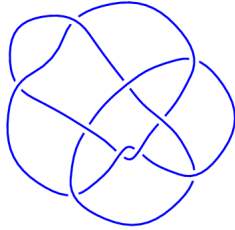
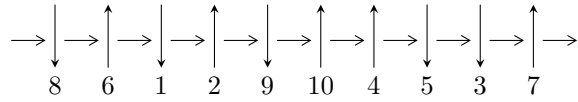


10₁₁₈ (K10a₈₈)

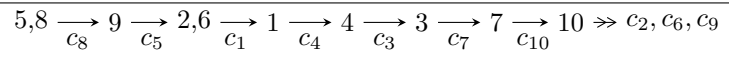


1

Arc Sequences



Solving Sequence



Representation Ideals

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

$$I_1^u = \langle u^8 + 4u^7 + 10u^6 + 16u^5 + 15u^4 + 8u^3 + u^2 - u - 1, \\ 7u^7 + 22u^6 + 49u^5 + 65u^4 + 40u^3 + 16u^2 + 5a + 4u + 6, \\ -4u^7 - 14u^6 - 33u^5 - 50u^4 - 40u^3 - 22u^2 + 5b - 3u + 3 \rangle$$

$$I_2^u = \langle u^{56} + 3u^{55} + \dots - 23u + 1, \\ -6.82989 \times 10^{168} u^{55} - 2.30077 \times 10^{169} u^{54} + \dots + 3.18715 \times 10^{168} b - 2.74292 \times 10^{167}, \\ 3.95296 \times 10^{169} u^{55} + 1.15025 \times 10^{170} u^{54} + \dots + 3.18715 \times 10^{168} a - 1.57535 \times 10^{170} \rangle$$

There are 2 irreducible components with 64 representations.

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

I.

$$I_1^u = \langle u^8 + 4u^7 + \cdots - u - 1, 7u^7 + 22u^6 + \cdots + 5a + 6, -4u^7 - 14u^6 + \cdots + 5b + 3 \rangle$$

(i) Arc colorings

$$\begin{aligned} a_5 &= \begin{pmatrix} 0 \\ u \end{pmatrix} \\ a_8 &= \begin{pmatrix} -\frac{7}{5}u^7 - \frac{22}{5}u^6 + \cdots - \frac{4}{5}u - \frac{6}{5} \\ \frac{4}{5}u^7 + \frac{14}{5}u^6 + \cdots + \frac{3}{5}u - \frac{3}{5} \end{pmatrix} \\ a_9 &= \begin{pmatrix} -\frac{7}{5}u^7 - \frac{22}{5}u^6 + \cdots - \frac{4}{5}u - \frac{6}{5} \\ \frac{1}{5}u^7 + \frac{1}{5}u^6 + \cdots + \frac{2}{5}u + \frac{3}{5} \end{pmatrix} \\ a_2 &= \begin{pmatrix} 1 \\ 0 \end{pmatrix} \\ a_6 &= \begin{pmatrix} \frac{1}{5}u^7 + \frac{6}{5}u^6 + \cdots - \frac{23}{5}u - \frac{7}{5} \\ \frac{1}{5}u^7 + \frac{1}{5}u^6 + \cdots + \frac{7}{5}u + \frac{3}{5} \end{pmatrix} \\ a_1 &= \begin{pmatrix} \frac{1}{5}u^7 + \frac{11}{5}u^6 + \cdots + \frac{17}{5}u + \frac{3}{5} \\ \frac{4}{5}u^7 + \frac{9}{5}u^6 + \cdots - \frac{12}{5}u - \frac{3}{5} \end{pmatrix} \\ a_4 &= \begin{pmatrix} -u \\ u \end{pmatrix} \\ a_3 &= \begin{pmatrix} \frac{8}{5}u^7 + \frac{33}{5}u^6 + \cdots + \frac{16}{5}u + \frac{4}{5} \\ -\frac{3}{5}u^7 - \frac{13}{5}u^6 + \cdots - \frac{6}{5}u + \frac{1}{5} \end{pmatrix} \\ a_7 &= \begin{pmatrix} -u^7 - 3u^6 - 6u^5 - 7u^4 - 2u^3 - u - 2 \\ \frac{2}{5}u^7 + \frac{7}{5}u^6 + \cdots + \frac{4}{5}u + \frac{1}{5} \end{pmatrix} \\ a_{10} &= \begin{pmatrix} -\frac{3}{5}u^7 - \frac{3}{5}u^6 + \cdots + \frac{24}{5}u - \frac{4}{5} \\ -\frac{1}{5}u^7 - \frac{6}{5}u^6 + \cdots - \frac{7}{5}u + \frac{2}{5} \end{pmatrix} \end{aligned}$$

(ii) Obstruction class = 1

$$(iii) \text{ Cusp Shapes} = -8u^7 - 28u^6 - 66u^5 - 95u^4 - 74u^3 - 30u^2 + 3u + 4$$

(iv) Complex Volumes and Cusp Shapes

Solution to I_1^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -1.41225$ $a = 0.200595$ $b = 0.747139$	4.69721	8.72999
$u = -0.767995 - 0.666287I$ $a = 0.508133 - 1.088906I$ $b = -1.13851 + 1.06522I$	$-1.62267 + 2.99663I$	$2.80411 - 6.12718I$
$u = -0.767995 + 0.666287I$ $a = 0.508133 + 1.088906I$ $b = -1.13851 - 1.06522I$	$-1.62267 - 2.99663I$	$2.80411 + 6.12718I$
$u = -0.50000 - 1.75726I$ $a = -0.044875 + 0.652463I$ $b = 0.564069 - 0.825728I$	6.39156I	$-8.17644I$
$u = -0.50000 + 1.75726I$ $a = -0.044875 - 0.652463I$ $b = 0.564069 + 0.825728I$	$-6.39156I$	8.17644I
$u = -0.232005 - 0.666287I$ $a = -1.48817 + 0.58927I$ $b = -0.468348 + 0.438200I$	$1.62267 + 2.99663I$	$-2.80411 - 6.12718I$
$u = -0.232005 + 0.666287I$ $a = -1.48817 - 0.58927I$ $b = -0.468348 - 0.438200I$	$1.62267 - 2.99663I$	$-2.80411 + 6.12718I$
$u = 0.412253$ $a = -3.15077$ $b = 1.33844$	-4.69721	-8.72999

$$\text{II. } I_2^u = \langle u^{56} + 3u^{55} + \dots - 23u + 1, -6.83 \times 10^{168}u^{55} - 2.30 \times 10^{169}u^{54} + \dots + 3.19 \times 10^{168}b - 2.74 \times 10^{167}, 3.95 \times 10^{169}u^{55} + 1.15 \times 10^{170}u^{54} + \dots + 3.19 \times 10^{168}a - 1.58 \times 10^{170} \rangle$$

(i) Arc colorings

$$\begin{aligned} a_5 &= \begin{pmatrix} 0 \\ u \end{pmatrix} \\ a_8 &= \begin{pmatrix} -12.4028u^{55} - 36.0902u^{54} + \dots - 1342.02u + 49.4282 \\ 2.14295u^{55} + 7.21890u^{54} + \dots + 47.7260u + 0.0860620 \end{pmatrix} \\ a_9 &= \begin{pmatrix} -12.4028u^{55} - 36.0902u^{54} + \dots - 1342.02u + 49.4282 \\ 4.03769u^{55} + 13.7281u^{54} + \dots + 85.8492u - 1.03221 \end{pmatrix} \\ a_2 &= \begin{pmatrix} 1 \\ 0 \end{pmatrix} \\ a_6 &= \begin{pmatrix} 33.4160u^{55} + 112.827u^{54} + \dots + 1195.99u - 72.1648 \\ -4.02724u^{55} - 13.0159u^{54} + \dots - 252.557u + 13.7718 \end{pmatrix} \\ a_1 &= \begin{pmatrix} -26.3503u^{55} - 86.2454u^{54} + \dots - 1554.87u + 97.6109 \\ -0.433894u^{55} - 0.367947u^{54} + \dots - 203.451u + 8.98716 \end{pmatrix} \\ a_4 &= \begin{pmatrix} -u \\ u \end{pmatrix} \\ a_3 &= \begin{pmatrix} 8.50724u^{55} + 28.3882u^{54} + \dots - 94.8859u + 59.0027 \\ -2.41988u^{55} - 7.10554u^{54} + \dots - 245.324u + 8.60202 \end{pmatrix} \\ a_7 &= \begin{pmatrix} -14.4351u^{55} - 42.9938u^{54} + \dots - 1396.17u + 51.3365 \\ 4.17529u^{55} + 14.1225u^{54} + \dots + 101.877u - 1.82226 \end{pmatrix} \\ a_{10} &= \begin{pmatrix} -20.4131u^{55} - 58.9377u^{54} + \dots - 2959.14u + 198.353 \\ -0.245067u^{55} - 0.109465u^{54} + \dots - 119.627u + 3.16003 \end{pmatrix} \end{aligned}$$

(ii) Obstruction class = -1

(iii) Cusp Shapes = $32.4574u^{55} + 97.4359u^{54} + \dots + 3415.56u - 174.213$

(iv) Complex Volumes and Cusp Shapes

Solution to I_2^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -1.83724$ $a = 0.539542$ $b = -1.28361$	3.28334	1.95804
$u = -1.234157 - 0.567369I$ $a = -0.159065 - 0.457452I$ $b = -0.330263 + 0.747920I$	$5.38278 + 1.94709I$	$9.07863 - 3.78322I$
$u = -1.234157 + 0.567369I$ $a = -0.159065 + 0.457452I$ $b = -0.330263 - 0.747920I$	$5.38278 - 1.94709I$	$9.07863 + 3.78322I$
$u = -1.20127$ $a = 1.24340$ $b = -0.299877$	1.54290	6.38462
$u = -1.16823 - 1.56942I$ $a = -0.155570 + 0.525956I$ $b = 0.987700 - 0.648175I$	$2.03150 + 6.02280I$	$3.73094 - 6.75893I$
$u = -1.16823 + 1.56942I$ $a = -0.155570 - 0.525956I$ $b = 0.987700 + 0.648175I$	$2.03150 - 6.02280I$	$3.73094 + 6.75893I$
$u = -1.07432 - 1.36291I$ $a = -0.327597 + 0.689372I$ $b = 0.495818 - 0.985480I$	$1.18098 + 5.45507I$	$4.29936 - 4.75401I$
$u = -1.07432 + 1.36291I$ $a = -0.327597 - 0.689372I$ $b = 0.495818 + 0.985480I$	$1.18098 - 5.45507I$	$4.29936 + 4.75401I$
$u = -0.97319 - 1.32442I$ $a = 0.282435 - 0.696343I$ $b = -0.874453 + 0.768327I$	$-1.91385 + 4.83850I$	$-2.53419 - 6.95729I$
$u = -0.97319 + 1.32442I$ $a = 0.282435 + 0.696343I$ $b = -0.874453 - 0.768327I$	$-1.91385 - 4.83850I$	$-2.53419 + 6.95729I$

Solution to I_2^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.962342 - 0.676541I$ $a = -0.689895 - 0.262727I$ $b = -0.867481 + 0.465833I$	$3.60092 + 1.79783I$	$4.19052 - 2.40869I$
$u = -0.962342 + 0.676541I$ $a = -0.689895 + 0.262727I$ $b = -0.867481 - 0.465833I$	$3.60092 - 1.79783I$	$4.19052 + 2.40869I$
$u = -0.856742 - 0.694261I$ $a = -0.758989 + 0.691101I$ $b = 1.63614 - 0.85817I$	$-3.60092 + 1.79783I$	$-4.19052 - 2.40869I$
$u = -0.856742 + 0.694261I$ $a = -0.758989 - 0.691101I$ $b = 1.63614 + 0.85817I$	$-3.60092 - 1.79783I$	$-4.19052 + 2.40869I$
$u = -0.735334 - 1.174977I$ $a = 0.389510 - 0.807225I$ $b = -1.16393 + 1.16318I$	$-2.03150 + 6.02280I$	$-3.73094 - 6.75893I$
$u = -0.735334 + 1.174977I$ $a = 0.389510 + 0.807225I$ $b = -1.16393 - 1.16318I$	$-2.03150 - 6.02280I$	$-3.73094 + 6.75893I$
$u = -0.730117 - 0.548940I$ $a = 0.566769 + 0.452477I$ $b = 0.531582 - 0.418877I$	$1.26494 + 1.26950I$	$4.50876 - 0.89106I$
$u = -0.730117 + 0.548940I$ $a = 0.566769 - 0.452477I$ $b = 0.531582 + 0.418877I$	$1.26494 - 1.26950I$	$4.50876 + 0.89106I$
$u = -0.717229 - 0.283512I$ $a = 0.840307 - 0.676792I$ $b = 0.614585 + 0.660088I$	$3.06725 + 0.91106I$	$2.78612 - 2.04256I$
$u = -0.717229 + 0.283512I$ $a = 0.840307 + 0.676792I$ $b = 0.614585 - 0.660088I$	$3.06725 - 0.91106I$	$2.78612 + 2.04256I$

Solution to I_2^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.498094 - 0.903498I$ $a = -0.28993 + 1.46329I$ $b = 0.695004 - 0.172107I$	$-5.06898 + 2.94565I$	$-6.46008 - 3.65784I$
$u = -0.498094 + 0.903498I$ $a = -0.28993 - 1.46329I$ $b = 0.695004 + 0.172107I$	$-5.06898 - 2.94565I$	$-6.46008 + 3.65784I$
$u = -0.494241 - 1.313962I$ $a = -0.019080 - 1.012746I$ $b = -0.907848 + 0.325017I$	$-2.56248 + 7.32114I$	$-3.13433 - 7.29187I$
$u = -0.494241 + 1.313962I$ $a = -0.019080 + 1.012746I$ $b = -0.907848 - 0.325017I$	$-2.56248 - 7.32114I$	$-3.13433 + 7.29187I$
$u = -0.268110 - 0.634954I$ $a = 1.310042 + 0.329790I$ $b = 0.606940 + 0.092167I$	$1.17763 + 1.90833I$	$-2.60907 - 2.19068I$
$u = -0.268110 + 0.634954I$ $a = 1.310042 - 0.329790I$ $b = 0.606940 - 0.092167I$	$1.17763 - 1.90833I$	$-2.60907 + 2.19068I$
$u = -0.162599 - 1.215955I$ $a = 0.0437655 + 0.0905220I$ $b = 0.671481 - 0.714028I$	$1.91385 + 4.83850I$	$2.53419 - 6.95729I$
$u = -0.162599 + 1.215955I$ $a = 0.0437655 - 0.0905220I$ $b = 0.671481 + 0.714028I$	$1.91385 - 4.83850I$	$2.53419 + 6.95729I$
$u = 0.050804 - 0.543574I$ $a = 0.110165 + 0.413409I$ $b = -0.783480 + 0.627461I$	$-1.26494 + 1.26950I$	$-4.50876 - 0.89106I$
$u = 0.050804 + 0.543574I$ $a = 0.110165 - 0.413409I$ $b = -0.783480 - 0.627461I$	$-1.26494 - 1.26950I$	$-4.50876 + 0.89106I$

Solution to I_2^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 0.0825027$ $a = -16.9254$ $b = 1.36704$	-3.28334	-1.95804
$u = 0.234535 - 0.184663I$ $a = -5.09042 + 0.29576I$ $b = -0.417667 - 0.587372I$	$2.12732 - 2.99186I$	$13.6584 + 6.9170I$
$u = 0.234535 + 0.184663I$ $a = -5.09042 - 0.29576I$ $b = -0.417667 + 0.587372I$	$2.12732 + 2.99186I$	$13.6584 - 6.9170I$
$u = 0.241391 - 0.195151I$ $a = 1.57991 + 2.79050I$ $b = -0.246039 - 1.330326I$	$-1.17763 - 1.90833I$	$2.60907 + 2.19068I$
$u = 0.241391 + 0.195151I$ $a = 1.57991 - 2.79050I$ $b = -0.246039 + 1.330326I$	$-1.17763 + 1.90833I$	$2.60907 - 2.19068I$
$u = 0.337369 - 0.654550I$ $a = 0.63381 + 1.55304I$ $b = -1.048226 - 0.400499I$	$-3.06725 - 0.91106I$	$-2.78612 + 2.04256I$
$u = 0.337369 + 0.654550I$ $a = 0.63381 - 1.55304I$ $b = -1.048226 + 0.400499I$	$-3.06725 + 0.91106I$	$-2.78612 - 2.04256I$
$u = 0.392381 - 0.245133I$ $a = -1.59086 - 2.00173I$ $b = -0.44552 + 1.55785I$	$2.56248 - 7.32114I$	$3.13433 + 7.29187I$
$u = 0.392381 + 0.245133I$ $a = -1.59086 + 2.00173I$ $b = -0.44552 - 1.55785I$	$2.56248 + 7.32114I$	$3.13433 - 7.29187I$
$u = 0.711761 - 0.476270I$ $a = -0.57001 + 1.29958I$ $b = -0.768372 - 0.912758I$	$-3.96282I$	$12.0335I$

Solution to I_2^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 0.711761 + 0.476270I$ $a = -0.57001 - 1.29958I$ $b = -0.768372 + 0.912758I$	$3.96282I$	$-12.0335I$
$u = 0.87217 - 1.98277I$ $a = 0.260010 + 0.481550I$ $b = -0.584292 - 0.088844I$	$-1.18098 + 5.45507I$	$-4.29936 - 4.75401I$
$u = 0.87217 + 1.98277I$ $a = 0.260010 - 0.481550I$ $b = -0.584292 + 0.088844I$	$-1.18098 - 5.45507I$	$-4.29936 + 4.75401I$
$u = 0.884782 - 0.578822I$ $a = 0.710976 + 1.197379I$ $b = -1.34569 - 0.94875I$	$-2.12732 - 2.99186I$	$-13.6584 + 6.9170I$
$u = 0.884782 + 0.578822I$ $a = 0.710976 - 1.197379I$ $b = -1.34569 + 0.94875I$	$-2.12732 + 2.99186I$	$-13.6584 - 6.9170I$
$u = 0.963651 - 0.662726I$ $a = 0.416599 - 0.875936I$ $b = 0.951068 + 0.899353I$	$5.00346 - 9.83371I$	$3.71372 + 7.72363I$
$u = 0.963651 + 0.662726I$ $a = 0.416599 + 0.875936I$ $b = 0.951068 - 0.899353I$	$5.00346 + 9.83371I$	$3.71372 - 7.72363I$
$u = 0.994968 - 0.036107I$ $a = -0.273483 - 0.811050I$ $b = 0.964815 + 1.009115I$	$5.06898 + 2.94565I$	$6.46008 - 3.65784I$
$u = 0.994968 + 0.036107I$ $a = -0.273483 + 0.811050I$ $b = 0.964815 - 1.009115I$	$5.06898 - 2.94565I$	$6.46008 + 3.65784I$
$u = 1.04075 - 1.16900I$ $a = -0.552115 - 0.556202I$ $b = 0.768710 + 0.080853I$	$-5.38278 + 1.94709I$	$-9.07863 - 3.78322I$

Solution to I_2^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 1.04075 + 1.16900I$ $a = -0.552115 + 0.556202I$ $b = 0.768710 - 0.080853I$	$-5.38278 - 1.94709I$	$-9.07863 + 3.78322I$
$u = 1.09944 - 1.02141I$ $a = -0.461267 - 0.891526I$ $b = 1.33347 + 0.88382I$	$-5.00346 - 9.83371I$	$-3.71372 + 7.72363I$
$u = 1.09944 + 1.02141I$ $a = -0.461267 + 0.891526I$ $b = 1.33347 - 0.88382I$	$-5.00346 + 9.83371I$	$-3.71372 - 7.72363I$
$u = 1.25812 - 1.19692I$ $a = 0.395794 + 0.774371I$ $b = -1.29911 - 0.91025I$	$-15.5452I$	$8.47183I$
$u = 1.25812 + 1.19692I$ $a = 0.395794 - 0.774371I$ $b = -1.29911 + 0.91025I$	$15.5452I$	$-8.47183I$
$u = 1.54115$ $a = 0.938846$ $b = -1.13343$	-1.54290	-6.38462

III. u-Polynomials

Crossings	u-Polynomials at each crossings
c_1	$(u^8 - u^6 + \dots - u^2 + 1)(u^{56} + 3u^{55} + \dots - 86u - 29)$
c_2	$(u^8 - u^7 + \dots - 2u - 1)(u^{56} - u^{54} + \dots - 12u + 1)$
c_3	$(u^8 + 4u^7 + 10u^6 + 16u^5 + 15u^4 + 8u^3 + u^2 - u - 1)$ $(u^{56} + 3u^{55} + \dots - 23u + 1)$
c_4	$(u^8 - 4u^7 + 10u^6 - 16u^5 + 15u^4 - 8u^3 + u^2 + u - 1)$ $(u^{56} + 3u^{55} + \dots - 23u + 1)$
c_5, c_{10}	$(u^8 - 3u^6 + \dots - 3u + 1)(u^{56} + u^{55} + \dots - 21u - 1)$
c_6, c_8	$(u^8 - 3u^6 + \dots + 3u + 1)(u^{56} + u^{55} + \dots - 21u - 1)$
c_7	$(u^8 - u^6 + \dots - u^2 + 1)(u^{56} + 3u^{55} + \dots - 86u - 29)$
c_9	$(u^8 + u^7 + \dots + 2u - 1)(u^{56} - u^{54} + \dots - 12u + 1)$

IV. Riley Polynomials

Crossings	Riley Polynomials at each crossings
c_1, c_7	$(y^8 - 2y^7 + 7y^6 - 12y^5 + 5y^4 - 12y^3 + 7y^2 - 2y + 1)$ $(y^{56} - 13y^{55} + \dots - 26246y + 841)$
c_2, c_9	$(y^8 + y^7 - y^6 - 13y^5 - 6y^4 + 13y^3 + 9y^2 + 2y + 1)$ $(y^{56} - 2y^{55} + \dots - 526y + 1)$
c_3, c_4	$(y^8 + 4y^7 + 2y^6 - 18y^5 - 5y^4 - 22y^3 - 13y^2 - 3y + 1)$ $(y^{56} + 5y^{55} + \dots - 155y + 1)$
c_5, c_8	$(y^8 - 6y^7 + 17y^6 - 31y^5 + 42y^4 - 45y^3 + 35y^2 - 15y + 1)$ $(y^{56} - 41y^{55} + \dots - 91y + 1)$
c_6	$(-1.68718 + 1.00000y)(-0.0802538 + 1.00000y)(1.00000y^2 - 2.61067y + 2.03839)(1.00000y^2$ $(1.00y^{56} - 41.0y^{55} + \dots - 91.0y + 1.00))$
c_{10}	$(-1.68718 + 1.00000y)(-0.0802538 + 1.00000y)(1.00000y^2 - 2.61067y + 2.03839)(1.00000y^2$ $(1.00y^{56} - 41.0y^{55} + \dots - 91.0y + 1.00))$