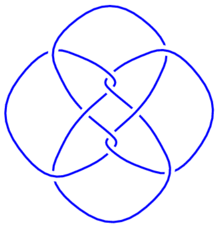
10_{120} $(K10a_{102})$



[1]

Arc Sequences

$$\rightarrow \downarrow \rightarrow \downarrow \rightarrow \downarrow \rightarrow \downarrow \rightarrow \downarrow \rightarrow \downarrow \rightarrow \downarrow \rightarrow \downarrow \rightarrow \downarrow \rightarrow \downarrow \rightarrow$$

5 9 6 2 8 10 4 1 7 3

Solving Sequence

$$1,5 \xrightarrow[c_1]{} 2,8 \xrightarrow[c_5]{} 6 \xrightarrow[c_8]{} 9 \xrightarrow[c_4]{} 4 \xrightarrow[c_3]{} 3 \xrightarrow[c_7]{} 7 \xrightarrow[c_{10}]{} 10 \twoheadrightarrow c_2, c_6, c_9$$

Representation Ideals

$$I = \bigcap_{i=1}^{7} I_i^u$$

$$\begin{aligned}
I_1^u &= \langle a^4 - a^3 - a^2 + a + 1,\ -a^3 + a^2 + u - 1,\ a^3 - 2a^2 + b + 1 \rangle \\
I_2^u &= \langle u^8 - 4u^7 + 9u^6 - 14u^5 + 15u^4 - 13u^3 + 9u^2 - 4u + 2,\ u^6 - 4u^5 + 8u^4 - 11u^3 + 9u^2 + b - 5u + 3, \\
&\quad -3u^7 + 12u^6 - 25u^5 + 34u^4 - 29u^3 + 17u^2 + 2a - 9u + 2 \rangle \\
I_3^u &= \langle u^{11} + 3u^{10} + 8u^9 + 13u^8 + 19u^7 + 22u^6 + 21u^5 + 17u^4 + 9u^3 + 4u^2 - 2, \\
&\quad -u^6 - u^5 - 2u^4 - u^3 - u^2 + b - u + 1, \\
&\quad -u^{10} - 3u^9 - 8u^8 - 13u^7 - 19u^6 - 20u^5 - 19u^4 - 13u^3 - 7u^2 + 2a - 2u + 2 \rangle \\
I_4^u &= \langle b^{24} - 3b^{23} + \cdots - 4b^2 + 1,\ 7.04666 \times 10^{21} u - 8.60639 \times 10^{21} b^{23} + \cdots + 3.60734 \times 10^{22} b - 2.09569 \times 10^{22}, \\
&\quad 1.04208 \times 10^{22} b^{23} - 3.69224 \times 10^{22} b^{22} + \cdots + 7.04666 \times 10^{21} a + 3.48324 \times 10^{22} \rangle \\
I_5^u &= \langle u^{18} + 5u^{17} + \cdots + 27u + 5,\ -u^{17} - 7u^{16} + \cdots + b - 13,\ -13u^{17} - 60u^{16} + \cdots + 5a + 4 \rangle \\
I_6^u &= \langle u^3 - u^2 + 2u - 1,\ u^2 + a + 1,\ u^2 + b - u + 1 \rangle \\
I_7^u &= \langle a^6 - a^4 + a^3 + 2a^2 - 3a + 1,\ 4a^5 + 2a^4 - 3a^3 + 2a^2 + b + 9a - 7,\ 3a^5 + 2a^4 - 2a^3 + 2a^2 + 7a + u - 5 \rangle
\end{aligned}$$

There are 7 irreducible components with 74 representations.

[1]The knot diagram image is adapter from "C. Livingston and A. H. Moore, KnotInfo: Table of Knot Invariants, http://www.indiana.edu/ knotinfo"

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

(i) Arc colorings

$$a_1 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_5 = \begin{pmatrix} 0 \\ a^3 - a^2 + 1 \end{pmatrix}$$
$$a_2 = \begin{pmatrix} 1 \\ a^3 - a^2 \end{pmatrix}$$
$$a_8 = \begin{pmatrix} a \\ -a^3 + 2a^2 - 1 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} -a^3 + a \\ 1 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} a^3 - 2a^2 + a + 1 \\ -a^3 + 2a^2 - 1 \end{pmatrix}$$
$$a_4 = \begin{pmatrix} a^3 - a^2 + 1 \\ a^3 - a^2 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} a^3 - 2a^2 + a + 2 \\ a^2 - 1 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} a^3 - a^2 + a + 1 \\ a^2 - 1 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} -2a^2 + a + 2 \\ -a^3 + a^2 + a \end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes $= 8a^3 - 8a^2 - 6$

(iv) Complex Volumes and Cusp Shapes

Solution to I_1^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u = 0.500000 - 0.866025I$ $a = -0.692440 - 0.318148I$ $b = -0.121744 + 1.306622I$	$1.64493 + 4.05977I$	$-10.00000 - 6.92820I$
$u = 0.500000 + 0.866025I$ $a = -0.692440 + 0.318148I$ $b = -0.121744 - 1.306622I$	$1.64493 - 4.05977I$	$-10.00000 + 6.92820I$
$u = 0.500000 - 0.866025I$ $a = 1.192440 - 0.547877I$ $b = 0.621744 - 0.440597I$	$1.64493 + 4.05977I$	$-10.00000 - 6.92820I$
$u = 0.500000 + 0.866025I$ $a = 1.192440 + 0.547877I$ $b = 0.621744 + 0.440597I$	$1.64493 - 4.05977I$	$-10.00000 + 6.92820I$

II. $I_2^u = \langle u^8 - 4u^7 + \cdots - 4u + 2,\ u^6 - 4u^5 + 8u^4 - 11u^3 + 9u^2 + b - 5u + 3,\ -3u^7 + 12u^6 + \cdots + 2a + 2\rangle$

(i) Arc colorings

$$a_1 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_5 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_2 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$
$$a_8 = \begin{pmatrix} \frac{3}{2}u^7 - 6u^6 + \cdots + \frac{9}{2}u - 1 \\ -u^6 + 4u^5 - 8u^4 + 11u^3 - 9u^2 + 5u - 3 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} \frac{1}{2}u^7 - 3u^6 + \cdots + \frac{15}{2}u - 4 \\ -u^7 + 3u^6 - 5u^5 + 6u^4 - 4u^3 + 3u^2 - u - 1 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} \frac{3}{2}u^7 - 5u^6 + \cdots - \frac{1}{2}u + 2 \\ -u^6 + 4u^5 - 8u^4 + 11u^3 - 9u^2 + 5u - 3 \end{pmatrix}$$
$$a_4 = \begin{pmatrix} u \\ u^3 + u \end{pmatrix}$$
$$a_3 = \begin{pmatrix} -\frac{1}{2}u^7 + 2u^6 + \cdots - \frac{7}{2}u + 1 \\ u^2 - u + 1 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} \frac{3}{2}u^7 - 6u^6 + \cdots + \frac{3}{2}u + 1 \\ -u^7 + 2u^6 - 2u^5 + 3u^3 - 2u^2 + 2u - 1 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} \frac{1}{2}u^7 - 2u^6 + \cdots + \frac{3}{2}u + 1 \\ -u^4 + 2u^3 - 3u^2 + 2u - 1 \end{pmatrix}$$

(ii) Obstruction class $= 1$

(iii) Cusp Shapes $= -3u^7 + 16u^6 - 43u^5 + 71u^4 - 82u^3 + 68u^2 - 40u + 20$

(iv) Complex Volumes and Cusp Shapes

Solution to I_2^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u = -0.138557 - 0.767522I$ $a = 0.066843 + 1.409778I$ $b = 1.072774 - 0.246639I$	$3.20028 - 5.62938I$	$-5.78161 + 5.27851I$
$u = -0.138557 + 0.767522I$ $a = 0.066843 - 1.409778I$ $b = 1.072774 + 0.246639I$	$3.20028 + 5.62938I$	$-5.78161 - 5.27851I$
$u = 0.192965 - 0.870342I$ $a = -0.81301 - 1.44822I$ $b = -1.41733 + 0.42814I$	$-0.732875 + 0.991478I$	$5.28161 + 3.59996I$
$u = 0.192965 + 0.870342I$ $a = -0.81301 + 1.44822I$ $b = -1.41733 - 0.42814I$	$-0.732875 - 0.991478I$	$5.28161 - 3.59996I$
$u = 0.59113 - 1.35317I$ $a = -0.762459 - 0.087166I$ $b = -0.568666 + 0.980213I$	$3.20028 + 5.62938I$	$-5.78161 - 5.27851I$
$u = 0.59113 + 1.35317I$ $a = -0.762459 + 0.087166I$ $b = -0.568666 - 0.980213I$	$3.20028 - 5.62938I$	$-5.78161 + 5.27851I$
$u = 1.354458 - 0.250532I$ $a = 0.008624 - 0.392991I$ $b = -0.086775 - 0.534450I$	$-0.732875 + 0.991478I$	$5.28161 + 3.59996I$
$u = 1.354458 + 0.250532I$ $a = 0.008624 + 0.392991I$ $b = -0.086775 + 0.534450I$	$-0.732875 - 0.991478I$	$5.28161 - 3.59996I$

III. $\boldsymbol{I_3^u = \langle u^{11} + 3u^{10} + \cdots + 4u^2 - 2,\ -u^6 - u^5 - 2u^4 - u^3 - u^2 + b - u + 1,\ -u^{10} - 3u^9 + \cdots + 2a + 2\rangle}$

(i) Arc colorings

$$a_1 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_5 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_2 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$
$$a_8 = \begin{pmatrix} \frac{1}{2}u^{10} + \frac{3}{2}u^9 + \cdots + u - 1 \\ u^6 + u^5 + 2u^4 + u^3 + u^2 + u - 1 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} \frac{1}{2}u^{10} + \frac{3}{2}u^9 + \cdots - \frac{1}{2}u^2 - u \\ u^9 + 2u^8 + 5u^7 + 6u^6 + 8u^5 + 7u^4 + 5u^3 + 3u^2 + u - 1 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} \frac{1}{2}u^{10} + \frac{3}{2}u^9 + \cdots + \frac{11}{2}u^3 + \frac{5}{2}u^2 \\ u^6 + u^5 + 2u^4 + u^3 + u^2 + u - 1 \end{pmatrix}$$
$$a_4 = \begin{pmatrix} u \\ u^3 + u \end{pmatrix}$$
$$a_3 = \begin{pmatrix} -\frac{1}{2}u^{10} - \frac{3}{2}u^9 + \cdots + u + 1 \\ -u^6 - u^5 - 2u^4 - u^3 - u^2 - u + 1 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} \frac{1}{2}u^{10} + \frac{5}{2}u^9 + \cdots + \frac{7}{2}u^2 - 1 \\ -u^{10} - 3u^9 - 7u^8 - 11u^7 - 14u^6 - 15u^5 - 12u^4 - 8u^3 - 3u^2 + 1 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} -\frac{1}{2}u^{10} - \frac{1}{2}u^9 + \cdots + u - 1 \\ -u^9 - 2u^8 - 5u^7 - 6u^6 - 8u^5 - 7u^4 - 5u^3 - 3u^2 + 1 \end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes $= -2u^8 - 6u^7 - 14u^6 - 18u^5 - 24u^4 - 18u^3 - 16u^2 - 6u - 6$

(iv) Complex Volumes and Cusp Shapes

Solution to I_3^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.955959 - 0.181916I$ $a = -0.517203 + 1.103777I$ $b = -0.695220 + 0.961079I$	$-0.51987 + 4.74721I$	$-10.74299 - 5.17166I$
$u = -0.955959 + 0.181916I$ $a = -0.517203 - 1.103777I$ $b = -0.695220 - 0.961079I$	$-0.51987 - 4.74721I$	$-10.74299 + 5.17166I$
$u = -0.641442 - 1.159657I$ $a = -0.736546 - 0.484569I$ $b = 0.089483 - 1.164964I$	$6.47745 - 4.30838I$	$-1.34168 + 3.93056I$
$u = -0.641442 + 1.159657I$ $a = -0.736546 + 0.484569I$ $b = 0.089483 + 1.164964I$	$6.47745 + 4.30838I$	$-1.34168 - 3.93056I$
$u = -0.58305 - 1.34141I$ $a = 1.128183 - 0.208445I$ $b = 0.93740 + 1.39182I$	$6.7235 - 16.2714I$	$-5.72276 + 8.85281I$
$u = -0.58305 + 1.34141I$ $a = 1.128183 + 0.208445I$ $b = 0.93740 - 1.39182I$	$6.7235 + 16.2714I$	$-5.72276 - 8.85281I$
$u = 0.104833 - 1.064773I$ $a = -1.051115 + 0.609326I$ $b = -0.538602 - 1.183076I$	$5.39093 + 0.52336I$	$-2.07555 + 0.88155I$
$u = 0.104833 + 1.064773I$ $a = -1.051115 - 0.609326I$ $b = -0.538602 + 1.183076I$	$5.39093 - 0.52336I$	$-2.07555 - 0.88155I$
$u = 0.375570 - 1.042266I$ $a = 0.289036 - 0.451507I$ $b = 0.362037 + 0.470824I$	$2.05520 + 3.23878I$	$-8.62571 - 3.68812I$
$u = 0.375570 + 1.042266I$ $a = 0.289036 + 0.451507I$ $b = 0.362037 - 0.470824I$	$2.05520 - 3.23878I$	$-8.62571 + 3.68812I$

Solution to I_3^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 0.400093$ $a = 0.775290$ $b = -0.310188$	-0.775978	-12.9826

IV.

$\boldsymbol{I_4^u = \langle b^{24} - 3b^{23} + \cdots - 4b^2 + 1,\ 7.05 \times 10^{21} u - 8.61 \times 10^{21} b^{23} + \cdots + 3.61 \times 10^{22} b - 2.10 \times 10^{22},\ 1.04 \times 10^{22} b^{23} - 3.69 \times 10^{22} b^{22} + \cdots + 7.05 \times 10^{21} a + 3.48 \times 10^{22} \rangle}$

(i) Arc colorings

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

$$a_5 = \begin{pmatrix} 0 \\ 1.22134b^{23} - 3.89962b^{22} + \cdots - 5.11922b + 2.97401 \end{pmatrix}$$

$$a_2 = \begin{pmatrix} 1 \\ 2.07963b^{23} - 6.84669b^{22} + \cdots - 10.8927b + 6.06104 \end{pmatrix}$$

$$a_8 = \begin{pmatrix} -1.47882b^{23} + 5.23970b^{22} + \cdots + 11.7807b - 4.94311 \\ b \end{pmatrix}$$

$$a_6 = \begin{pmatrix} -0.176108b^{23} + 1.02352b^{22} + \cdots + 5.12518b - 3.45563 \\ 1 \end{pmatrix}$$

$$a_9 = \begin{pmatrix} -1.47882b^{23} + 5.23970b^{22} + \cdots + 10.7807b - 4.94311 \\ b \end{pmatrix}$$

$$a_4 = \begin{pmatrix} 1.22134b^{23} - 3.89962b^{22} + \cdots - 5.11922b + 2.97401 \\ 4.21288b^{23} - 14.1349b^{22} + \cdots - 23.5681b + 12.1735 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} 1.49365b^{23} - 4.45496b^{22} + \cdots - 6.96911b + 6.32298 \\ 1.59324b^{23} - 5.12202b^{22} + \cdots - 7.19884b + 3.58183 \end{pmatrix}$$

$$a_7 = \begin{pmatrix} 3.94417b^{23} - 13.3196b^{22} + \cdots - 21.7898b + 7.05099 \\ 10.8673b^{23} - 37.3225b^{22} + \cdots - 69.0682b + 25.9333 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} -2.77421b^{23} + 10.3397b^{22} + \cdots + 21.8528b - 8.41084 \\ -3.67655b^{23} + 12.0934b^{22} + \cdots + 20.9215b - 9.46186 \end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes $= \frac{2439985861724667823855584}{7046664504998642719127} b^{23} - \frac{8351565033514832020999928}{7046664504998642719127} b^{22} + \cdots - \frac{15007177987110812171647776}{7046664504998642719127} b + \frac{5149782145271022419289500}{7046664504998642719127}$

(iv) Complex Volumes and Cusp Shapes

Solution to I_4^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.185688 - 0.817666I$ $a = -0.762192 + 0.903819I$ $b = -1.44128 - 0.18321I$	$-1.05784 - 1.08263I$	$-14.2815 + 5.6276I$
$u = -0.185688 + 0.817666I$ $a = -0.762192 - 0.903819I$ $b = -1.44128 + 0.18321I$	$-1.05784 + 1.08263I$	$-14.2815 - 5.6276I$
$u = \quad 0.55241 + 1.40748I$ $a = -0.756136 + 0.049190I$ $b = -0.945979 - 0.875748I$	$3.72285 - 6.96551I$	$-5.97171 + 10.57440I$
$u = \quad 0.55241 - 1.40748I$ $a = -0.756136 - 0.049190I$ $b = -0.945979 + 0.875748I$	$3.72285 + 6.96551I$	$-5.97171 - 10.57440I$
$u = -0.185688 - 0.817666I$ $a = -0.59374 + 1.62783I$ $b = -0.880553 - 0.455390I$	$-1.05784 - 1.08263I$	$-14.2815 + 5.6276I$
$u = -0.185688 + 0.817666I$ $a = -0.59374 - 1.62783I$ $b = -0.880553 + 0.455390I$	$-1.05784 + 1.08263I$	$-14.2815 - 5.6276I$
$u = \quad 0.529049 + 1.245358I$ $a = -0.701975 + 0.258240I$ $b = -0.578176 - 1.181711I$	$2.26979 - 4.55813I$	$-9.74676 + 1.77049I$
$u = \quad 0.529049 - 1.245358I$ $a = -0.701975 - 0.258240I$ $b = -0.578176 + 1.181711I$	$2.26979 + 4.55813I$	$-9.74676 - 1.77049I$
$u = \quad 1.090291 - 0.140460I$ $a = -0.240626 + 0.291610I$ $b = -0.401743 - 0.003834I$	$-1.05784 + 1.08263I$	$-14.2815 - 5.6276I$
$u = \quad 1.090291 + 0.140460I$ $a = -0.240626 - 0.291610I$ $b = -0.401743 + 0.003834I$	$-1.05784 - 1.08263I$	$-14.2815 + 5.6276I$

Solution to I_4^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u = 1.090291 - 0.140460I$ $a = 0.362012 + 0.050153I$ $b = 0.221393 - 0.351739I$	$-1.05784 + 1.08263I$	$-14.2815 - 5.6276I$
$u = 1.090291 + 0.140460I$ $a = 0.362012 - 0.050153I$ $b = 0.221393 + 0.351739I$	$-1.05784 - 1.08263I$	$-14.2815 + 5.6276I$
$u = -0.234552 + 1.002019I$ $a = 0.00700 + 2.10465I$ $b = 0.451474 - 0.578868I$	$3.72285 + 6.96551I$	$-5.97171 - 10.57440I$
$u = -0.234552 - 1.002019I$ $a = 0.00700 - 2.10465I$ $b = 0.451474 + 0.578868I$	$3.72285 - 6.96551I$	$-5.97171 + 10.57440I$
$u = 0.55241 - 1.40748I$ $a = 0.767735 + 0.370784I$ $b = 0.486934 - 1.037075I$	$3.72285 + 6.96551I$	$-5.97171 - 10.57440I$
$u = 0.55241 + 1.40748I$ $a = 0.767735 - 0.370784I$ $b = 0.486934 + 1.037075I$	$3.72285 - 6.96551I$	$-5.97171 + 10.57440I$
$u = 0.529049 - 1.245358I$ $a = 0.970902 + 0.051810I$ $b = 0.692981 - 0.737589I$	$2.26979 + 4.55813I$	$-9.74676 - 1.77049I$
$u = 0.529049 + 1.245358I$ $a = 0.970902 - 0.051810I$ $b = 0.692981 + 0.737589I$	$2.26979 - 4.55813I$	$-9.74676 + 1.77049I$
$u = -0.251512 + 0.449740I$ $a = 0.04323 + 2.16308I$ $b = 0.800711 - 0.884208I$	$2.26979 - 4.55813I$	$-9.74676 + 1.77049I$
$u = -0.251512 - 0.449740I$ $a = 0.04323 - 2.16308I$ $b = 0.800711 + 0.884208I$	$2.26979 + 4.55813I$	$-9.74676 - 1.77049I$

Solution to I_4^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u = -0.251512 - 0.449740I$ $a = 2.25611 - 0.51868I$ $b = 0.983696 - 0.524600I$	$2.26979 + 4.55813I$	$-9.74676 - 1.77049I$
$u = -0.251512 + 0.449740I$ $a = 2.25611 + 0.51868I$ $b = 0.983696 + 0.524600I$	$2.26979 - 4.55813I$	$-9.74676 + 1.77049I$
$u = -0.234552 - 1.002019I$ $a = 0.647681 - 0.298955I$ $b = 2.11054 - 0.48664I$	$3.72285 - 6.96551I$	$-5.97171 + 10.57440I$
$u = -0.234552 + 1.002019I$ $a = 0.647681 + 0.298955I$ $b = 2.11054 + 0.48664I$	$3.72285 + 6.96551I$	$-5.97171 - 10.57440I$

V. $I_5^u =$
$\langle u^{18}+5u^{17}+\cdots+27u+5,\ -u^{17}-7u^{16}+\cdots+b-13,\ -13u^{17}-60u^{16}+\cdots+5a+4\rangle$

(i) Arc colorings

$$a_1 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_5 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_2 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$
$$a_8 = \begin{pmatrix} \frac{13}{5}u^{17} + 12u^{16} + \cdots + \frac{77}{5}u - \frac{4}{5} \\ u^{17} + 7u^{16} + \cdots + 71u + 13 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} -\frac{11}{5}u^{17} - 11u^{16} + \cdots - \frac{229}{5}u - \frac{42}{5} \\ -3u^{15} - 13u^{14} + \cdots - 50u - 11 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} \frac{8}{5}u^{17} + 5u^{16} + \cdots - \frac{278}{5}u - \frac{69}{5} \\ u^{17} + 7u^{16} + \cdots + 71u + 13 \end{pmatrix}$$
$$a_4 = \begin{pmatrix} u \\ u^3 + u \end{pmatrix}$$
$$a_3 = \begin{pmatrix} \frac{4}{5}u^{17} + 8u^{16} + \cdots + \frac{391}{5}u + \frac{73}{5} \\ -3u^{17} - 16u^{16} + \cdots - 62u - 11 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} \frac{13}{5}u^{17} + 13u^{16} + \cdots + \frac{67}{5}u - \frac{4}{5} \\ u^{16} + 5u^{15} + \cdots + 42u + 8 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} \frac{9}{5}u^{17} + 6u^{16} + \cdots - \frac{189}{5}u - \frac{32}{5} \\ -u^{17} - 4u^{16} + \cdots + 16u + 4 \end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes
$= 26u^{17} + 130u^{16} + 415u^{15} + 871u^{14} + 1236u^{13} + 1002u^{12} - 275u^{11} - 2187u^{10} - 3562u^9 - 3091u^8 - 569u^7 + 2567u^6 + 4603u^5 + 4614u^4 + 3181u^3 + 1560u^2 + 486u + 63$

(iv) Complex Volumes and Cusp Shapes

Solution to I_5^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -1.156418 - 0.102576I$ $a = 0.521985 - 0.890705I$ $b = 0.694998 - 0.976484I$	$2.81259 + 10.16841I$	$-7.74812 - 7.64867I$
$u = -1.156418 + 0.102576I$ $a = 0.521985 + 0.890705I$ $b = 0.694998 + 0.976484I$	$2.81259 - 10.16841I$	$-7.74812 + 7.64867I$
$u = -0.642487 - 0.199869I$ $a = 1.21195 + 1.14348I$ $b = 0.550112 + 0.976904I$	$4.26456 - 0.69984I$	$-4.65022 + 1.89978I$
$u = -0.642487 + 0.199869I$ $a = 1.21195 - 1.14348I$ $b = 0.550112 - 0.976904I$	$4.26456 + 0.69984I$	$-4.65022 - 1.89978I$
$u = -0.545158 - 1.253177I$ $a = -1.229126 + 0.230487I$ $b = -0.95891 - 1.41466I$	$2.81259 - 10.16841I$	$-7.74812 + 7.64867I$
$u = -0.545158 + 1.253177I$ $a = -1.229126 - 0.230487I$ $b = -0.95891 + 1.41466I$	$2.81259 + 10.16841I$	$-7.74812 - 7.64867I$
$u = -0.369880 - 1.229186I$ $a = 1.216831 - 0.459753I$ $b = 1.01520 + 1.32566I$	$8.30021 - 4.38855I$	$-1.11965 + 3.68700I$
$u = -0.369880 + 1.229186I$ $a = 1.216831 + 0.459753I$ $b = 1.01520 - 1.32566I$	$8.30021 + 4.38855I$	$-1.11965 - 3.68700I$
$u = -0.35655 - 1.50992I$ $a = -0.544015 - 0.110198I$ $b = -0.027580 - 0.860709I$	$8.30021 + 4.38855I$	$-1.11965 - 3.68700I$
$u = -0.35655 + 1.50992I$ $a = -0.544015 + 0.110198I$ $b = -0.027580 + 0.860709I$	$8.30021 - 4.38855I$	$-1.11965 + 3.68700I$

Solution to I_5^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u = -0.311796 - 1.205214I$ $a = 0.814403 + 0.074315I$ $b = 0.164362 + 1.004701I$	$4.26456 + 0.69984I$	$-4.65022 - 1.89978I$
$u = -0.311796 + 1.205214I$ $a = 0.814403 - 0.074315I$ $b = 0.164362 - 1.004701I$	$4.26456 - 0.69984I$	$-4.65022 + 1.89978I$
$u = -0.198527 - 0.827118I$ $a = -0.81586 + 1.28949I$ $b = -1.228527 - 0.418813I$	$-1.04793 - 1.11007I$	$-17.5535 + 4.7867I$
$u = -0.198527 + 0.827118I$ $a = -0.81586 - 1.28949I$ $b = -1.228527 + 0.418813I$	$-1.04793 + 1.11007I$	$-17.5535 - 4.7867I$
$u = -0.079308 - 0.836177I$ $a = 1.38823 - 0.30834I$ $b = 0.367922 + 1.136350I$	4.23983	-2.85705
$u = -0.079308 + 0.836177I$ $a = 1.38823 + 0.30834I$ $b = 0.367922 - 1.136350I$	4.23983	-2.85705
$u = 1.160126 - 0.229157I$ $a = 0.035605 + 0.158300I$ $b = -0.077582 - 0.175489I$	$-1.04793 + 1.11007I$	$-17.5535 - 4.7867I$
$u = 1.160126 + 0.229157I$ $a = 0.035605 - 0.158300I$ $b = -0.077582 + 0.175489I$	$-1.04793 - 1.11007I$	$-17.5535 + 4.7867I$

VI. $I_6^u = \langle u^3 - u^2 + 2u - 1,\ u^2 + a + 1,\ u^2 + b - u + 1 \rangle$

(i) Arc colorings

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

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

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

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

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

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

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

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

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

$$a_{10} = \begin{pmatrix} 0 \\ -u \end{pmatrix}$$

(ii) Obstruction class $= 1$

(iii) Cusp Shapes $= -8u^2 + 8u - 20$

(iv) Complex Volumes and Cusp Shapes

Solution to I_6^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u = 0.215080 - 1.307141I$ $a = 0.662359 + 0.562280I$ $b = 0.877439 - 0.744862I$	$6.04826 + 5.65624I$	$-4.98049 - 5.95889I$
$u = 0.215080 + 1.307141I$ $a = 0.662359 - 0.562280I$ $b = 0.877439 + 0.744862I$	$6.04826 - 5.65624I$	$-4.98049 + 5.95889I$
$u = 0.569840$ $a = -1.32472$ $b = -0.754878$	-2.22691	-18.0390

VII. $\boldsymbol{I_7^u = \langle a^6 - a^4 + a^3 + 2a^2 - 3a + 1,\ 4a^5 + 2a^4 - 3a^3 + 2a^2 + b + 9a - 7,\ 3a^5 + 2a^4 - 2a^3 + 2a^2 + 7a + u - 5\rangle}$

(i) Arc colorings

$$a_1 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_5 = \begin{pmatrix} 0 \\ -3a^5 - 2a^4 + 2a^3 - 2a^2 - 7a + 5 \end{pmatrix}$$
$$a_2 = \begin{pmatrix} 1 \\ -a^5 - a^4 - a^2 - 2a \end{pmatrix}$$
$$a_8 = \begin{pmatrix} a \\ -4a^5 - 2a^4 + 3a^3 - 2a^2 - 9a + 7 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} a^5 + a^4 - a^3 + 3a - 2 \\ 1 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} 4a^5 + 2a^4 - 3a^3 + 2a^2 + 10a - 7 \\ -4a^5 - 2a^4 + 3a^3 - 2a^2 - 9a + 7 \end{pmatrix}$$
$$a_4 = \begin{pmatrix} -3a^5 - 2a^4 + 2a^3 - 2a^2 - 7a + 5 \\ 2a^5 + a^4 - 2a^3 + a^2 + 5a - 4 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} -4a^5 - 2a^4 + 2a^3 - 2a^2 - 9a + 6 \\ 4a^5 + 2a^4 - 3a^3 + 2a^2 + 9a - 7 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} 3a^5 + a^4 - 3a^3 + 2a^2 + 7a - 7 \\ -2a^5 + 3a^3 - a^2 - 4a + 6 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} -4a^5 - 3a^4 + 2a^3 - 3a^2 - 9a + 5 \\ 8a^5 + 5a^4 - 5a^3 + 5a^2 + 19a - 12 \end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes $= -16a^5 - 8a^4 + 16a^3 - 8a^2 - 40a + 26$

(iv) Complex Volumes and Cusp Shapes

Solution to I_7^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u = 0.215080 - 1.307141I$ $a = -1.25666 - 0.68552I$ $b = -0.288915 + 0.750335I$	$7.69319 + 5.65624I$	$1.01951 - 5.95889I$
$u = 0.215080 + 1.307141I$ $a = -1.25666 + 0.68552I$ $b = -0.288915 - 0.750335I$	$7.69319 - 5.65624I$	$1.01951 + 5.95889I$
$u = 0.215080 + 1.307141I$ $a = 0.594305 - 0.123240I$ $b = 1.16635 + 1.49520I$	$7.69319 - 5.65624I$	$1.01951 + 5.95889I$
$u = 0.215080 - 1.307141I$ $a = 0.594305 + 0.123240I$ $b = 1.16635 - 1.49520I$	$7.69319 + 5.65624I$	$1.01951 - 5.95889I$
$u = 0.569840$ $a = 0.662359 - 0.941275I$ $b = -0.377439 - 0.536376I$	-0.581975	-12.0390
$u = 0.569840$ $a = 0.662359 + 0.941275I$ $b = -0.377439 + 0.536376I$	-0.581975	-12.0390

VIII. u-Polynomials

Crossings	u-Polynomials at each crossings
c_1, c_6	$(u^2+u+1)^2(u^3-u^2+2u-1)(u^3+u^2+2u+1)^2$ $(u^8-4u^7+9u^6-14u^5+15u^4-13u^3+9u^2-4u+2)$ $(u^{11}-3u^{10}+8u^9-13u^8+19u^7-22u^6+21u^5-17u^4+9u^3-4u^2+2)$ $(1+4u^2+6u^3+10u^4+17u^5+19u^6+21u^7+18u^8+13u^9+8u^{10}+3u^{11}+u^{12})^2$ $(u^{18}-5u^{17}+\cdots-27u+5)$
c_2, c_7	$(u-1)^4(u^3+u^2+2u+1)(u^4-u^3+u^2+1)^2$ $(u^6+5u^5+16u^4+28u^3+30u^2+18u+5)$ $(u^9-2u^8+4u^7-5u^6+7u^5-5u^4+3u^3-2u^2+u-1)^2$ $(u^{11}+5u^{10}+\cdots+10u+4)$ $(u^{12}+u^{10}-6u^9+10u^8-2u^7+2u^6-2u^4+2u^2+1)^2$
c_3, c_5, c_8 c_{10}	$(u^3+u^2-1)(u^4+u^3+\cdots+2u+1)(u^6+u^5+\cdots-2u+1)$ $(u^8-2u^7+3u^5-3u^4+3u^2-u+1)$ $(u^{11}+4u^9-u^8+11u^7-4u^6+15u^5-3u^4+9u^3+u^2+2u-1)$ $(u^{18}+u^{17}+\cdots-3u+1)(u^{24}+3u^{23}+\cdots-4u^2+1)$
c_4, c_9	$(u^2+u+1)^2(u^3+u^2+2u+1)^3$ $(u^8+4u^7+9u^6+14u^5+15u^4+13u^3+9u^2+4u+2)$ $(u^{11}-3u^{10}+8u^9-13u^8+19u^7-22u^6+21u^5-17u^4+9u^3-4u^2+2)$ $(1+4u^2+6u^3+10u^4+17u^5+19u^6+21u^7+18u^8+13u^9+8u^{10}+3u^{11}+u^{12})^2$ $(u^{18}-5u^{17}+\cdots-27u+5)$

IX. Riley Polynomials

Crossings	Riley Polynomials at each crossings
c_1, c_4, c_6 c_9	$(y^2+y+1)^2(y^3+3y^2+2y-1)^3$ $(y^8+2y^7-y^6-12y^5-5y^4+25y^3+37y^2+20y+4)$ $(y^{11}+7y^{10}+\cdots+16y-4)$ $(1+8y+36y^2+82y^3+84y^4-y^5-83y^6-67y^7+31y^9+22y^{10}+7y^{11}+y^{12})^2$ $(y^{18}+9y^{17}+\cdots+61y+25)$
c_2, c_7	$(y-1)^4(y^3+3y^2+2y-1)(y^4+y^3+3y^2+2y+1)^2$ $(y^6+7y^5+36y^4+6y^3+52y^2-24y+25)$ $(y^9+4y^8+10y^7+17y^6+17y^5+y^4-7y^3-8y^2-3y-1)^2$ $(y^{11}-5y^{10}+\cdots+60y-16)$ $(1+4y-4y^3+32y^4+34y^5-30y^6+36y^7+76y^8-12y^9+21y^{10}+2y^{11}+y^{12})^2$
c_3, c_5, c_8 c_{10}	$(y^3-y^2+2y-1)(y^4+3y^3+2y^2+1)$ $(y^6+3y^5+16y^4+18y^3+12y^2+4y+1)$ $(y^8-4y^7+6y^6-3y^5+7y^4-12y^3+3y^2+5y+1)$ $(y^{11}+8y^{10}+\cdots+6y-1)(y^{18}+9y^{17}+\cdots+43y+1)$ $(y^{24}-11y^{23}+\cdots-8y+1)$