I$ $b = 0.645452 - 0.781684I$ | $0.56632 + 2.39851I$ | $5.00404 - 0.87866I$ |
| $u = 0.314282 - 0.746075I$ $a = -1.16727 - 0.88863I$ $b = 0.209332 + 0.676070I$ | $0.63189 + 5.08816I$ | $2.51962 - 5.57765I$ |

| Solution to I_2^u | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---------------------------------------|------------------------|
| $u = 0.314282 + 0.746075I$ $a = -1.16727 + 0.88863I$ $b = 0.209332 - 0.676070I$ | $0.63189 - 5.08816I$ | $2.51962 + 5.57765I$ |
| $u = 0.43454 - 1.56838I$ $a = 0.077767 + 0.767805I$ $b = 0.745202 - 0.733734I$ | $-4.59267 - 0.70618I$ | $0.622977 - 0.556758I$ |
| $u = 0.43454 + 1.56838I$ $a = 0.077767 - 0.767805I$ $b = 0.745202 + 0.733734I$ | $-4.59267 + 0.70618I$ | $0.622977 + 0.556758I$ |
| $u = 0.50922 - 1.38468I$ $a = 0.014651 - 0.707609I$ $b = -0.836375 + 0.809644I$ | $-4.73966 - 4.32552I$ | $1.66531 + 7.57694I$ |
| $u = 0.50922 + 1.38468I$ $a = 0.014651 + 0.707609I$ $b = -0.836375 - 0.809644I$ | $-4.73966 + 4.32552I$ | $1.66531 - 7.57694I$ |
| $u = 0.602587 - 0.511748I$ $a = 1.114755 + 0.543683I$ $b = -0.145920 - 0.358325I$ | $-1.72875 + 0.76607I$ | $-3.12845 - 1.30178I$ |
| $u = 0.602587 + 0.511748I$ $a = 1.114755 - 0.543683I$ $b = -0.145920 + 0.358325I$ | $-1.72875 - 0.76607I$ | $-3.12845 + 1.30178I$ |
| $u = 0.60381 - 3.06472I$ $a = -0.269477 - 0.325201I$ $b = 1.028179 + 0.723271I$ | $-0.68940 + 13.58856I$ | $3.64913 - 9.29837I$ |
| $u = 0.60381 + 3.06472I$ $a = -0.269477 + 0.325201I$ $b = 1.028179 - 0.723271I$ | $-0.68940 - 13.58856I$ | $3.64913 + 9.29837I$ |
| $u = 0.61307 - 1.96776I$ $a = -0.457502 - 0.202967I$ $b = 0.999660 + 0.570752I$ | $3.66366 + 4.35155I$ | $8.59858 - 5.33139I$ |

| Solution to I_2^u | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---------------------------------------|----------------------|
| $u = 0.61307 + 1.96776I$ $a = -0.457502 + 0.202967I$ $b = 0.999660 - 0.570752I$ | $3.66366 - 4.35155I$ | $8.59858 + 5.33139I$ |
| $u = 0.802948$ $a = 1.53006$ $b = -0.938084$ | 0.325164 | 11.1789 |
| $u = 0.812549 - 0.830092I$ $a = -0.976659 - 0.183444I$ $b = 0.988336 - 0.481239I$ | $2.85726 + 1.06689I$ | $7.69538 - 0.36183I$ |
| $u = 0.812549 + 0.830092I$ $a = -0.976659 + 0.183444I$ $b = 0.988336 + 0.481239I$ | $2.85726 - 1.06689I$ | $7.69538 + 0.36183I$ |
| $u = 0.827693 - 0.324495I$ $a = 0.554501 - 0.355300I$ $b = -0.794934 - 0.673703I$ | $-2.06220 + 2.20756I$ | $3.08817 - 4.39193I$ |
| $u = 0.827693 + 0.324495I$ $a = 0.554501 + 0.355300I$ $b = -0.794934 + 0.673703I$ | $-2.06220 - 2.20756I$ | $3.08817 + 4.39193I$ |
| $u = 0.91194 - 1.24381I$ $a = 0.474052 + 0.070417I$ $b = -0.932953 + 0.658227I$ | $-1.62453 - 2.94974I$ | $4.00088 + 1.92478I$ |
| $u = 0.91194 + 1.24381I$ $a = 0.474052 - 0.070417I$ $b = -0.932953 - 0.658227I$ | $-1.62453 + 2.94974I$ | $4.00088 - 1.92478I$ |
| $u = 0.97503 - 1.16280I$ $a = -0.608831 + 0.191393I$ $b = 1.020287 - 0.695366I$ | $1.68665 - 7.98804I$ | $6.75545 + 5.63639I$ |
| $u = 0.97503 + 1.16280I$ $a = -0.608831 - 0.191393I$ $b = 1.020287 + 0.695366I$ | $1.68665 + 7.98804I$ | $6.75545 - 5.63639I$ |
| Solution to I_2^u | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
| $u = 1.14146 - 3.00590I$ $a = 0.268135 + 0.235188I$ $b = -0.988556 - 0.699620I$ | $-3.05223 + 7.32917I$ | $2.09146 - 6.67478I$ |
| $u = 1.14146 + 3.00590I$ $a = 0.268135 - 0.235188I$ $b = -0.988556 + 0.699620I$ | $-3.05223 - 7.32917I$ | $2.09146 + 6.67478I$ |

III. u-Polynomials

| Crossings | u-Polynomials at each crossings |
|-----------|--|
| c_1 | $(u^3 + u^2 + 2u + 1)(u^{42} + 14u^{41} + \dots - 2u + 1)$ |
| c_2 | $(u^3 + u^2 - 1)(u^{42} + 2u^{41} + \dots - 2u - 1)$ |
| c_3 | $(u^3 - u^2 + 2u - 1)(u^{42} + 14u^{41} + \dots - 2u + 1)$ |
| c_4 | $(u - 1)^3(u^{42} + 4u^{41} + \dots - 7u - 1)$ |
| c_5 | $(u + 1)^3(u^{42} + 20u^{41} + \dots + 39u + 1)$ |
| c_6 | $u^3(u^{42} + u^{41} + \dots + 28u + 8)$ |
| c_7 | $(u + 1)^3(u^{42} + 4u^{41} + \dots - 7u - 1)$ |
| c_8 | $(u^3 - u^2 + 1)(u^{42} + 2u^{41} + \dots - 2u - 1)$ |
| c_9 | $u^3(u^{42} + u^{41} + \dots + 28u + 8)$ |
| c_{10} | $(u^3 - u^2 + 2u - 1)(u^{42} + 2u^{41} + \dots - 168u - 49)$ |

IV. Riley Polynomials

| Crossings | Riley Polynomials at each crossings |
|------------|--|
| c_1, c_3 | $(y^3 + 3y^2 + 2y - 1)(y^{42} + 30y^{41} + \dots + 2y + 1)$ |
| c_2, c_8 | $(y^3 - y^2 + 2y - 1)(y^{42} - 14y^{41} + \dots + 2y + 1)$ |
| c_4 | $(y - 1)^3(y^{42} - 20y^{41} + \dots - 39y + 1)$ |
| c_5 | $(y - 1)^3(y^{42} + 8y^{41} + \dots - 999y + 1)$ |
| c_6 | $y^3(y^{42} - 21y^{41} + \dots - 784y + 64)$ |
| c_7 | $(y - 1)^3(y^{42} - 20y^{41} + \dots - 39y + 1)$ |
| c_9 | $y^3(y^{42} - 21y^{41} + \dots - 784y + 64)$ |
| c_{10} | $(y^3 + 3y^2 + 2y - 1)(y^{42} - 6y^{41} + \dots - 7154y + 2401)$ |