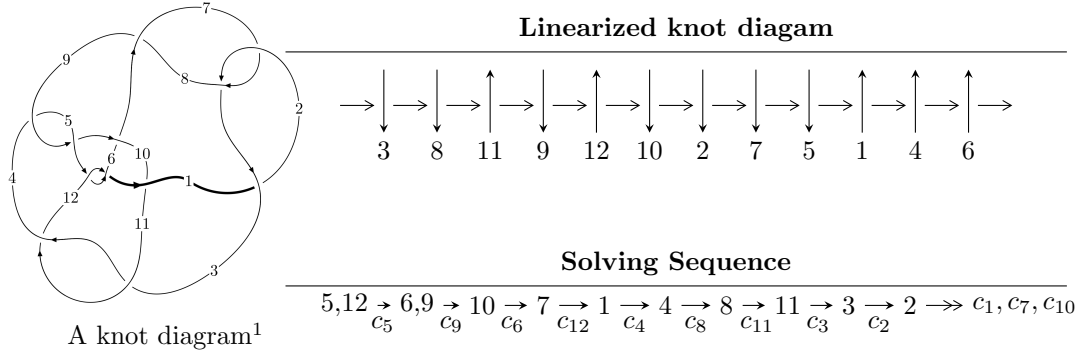


12a<sub>0784</sub> (K12a<sub>0784</sub>)



**Ideals for irreducible components<sup>2</sup> of  $X_{\text{par}}$**

$$\begin{aligned}
 I_1^u &= \langle 2.63739 \times 10^{482} u^{126} + 1.73298 \times 10^{482} u^{125} + \dots + 2.05419 \times 10^{482} b - 2.00818 \times 10^{485}, \\
 &\quad - 1.32661 \times 10^{485} u^{126} - 1.40289 \times 10^{485} u^{125} + \dots + 2.36848 \times 10^{485} a + 1.00544 \times 10^{488}, \\
 &\quad u^{127} + u^{126} + \dots - 6672u - 1153 \rangle \\
 I_2^u &= \langle -286200551u^{28} - 494699359u^{27} + \dots + 112090025b + 67634672, \\
 &\quad - 816612824u^{28} - 1336630466u^{27} + \dots + 112090025a + 558878203, u^{29} + u^{28} + \dots - u + 1 \rangle \\
 I_3^u &= \langle b - u + 1, a, u^2 - u - 1 \rangle
 \end{aligned}$$

\* 3 irreducible components of  $\dim_{\mathbb{C}} = 0$ , with total 158 representations.

<sup>1</sup>The image of knot diagram is generated by the software “**Draw programme**” developed by Andrew Bartholomew(<http://www.layer8.co.uk/maths/draw/index.htm#Running-draw>), where we modified some parts for our purpose(<https://github.com/CATsTAILs/LinksPainter>).

<sup>2</sup>All coefficients of polynomials are rational numbers. But the coefficients are sometimes approximated in decimal forms when there is not enough margin.

$$\mathbf{I. } J_1^u = \langle 2.64 \times 10^{482} u^{126} + 1.73 \times 10^{482} u^{125} + \dots + 2.05 \times 10^{482} b - 2.01 \times 10^{485}, -1.33 \times 10^{485} u^{126} - 1.40 \times 10^{485} u^{125} + \dots + 2.37 \times 10^{485} a + 1.01 \times 10^{488}, u^{127} + u^{126} + \dots - 6672u - 1153 \rangle$$

(i) Arc colorings

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

$$a_{12} = \begin{pmatrix} 0 \\ u \end{pmatrix}$$

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

$$a_9 = \begin{pmatrix} 0.560111u^{126} + 0.592315u^{125} + \dots - 752.208u - 424.508 \\ -1.28391u^{126} - 0.843635u^{125} + \dots + 3591.97u + 977.602 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} 1.84402u^{126} + 1.43595u^{125} + \dots - 4344.18u - 1402.11 \\ -1.28391u^{126} - 0.843635u^{125} + \dots + 3591.97u + 977.602 \end{pmatrix}$$

$$a_7 = \begin{pmatrix} -0.934886u^{126} - 0.344702u^{125} + \dots + 5811.23u + 1302.90 \\ -0.433227u^{126} + 0.455790u^{125} + \dots + 8089.02u + 1593.55 \end{pmatrix}$$

$$a_1 = \begin{pmatrix} u \\ -u^3 + u \end{pmatrix}$$

$$a_4 = \begin{pmatrix} -0.0709417u^{126} - 0.649720u^{125} + \dots - 6676.29u - 1248.62 \\ 2.42115u^{126} + 0.505784u^{125} + \dots - 14133.4u - 3134.64 \end{pmatrix}$$

$$a_8 = \begin{pmatrix} -0.0120408u^{126} + 0.123095u^{125} + \dots + 4476.63u + 997.946 \\ 1.42633u^{126} - 0.415950u^{125} + \dots - 13110.2u - 2621.56 \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} 0.546467u^{126} + 0.457767u^{125} + \dots - 1204.38u - 453.814 \\ -1.74298u^{126} - 1.01022u^{125} + \dots + 6097.02u + 1557.66 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} 1.03181u^{126} + 0.0803714u^{125} + \dots - 7342.95u - 1545.08 \\ 1.99899u^{126} + 0.207011u^{125} + \dots - 13754.8u - 2953.24 \end{pmatrix}$$

$$a_2 = \begin{pmatrix} 0.601134u^{126} - 0.502581u^{125} + \dots - 4109.22u - 598.688 \\ 3.57670u^{126} + 0.360615u^{125} + \dots - 21584.6u - 4600.97 \end{pmatrix}$$

(ii) Obstruction class = -1

(iii) Cusp Shapes =  $-5.36102u^{126} - 0.802747u^{125} + \dots + 30637.4u + 6600.82$

(iv) u-Polynomials at the component

Crossings	u-Polynomials at each crossing
$c_1, c_8$	$u^{127} + 39u^{126} + \dots + 1944u + 81$
$c_2, c_7$	$u^{127} + u^{126} + \dots + 18u - 9$
$c_3, c_{11}$	$u^{127} - 2u^{126} + \dots - 91249u + 90319$
$c_4, c_9$	$u^{127} + 2u^{126} + \dots - 15u - 1$
$c_5, c_{12}$	$u^{127} + u^{126} + \dots - 6672u - 1153$
$c_6$	$u^{127} - 2u^{126} + \dots - 934469u + 281173$
$c_{10}$	$u^{127} + 6u^{126} + \dots + 1248715953u + 143741087$

(v) Riley Polynomials at the component

Crossings	Riley Polynomials at each crossing
$c_1, c_8$	$y^{127} + 109y^{126} + \dots + 84564y - 6561$
$c_2, c_7$	$y^{127} - 39y^{126} + \dots + 1944y - 81$
$c_3, c_{11}$	$y^{127} - 106y^{126} + \dots + 204122256495y - 8157521761$
$c_4, c_9$	$y^{127} - 66y^{126} + \dots + 191y - 1$
$c_5, c_{12}$	$y^{127} - 83y^{126} + \dots + 49166786y - 1329409$
$c_6$	$y^{127} + 22y^{126} + \dots - 2134776124149y - 79058255929$
$c_{10}$	$y^{127} - 58y^{126} + \dots + 427269195188756631y - 20661500091941569$

(vi) Complex Volumes and Cusp Shapes

Solutions to $I_1^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 0.899609 + 0.424992I$ $a = -1.10629 - 0.94682I$ $b = -1.11918 + 0.90820I$	$-1.07536 + 5.17840I$	0
$u = 0.899609 - 0.424992I$ $a = -1.10629 + 0.94682I$ $b = -1.11918 - 0.90820I$	$-1.07536 - 5.17840I$	0
$u = -0.969383 + 0.217043I$ $a = -0.242095 + 0.716577I$ $b = -1.108500 - 0.431288I$	$-2.20885 - 0.84555I$	0
$u = -0.969383 - 0.217043I$ $a = -0.242095 - 0.716577I$ $b = -1.108500 + 0.431288I$	$-2.20885 + 0.84555I$	0
$u = 0.975700 + 0.058998I$ $a = -1.50968 - 0.43039I$ $b = -1.39756 + 0.26312I$	$1.86265 + 1.12684I$	0
$u = 0.975700 - 0.058998I$ $a = -1.50968 + 0.43039I$ $b = -1.39756 - 0.26312I$	$1.86265 - 1.12684I$	0
$u = -0.833264 + 0.468989I$ $a = -0.481761 + 0.814515I$ $b = -1.350000 + 0.031703I$	$1.37120 + 3.57194I$	0
$u = -0.833264 - 0.468989I$ $a = -0.481761 - 0.814515I$ $b = -1.350000 - 0.031703I$	$1.37120 - 3.57194I$	0
$u = 0.785879 + 0.517921I$ $a = 0.504803 + 0.816321I$ $b = 1.361010 + 0.150128I$	$1.55196 + 1.85604I$	0
$u = 0.785879 - 0.517921I$ $a = 0.504803 - 0.816321I$ $b = 1.361010 - 0.150128I$	$1.55196 - 1.85604I$	0

Solutions to $I_1^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.921369$ $a = 1.14442$ $b = 1.76452$	-3.14048	0
$u = 0.941710 + 0.530939I$ $a = -1.091830 - 0.862514I$ $b = -1.00896 + 1.08502I$	$3.99006 + 8.76786I$	0
$u = 0.941710 - 0.530939I$ $a = -1.091830 + 0.862514I$ $b = -1.00896 - 1.08502I$	$3.99006 - 8.76786I$	0
$u = 0.465741 + 0.983160I$ $a = 1.42474 - 0.17082I$ $b = 1.038660 - 0.084011I$	$-3.47260 + 4.47855I$	0
$u = 0.465741 - 0.983160I$ $a = 1.42474 + 0.17082I$ $b = 1.038660 + 0.084011I$	$-3.47260 - 4.47855I$	0
$u = 0.910313 + 0.030662I$ $a = -0.115819 - 0.906180I$ $b = 0.615448 + 0.407124I$	$1.46568 + 0.43178I$	0
$u = 0.910313 - 0.030662I$ $a = -0.115819 + 0.906180I$ $b = 0.615448 - 0.407124I$	$1.46568 - 0.43178I$	0
$u = 0.885847 + 0.205046I$ $a = -1.11298 - 0.88899I$ $b = -1.33628 + 0.72164I$	$1.31135 + 1.25389I$	0
$u = 0.885847 - 0.205046I$ $a = -1.11298 + 0.88899I$ $b = -1.33628 - 0.72164I$	$1.31135 - 1.25389I$	0
$u = 1.086360 + 0.116517I$ $a = 0.035013 + 0.516038I$ $b = 0.885902 - 0.829996I$	$2.98971 + 0.94847I$	0

Solutions to $I_1^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 1.086360 - 0.116517I$ $a = 0.035013 - 0.516038I$ $b = 0.885902 + 0.829996I$	$2.98971 - 0.94847I$	0
$u = -1.066830 + 0.244598I$ $a = 1.21273 - 1.16451I$ $b = 1.105170 + 0.598534I$	$1.54996 - 5.14937I$	0
$u = -1.066830 - 0.244598I$ $a = 1.21273 + 1.16451I$ $b = 1.105170 - 0.598534I$	$1.54996 + 5.14937I$	0
$u = -0.898348 + 0.070569I$ $a = 1.075500 - 0.494864I$ $b = 1.65418 + 0.50089I$	$0.62635 - 5.91693I$	0
$u = -0.898348 - 0.070569I$ $a = 1.075500 + 0.494864I$ $b = 1.65418 - 0.50089I$	$0.62635 + 5.91693I$	0
$u = -0.965308 + 0.528116I$ $a = 1.070340 - 0.856967I$ $b = 0.95027 + 1.08029I$	$4.24976 - 3.00059I$	0
$u = -0.965308 - 0.528116I$ $a = 1.070340 + 0.856967I$ $b = 0.95027 - 1.08029I$	$4.24976 + 3.00059I$	0
$u = -1.090420 + 0.156147I$ $a = -0.131377 + 0.486924I$ $b = -1.074270 - 0.867636I$	$2.02042 - 6.23432I$	0
$u = -1.090420 - 0.156147I$ $a = -0.131377 - 0.486924I$ $b = -1.074270 + 0.867636I$	$2.02042 + 6.23432I$	0
$u = 1.106460 + 0.094367I$ $a = -1.97773 - 1.38977I$ $b = -0.993385 + 0.393640I$	$8.69249 + 0.96192I$	0

Solutions to $I_1^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 1.106460 - 0.094367I$ $a = -1.97773 + 1.38977I$ $b = -0.993385 - 0.393640I$	$8.69249 - 0.96192I$	0
$u = 1.071220 + 0.326687I$ $a = -0.670886 - 0.787907I$ $b = 0.118526 + 0.756860I$	$6.62998 + 0.44766I$	0
$u = 1.071220 - 0.326687I$ $a = -0.670886 + 0.787907I$ $b = 0.118526 - 0.756860I$	$6.62998 - 0.44766I$	0
$u = -1.117830 + 0.106521I$ $a = 1.85098 - 1.49346I$ $b = 0.986138 + 0.434205I$	$8.52486 - 7.18622I$	0
$u = -1.117830 - 0.106521I$ $a = 1.85098 + 1.49346I$ $b = 0.986138 - 0.434205I$	$8.52486 + 7.18622I$	0
$u = 0.534383 + 0.689920I$ $a = 0.478682 + 0.686201I$ $b = 1.160460 + 0.697958I$	$2.82278 - 4.08425I$	0
$u = 0.534383 - 0.689920I$ $a = 0.478682 - 0.686201I$ $b = 1.160460 - 0.697958I$	$2.82278 + 4.08425I$	0
$u = -1.067680 + 0.371245I$ $a = 0.733164 - 0.800903I$ $b = -0.003651 + 0.784977I$	$6.42520 - 6.45218I$	0
$u = -1.067680 - 0.371245I$ $a = 0.733164 + 0.800903I$ $b = -0.003651 - 0.784977I$	$6.42520 + 6.45218I$	0
$u = 0.620487 + 0.589256I$ $a = 0.548489 + 0.759148I$ $b = 1.217960 + 0.436850I$	$-1.83228 - 1.08155I$	0



Solutions to $I_1^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 0.620487 - 0.589256I$	$-1.83228 + 1.08155I$	0
$a = 0.548489 - 0.759148I$		
$b = 1.217960 - 0.436850I$		
$u = -1.045130 + 0.469194I$	$0.47688 - 4.49237I$	0
$a = 0.946605 - 0.934179I$		
$b = 0.788954 + 0.736081I$		
$u = -1.045130 - 0.469194I$	$0.47688 + 4.49237I$	0
$a = 0.946605 + 0.934179I$		
$b = 0.788954 - 0.736081I$		
$u = -0.502135 + 0.687224I$	$2.92596 - 1.65726I$	0
$a = -0.472241 + 0.657894I$		
$b = -1.092990 + 0.722258I$		
$u = -0.502135 - 0.687224I$	$2.92596 + 1.65726I$	0
$a = -0.472241 - 0.657894I$		
$b = -1.092990 - 0.722258I$		
$u = -0.435982 + 0.722667I$	$-1.65126 + 0.13326I$	0
$a = -1.396900 - 0.103093I$		
$b = -0.943841 + 0.061516I$		
$u = -0.435982 - 0.722667I$	$-1.65126 - 0.13326I$	0
$a = -1.396900 + 0.103093I$		
$b = -0.943841 - 0.061516I$		
$u = 0.256758 + 0.792899I$	$7.42361 + 0.98363I$	0
$a = -1.52637 - 0.60838I$		
$b = -0.400374 - 0.677480I$		
$u = 0.256758 - 0.792899I$	$7.42361 - 0.98363I$	0
$a = -1.52637 + 0.60838I$		
$b = -0.400374 + 0.677480I$		
$u = 0.158435 + 0.811000I$	$-5.85707 - 1.88338I$	0
$a = 1.58987 - 0.20219I$		
$b = 1.186190 + 0.129187I$		

Solutions to $I_1^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 0.158435 - 0.811000I$		
$a = 1.58987 + 0.20219I$	$-5.85707 + 1.88338I$	0
$b = 1.186190 - 0.129187I$		
$u = 0.110570 + 1.195880I$		
$a = -1.335490 - 0.397774I$	$5.53142 - 5.95429I$	0
$b = -1.073010 - 0.594550I$		
$u = 0.110570 - 1.195880I$		
$a = -1.335490 + 0.397774I$	$5.53142 + 5.95429I$	0
$b = -1.073010 + 0.594550I$		
$u = -0.089749 + 1.201270I$		
$a = 1.339290 - 0.390590I$	$4.52673 + 12.24300I$	0
$b = 1.122270 - 0.584605I$		
$u = -0.089749 - 1.201270I$		
$a = 1.339290 + 0.390590I$	$4.52673 - 12.24300I$	0
$b = 1.122270 + 0.584605I$		
$u = -1.118870 + 0.449295I$		
$a = 0.878072 - 1.027960I$	$0.54978 - 4.62144I$	0
$b = 0.920268 + 0.556646I$		
$u = -1.118870 - 0.449295I$		
$a = 0.878072 + 1.027960I$	$0.54978 + 4.62144I$	0
$b = 0.920268 - 0.556646I$		
$u = -0.745220 + 0.204465I$		
$a = 0.07001 - 1.44950I$	$-0.32061 - 3.50677I$	0
$b = -0.394495 + 0.100817I$		
$u = -0.745220 - 0.204465I$		
$a = 0.07001 + 1.44950I$	$-0.32061 + 3.50677I$	0
$b = -0.394495 - 0.100817I$		
$u = -0.728800 + 0.172451I$		
$a = 1.41642 - 2.53956I$	$6.73042 - 6.79692I$	0
$b = -0.269398 - 0.042175I$		

Solutions to $I_1^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.728800 - 0.172451I$ $a = 1.41642 + 2.53956I$ $b = -0.269398 + 0.042175I$	$6.73042 + 6.79692I$	0
$u = -0.223887 + 0.712552I$ $a = 1.63558 - 0.63068I$ $b = 0.283171 - 0.714554I$	$6.85744 - 7.23141I$	0
$u = -0.223887 - 0.712552I$ $a = 1.63558 + 0.63068I$ $b = 0.283171 + 0.714554I$	$6.85744 + 7.23141I$	0
$u = 0.315325 + 1.215630I$ $a = -1.272500 - 0.456206I$ $b = -0.851784 - 0.462480I$	$1.67897 - 1.92022I$	0
$u = 0.315325 - 1.215630I$ $a = -1.272500 + 0.456206I$ $b = -0.851784 + 0.462480I$	$1.67897 + 1.92022I$	0
$u = 0.713232 + 0.155152I$ $a = -1.72331 - 2.33254I$ $b = 0.267307 - 0.045218I$	$7.03336 + 0.58707I$	0
$u = 0.713232 - 0.155152I$ $a = -1.72331 + 2.33254I$ $b = 0.267307 + 0.045218I$	$7.03336 - 0.58707I$	0
$u = 1.284030 + 0.310582I$ $a = -0.0338741 + 0.0205357I$ $b = -0.258211 - 1.200890I$	$4.42676 + 6.00018I$	0
$u = 1.284030 - 0.310582I$ $a = -0.0338741 - 0.0205357I$ $b = -0.258211 + 1.200890I$	$4.42676 - 6.00018I$	0
$u = -0.030399 + 0.678002I$ $a = 1.82967 - 0.36505I$ $b = 1.264820 + 0.355903I$	$-0.64284 - 7.09594I$	$-5.07346 + 6.77744I$

Solutions to $I_1^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.030399 - 0.678002I$ $a = 1.82967 + 0.36505I$ $b = 1.264820 - 0.355903I$	$-0.64284 + 7.09594I$	$-5.07346 - 6.77744I$
$u = 1.175060 + 0.609769I$ $a = -0.762664 - 0.880020I$ $b = -0.872464 + 0.252078I$	$-1.06435 + 1.29725I$	0
$u = 1.175060 - 0.609769I$ $a = -0.762664 + 0.880020I$ $b = -0.872464 - 0.252078I$	$-1.06435 - 1.29725I$	0
$u = -1.272320 + 0.367407I$ $a = 0.68412 - 1.26924I$ $b = 1.135280 + 0.549511I$	$3.93987 - 5.23803I$	0
$u = -1.272320 - 0.367407I$ $a = 0.68412 + 1.26924I$ $b = 1.135280 - 0.549511I$	$3.93987 + 5.23803I$	0
$u = 1.269610 + 0.394723I$ $a = 0.0409520 - 0.0525356I$ $b = -0.50725 - 1.32126I$	$11.1187 + 11.2500I$	0
$u = 1.269610 - 0.394723I$ $a = 0.0409520 + 0.0525356I$ $b = -0.50725 + 1.32126I$	$11.1187 - 11.2500I$	0
$u = -0.427878 + 0.513104I$ $a = -0.835560 + 0.459521I$ $b = -0.854553 + 0.377787I$	$-1.286080 + 0.455261I$	$-7.70736 + 1.32907I$
$u = -0.427878 - 0.513104I$ $a = -0.835560 - 0.459521I$ $b = -0.854553 - 0.377787I$	$-1.286080 - 0.455261I$	$-7.70736 - 1.32907I$
$u = 1.250100 + 0.466607I$ $a = -0.683965 - 1.073830I$ $b = -1.075790 + 0.420354I$	$-2.44640 + 6.61908I$	0

Solutions to $I_1^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 1.250100 - 0.466607I$ $a = -0.683965 + 1.073830I$ $b = -1.075790 - 0.420354I$	$-2.44640 - 6.61908I$	0
$u = -0.158795 + 1.330380I$ $a = 1.283370 - 0.378700I$ $b = 1.006120 - 0.419750I$	$-2.71266 + 5.78701I$	0
$u = -0.158795 - 1.330380I$ $a = 1.283370 + 0.378700I$ $b = 1.006120 + 0.419750I$	$-2.71266 - 5.78701I$	0
$u = 1.290630 + 0.383162I$ $a = -0.637761 - 1.244490I$ $b = -1.159890 + 0.528856I$	$3.39980 + 11.12530I$	0
$u = 1.290630 - 0.383162I$ $a = -0.637761 + 1.244490I$ $b = -1.159890 - 0.528856I$	$3.39980 - 11.12530I$	0
$u = -1.289890 + 0.395097I$ $a = -0.0207285 - 0.0679971I$ $b = 0.524654 - 1.259980I$	$11.90370 - 5.14638I$	0
$u = -1.289890 - 0.395097I$ $a = -0.0207285 + 0.0679971I$ $b = 0.524654 + 1.259980I$	$11.90370 + 5.14638I$	0
$u = -1.217590 + 0.670566I$ $a = -1.61163 + 0.39154I$ $b = -0.946882 - 0.528758I$	$9.26360 + 1.80665I$	0
$u = -1.217590 - 0.670566I$ $a = -1.61163 - 0.39154I$ $b = -0.946882 + 0.528758I$	$9.26360 - 1.80665I$	0
$u = -0.030368 + 0.608580I$ $a = -0.032047 + 0.352615I$ $b = -0.059994 + 0.820870I$	$3.49662 + 2.89047I$	$-0.32814 - 2.83025I$

Solutions to $I_1^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.030368 - 0.608580I$ $a = -0.032047 - 0.352615I$ $b = -0.059994 - 0.820870I$	$3.49662 - 2.89047I$	$-0.32814 + 2.83025I$
$u = -1.368090 + 0.313616I$ $a = 0.1135650 - 0.0396663I$ $b = 0.356367 - 0.956192I$	$7.68279 - 2.73588I$	0
$u = -1.368090 - 0.313616I$ $a = 0.1135650 + 0.0396663I$ $b = 0.356367 + 0.956192I$	$7.68279 + 2.73588I$	0
$u = 1.397660 + 0.141411I$ $a = -0.261924 + 0.078658I$ $b = 0.047609 - 0.650115I$	$4.27409 - 0.09782I$	0
$u = 1.397660 - 0.141411I$ $a = -0.261924 - 0.078658I$ $b = 0.047609 + 0.650115I$	$4.27409 + 0.09782I$	0
$u = -0.001739 + 0.590856I$ $a = -1.99205 - 0.28236I$ $b = -1.178080 + 0.395962I$	$0.06673 + 1.46934I$	$-3.77347 - 1.94821I$
$u = -0.001739 - 0.590856I$ $a = -1.99205 + 0.28236I$ $b = -1.178080 - 0.395962I$	$0.06673 - 1.46934I$	$-3.77347 + 1.94821I$
$u = -0.584488 + 1.282970I$ $a = 1.156800 - 0.490604I$ $b = 0.794712 - 0.304872I$	$-1.74040 - 2.72976I$	0
$u = -0.584488 - 1.282970I$ $a = 1.156800 + 0.490604I$ $b = 0.794712 + 0.304872I$	$-1.74040 + 2.72976I$	0
$u = 1.25413 + 0.65584I$ $a = 1.56004 + 0.46546I$ $b = 0.982720 - 0.572883I$	$10.07250 + 4.68382I$	0

Solutions to $I_1^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 1.25413 - 0.65584I$ $a = 1.56004 - 0.46546I$ $b = 0.982720 + 0.572883I$	$10.07250 - 4.68382I$	0
$u = 1.43785 + 0.04048I$ $a = -0.535512 - 0.137324I$ $b = 0.713551 + 0.400227I$	$9.48279 + 3.64685I$	0
$u = 1.43785 - 0.04048I$ $a = -0.535512 + 0.137324I$ $b = 0.713551 - 0.400227I$	$9.48279 - 3.64685I$	0
$u = 0.553209 + 0.067349I$ $a = -1.098260 - 0.704150I$ $b = 0.358204 - 0.037734I$	$1.291040 + 0.409621I$	$6.92214 - 0.12402I$
$u = 0.553209 - 0.067349I$ $a = -1.098260 + 0.704150I$ $b = 0.358204 + 0.037734I$	$1.291040 - 0.409621I$	$6.92214 + 0.12402I$
$u = -1.45221 + 0.03510I$ $a = 0.549371 - 0.108937I$ $b = -0.751998 + 0.326051I$	$9.62150 + 2.15278I$	0
$u = -1.45221 - 0.03510I$ $a = 0.549371 + 0.108937I$ $b = -0.751998 - 0.326051I$	$9.62150 - 2.15278I$	0
$u = -0.370734 + 0.393926I$ $a = -0.429653 - 0.083886I$ $b = -0.494247 + 0.281919I$	$-1.210000 + 0.364522I$	$-7.31156 - 0.42344I$
$u = -0.370734 - 0.393926I$ $a = -0.429653 + 0.083886I$ $b = -0.494247 - 0.281919I$	$-1.210000 - 0.364522I$	$-7.31156 + 0.42344I$
$u = -1.46400$ $a = 0.528721$ $b = -0.689013$	5.43041	0

Solutions to $I_1^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 1.36214 + 0.59920I$ $a = 1.23814 + 0.71467I$ $b = 1.24462 - 0.77204I$	$9.5011 + 12.2560I$	0
$u = 1.36214 - 0.59920I$ $a = 1.23814 - 0.71467I$ $b = 1.24462 + 0.77204I$	$9.5011 - 12.2560I$	0
$u = -1.36570 + 0.59786I$ $a = -1.211510 + 0.722450I$ $b = -1.27196 - 0.77970I$	$8.5561 - 18.5437I$	0
$u = -1.36570 - 0.59786I$ $a = -1.211510 - 0.722450I$ $b = -1.27196 + 0.77970I$	$8.5561 + 18.5437I$	0
$u = 1.35288 + 0.63179I$ $a = 1.30740 + 0.57713I$ $b = 1.176410 - 0.646957I$	$5.19449 + 8.54254I$	0
$u = 1.35288 - 0.63179I$ $a = 1.30740 - 0.57713I$ $b = 1.176410 + 0.646957I$	$5.19449 - 8.54254I$	0
$u = -1.37309 + 0.61522I$ $a = -1.212770 + 0.607975I$ $b = -1.26327 - 0.66728I$	$1.28295 - 12.44340I$	0
$u = -1.37309 - 0.61522I$ $a = -1.212770 - 0.607975I$ $b = -1.26327 + 0.66728I$	$1.28295 + 12.44340I$	0
$u = -1.36625 + 0.67954I$ $a = -1.304500 + 0.449717I$ $b = -1.166820 - 0.541799I$	$1.26955 - 4.49210I$	0
$u = -1.36625 - 0.67954I$ $a = -1.304500 - 0.449717I$ $b = -1.166820 + 0.541799I$	$1.26955 + 4.49210I$	0



Solutions to $I_1^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 1.55952$ $a = -0.369842$ $b = -0.107026$	4.40346	0
$u = -1.53003 + 0.40063I$ $a = 0.239958 - 0.198517I$ $b = 0.672186 - 0.604197I$	$11.05410 - 0.02645I$	0
$u = -1.53003 - 0.40063I$ $a = 0.239958 + 0.198517I$ $b = 0.672186 + 0.604197I$	$11.05410 + 0.02645I$	0
$u = -0.392255 + 0.133279I$ $a = 1.09057 - 2.12779I$ $b = -0.415248 - 0.317817I$	$-0.33314 - 3.44474I$	$-1.95232 + 7.26627I$
$u = -0.392255 - 0.133279I$ $a = 1.09057 + 2.12779I$ $b = -0.415248 + 0.317817I$	$-0.33314 + 3.44474I$	$-1.95232 - 7.26627I$
$u = 1.57828 + 0.43033I$ $a = -0.289281 - 0.232214I$ $b = -0.729025 - 0.506644I$	$9.98593 - 6.02268I$	0
$u = 1.57828 - 0.43033I$ $a = -0.289281 + 0.232214I$ $b = -0.729025 + 0.506644I$	$9.98593 + 6.02268I$	0

**II.**

$$I_2^u = \langle -2.86 \times 10^8 u^{28} - 4.95 \times 10^8 u^{27} + \dots + 1.12 \times 10^8 b + 6.76 \times 10^7, -8.17 \times 10^8 u^{28} - 1.34 \times 10^9 u^{27} + \dots + 1.12 \times 10^8 a + 5.59 \times 10^8, u^{29} + u^{28} + \dots - u + 1 \rangle$$

**(i) Arc colorings**

$$\begin{aligned} a_5 &= \begin{pmatrix} 1 \\ 0 \end{pmatrix} \\ a_{12} &= \begin{pmatrix} 0 \\ u \end{pmatrix} \\ a_6 &= \begin{pmatrix} 1 \\ -u^2 \end{pmatrix} \\ a_9 &= \begin{pmatrix} 7.28533u^{28} + 11.9246u^{27} + \dots + 3.04539u - 4.98598 \\ 2.55331u^{28} + 4.41341u^{27} + \dots + 3.99911u - 0.603396 \end{pmatrix} \\ a_{10} &= \begin{pmatrix} 4.73202u^{28} + 7.51120u^{27} + \dots - 0.953725u - 4.38258 \\ 2.55331u^{28} + 4.41341u^{27} + \dots + 3.99911u - 0.603396 \end{pmatrix} \\ a_7 &= \begin{pmatrix} -2.17231u^{28} - 4.24622u^{27} + \dots - 0.543133u + 11.1661 \\ u^{27} + u^{26} + \dots + 2u^2 + u \end{pmatrix} \\ a_1 &= \begin{pmatrix} u \\ -u^3 + u \end{pmatrix} \\ a_4 &= \begin{pmatrix} 0.603396u^{28} + 2.15671u^{27} + \dots - 1.36969u + 3.39572 \\ -3.77918u^{28} - 10.9579u^{27} + \dots - 5.34944u + 8.73202 \end{pmatrix} \\ a_8 &= \begin{pmatrix} -4.46408u^{28} - 9.63668u^{27} + \dots - 7.21401u + 7.77398 \\ -1.75545u^{28} - 0.547472u^{27} + \dots + 10.0792u - 0.00136247 \end{pmatrix} \\ a_{11} &= \begin{pmatrix} 5.73202u^{28} + 8.51120u^{27} + \dots - 0.953725u - 4.38258 \\ 2.55331u^{28} + 4.41341u^{27} + \dots + 4.99911u - 0.603396 \end{pmatrix} \\ a_3 &= \begin{pmatrix} -1.71156u^{28} - 2.73546u^{27} + \dots - 0.661777u + 6.75592 \\ -1.91908u^{28} - 6.68368u^{27} + \dots - 4.39953u + 8.17871 \end{pmatrix} \\ a_2 &= \begin{pmatrix} -8.68370u^{28} - 14.2212u^{27} + \dots - 0.542786u + 6.59926 \\ 2.44891u^{28} - 0.130150u^{27} + \dots - 11.8599u + 2.56577 \end{pmatrix} \end{aligned}$$

**(ii) Obstruction class = 1**

**(iii) Cusp Shapes** =  $\frac{101871452}{22418005}u^{28} + \frac{257938703}{22418005}u^{27} + \dots + \frac{351259376}{22418005}u - \frac{510075814}{22418005}$

(iv)  $u$ -Polynomials at the component

Crossings	u-Polynomials at each crossing
$c_1$	$u^{29} - 10u^{28} + \dots + 10u - 1$
$c_2$	$u^{29} - 2u^{28} + \dots - 2u + 1$
$c_3$	$u^{29} + 2u^{28} + \dots - 10u^2 + 1$
$c_4$	$u^{29} - 10u^{27} + \dots + 2u + 1$
$c_5$	$u^{29} + u^{28} + \dots - u + 1$
$c_6$	$u^{29} - 5u^{28} + \dots - 3u - 1$
$c_7$	$u^{29} + 2u^{28} + \dots - 2u - 1$
$c_8$	$u^{29} + 10u^{28} + \dots + 10u + 1$
$c_9$	$u^{29} - 10u^{27} + \dots + 2u - 1$
$c_{10}$	$u^{29} + 10u^{28} + \dots - 12u - 1$
$c_{11}$	$u^{29} - 2u^{28} + \dots + 10u^2 - 1$
$c_{12}$	$u^{29} - u^{28} + \dots - u - 1$



(v) Riley Polynomials at the component

Crossings	Riley Polynomials at each crossing
$c_1, c_8$	$y^{29} + 26y^{28} + \cdots - 6y - 1$
$c_2, c_7$	$y^{29} - 10y^{28} + \cdots + 10y - 1$
$c_3, c_{11}$	$y^{29} - 28y^{28} + \cdots + 20y - 1$
$c_4, c_9$	$y^{29} - 20y^{28} + \cdots + 28y - 1$
$c_5, c_{12}$	$y^{29} - 17y^{28} + \cdots + 7y - 1$
$c_6$	$y^{29} - y^{28} + \cdots + 17y - 1$
$c_{10}$	$y^{29} + 2y^{27} + \cdots + 12y - 1$

(vi) Complex Volumes and Cusp Shapes

Solutions to $I_2^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 0.717329 + 0.639076I$		
$a = 0.835365 + 0.632972I$	$-0.49913 - 1.32873I$	$-0.11938 + 3.61914I$
$b = 0.944147 + 0.381573I$		
$u = 0.717329 - 0.639076I$		
$a = 0.835365 - 0.632972I$	$-0.49913 + 1.32873I$	$-0.11938 - 3.61914I$
$b = 0.944147 - 0.381573I$		
$u = 0.971101 + 0.390171I$		
$a = -1.06836 - 1.27741I$	$0.14499 + 5.23557I$	$-2.62383 - 11.25511I$
$b = -0.831437 + 0.726843I$		
$u = 0.971101 - 0.390171I$		
$a = -1.06836 + 1.27741I$	$0.14499 - 5.23557I$	$-2.62383 + 11.25511I$
$b = -0.831437 - 0.726843I$		
$u = 0.219513 + 1.090680I$		
$a = -1.54205 + 0.42138I$	$-2.51265 + 4.70394I$	$-0.95489 - 4.11722I$
$b = -0.972784 + 0.254874I$		
$u = 0.219513 - 1.090680I$		
$a = -1.54205 - 0.42138I$	$-2.51265 - 4.70394I$	$-0.95489 + 4.11722I$
$b = -0.972784 - 0.254874I$		
$u = 1.068400 + 0.338347I$		
$a = -0.669211 - 0.895117I$	$2.25935 + 2.55675I$	$0.21907 - 3.50060I$
$b = -1.03410 + 0.97557I$		
$u = 1.068400 - 0.338347I$		
$a = -0.669211 + 0.895117I$	$2.25935 - 2.55675I$	$0.21907 + 3.50060I$
$b = -1.03410 - 0.97557I$		
$u = 0.787446 + 0.344627I$		
$a = -2.41393 - 1.87520I$	$6.61601 + 7.49632I$	$0.75406 - 11.77555I$
$b = -0.674591 + 0.430681I$		
$u = 0.787446 - 0.344627I$		
$a = -2.41393 + 1.87520I$	$6.61601 - 7.49632I$	$0.75406 + 11.77555I$
$b = -0.674591 - 0.430681I$		

Solutions to $I_2^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -1.110140 + 0.349021I$ $a = 0.724328 - 0.749361I$ $b = 1.16818 + 0.92442I$	$1.89518 - 7.59700I$	$0.23689 + 9.81031I$
$u = -1.110140 - 0.349021I$ $a = 0.724328 + 0.749361I$ $b = 1.16818 - 0.92442I$	$1.89518 + 7.59700I$	$0.23689 - 9.81031I$
$u = -0.741037 + 0.349545I$ $a = 2.75181 - 1.61634I$ $b = 0.698318 + 0.378783I$	$6.79683 - 1.24647I$	$0.17790 + 6.35109I$
$u = -0.741037 - 0.349545I$ $a = 2.75181 + 1.61634I$ $b = 0.698318 - 0.378783I$	$6.79683 + 1.24647I$	$0.17790 - 6.35109I$
$u = -1.077370 + 0.524252I$ $a = 1.179200 - 0.687396I$ $b = 1.075340 + 0.596166I$	$-0.46459 - 3.20098I$	$-3.62932 + 1.91041I$
$u = -1.077370 - 0.524252I$ $a = 1.179200 + 0.687396I$ $b = 1.075340 - 0.596166I$	$-0.46459 + 3.20098I$	$-3.62932 - 1.91041I$
$u = 0.701084 + 0.230911I$ $a = 0.353519 + 0.284777I$ $b = 1.37458 + 0.58598I$	$0.823771 + 0.029925I$	$-2.16055 - 2.77865I$
$u = 0.701084 - 0.230911I$ $a = 0.353519 - 0.284777I$ $b = 1.37458 - 0.58598I$	$0.823771 - 0.029925I$	$-2.16055 + 2.77865I$
$u = -0.709684 + 0.161413I$ $a = -0.259884 + 0.183138I$ $b = -1.58614 + 0.56071I$	$0.08985 + 5.26986I$	$-5.32900 - 1.52833I$
$u = -0.709684 - 0.161413I$ $a = -0.259884 - 0.183138I$ $b = -1.58614 - 0.56071I$	$0.08985 - 5.26986I$	$-5.32900 + 1.52833I$



Solutions to $I_2^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.682387 + 1.121540I$ $a = -1.015240 + 0.547779I$ $b = -0.918132 + 0.262247I$	$-2.34299 - 2.57657I$	$-7.69899 + 0.14437I$
$u = -0.682387 - 1.121540I$ $a = -1.015240 - 0.547779I$ $b = -0.918132 - 0.262247I$	$-2.34299 + 2.57657I$	$-7.69899 - 0.14437I$
$u = -1.399970 + 0.152116I$ $a = 0.361293 + 0.773973I$ $b = -0.529293 + 0.096178I$	$9.65667 - 1.04707I$	$3.49346 - 0.44914I$
$u = -1.399970 - 0.152116I$ $a = 0.361293 - 0.773973I$ $b = -0.529293 - 0.096178I$	$9.65667 + 1.04707I$	$3.49346 + 0.44914I$
$u = -1.41919$ $a = 0.677909$ $b = -0.520773$	$5.72976$	$16.4330$
$u = 1.41200 + 0.20655I$ $a = -0.106841 + 0.820821I$ $b = 0.551900 + 0.121988I$	$9.15952 - 4.90987I$	$1.56419 + 4.39302I$
$u = 1.41200 - 0.20655I$ $a = -0.106841 - 0.820821I$ $b = 0.551900 - 0.121988I$	$9.15952 + 4.90987I$	$1.56419 - 4.39302I$
$u = 0.053312 + 0.478165I$ $a = 1.53105 + 1.74843I$ $b = 0.994390 + 0.198323I$	$0.055929 - 0.701152I$	$-0.646183 + 0.411566I$
$u = 0.053312 - 0.478165I$ $a = 1.53105 - 1.74843I$ $b = 0.994390 - 0.198323I$	$0.055929 + 0.701152I$	$-0.646183 - 0.411566I$

$$\text{III. } \Gamma_3^u = \langle b - u + 1, a, u^2 - u - 1 \rangle$$

(i) Arc colorings

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

$$a_{12} = \begin{pmatrix} 0 \\ u \end{pmatrix}$$

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

$$a_9 = \begin{pmatrix} 0 \\ u - 1 \end{pmatrix}$$

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

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

$$a_1 = \begin{pmatrix} u \\ -u - 1 \end{pmatrix}$$

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

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

$$a_{11} = \begin{pmatrix} -u \\ 2u - 1 \end{pmatrix}$$

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

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

(ii) Obstruction class = 1

(iii) Cusp Shapes = -13

(iv) u-Polynomials at the component

Crossings	u-Polynomials at each crossing
$c_1, c_7$	$(u - 1)^2$
$c_2, c_6, c_8$	$(u + 1)^2$
$c_3, c_5, c_9$	$u^2 - u - 1$
$c_4, c_{10}, c_{11}$ $c_{12}$	$u^2 + u - 1$

(v) Riley Polynomials at the component

Crossings	Riley Polynomials at each crossing
$c_1, c_2, c_6$ $c_7, c_8$	$(y - 1)^2$
$c_3, c_4, c_5$ $c_9, c_{10}, c_{11}$ $c_{12}$	$y^2 - 3y + 1$

(vi) Complex Volumes and Cusp Shapes

Solutions to $I_3^u$	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.618034$ $a = 0$ $b = -1.61803$	-3.94784	-13.0000
$u = 1.61803$ $a = 0$ $b = 0.618034$	3.94784	-13.0000

#### IV. u-Polynomials

Crossings	u-Polynomials at each crossing
$c_1$	$((u-1)^2)(u^{29} - 10u^{28} + \dots + 10u - 1)$ $\cdot (u^{127} + 39u^{126} + \dots + 1944u + 81)$
$c_2$	$((u+1)^2)(u^{29} - 2u^{28} + \dots - 2u + 1)(u^{127} + u^{126} + \dots + 18u - 9)$
$c_3$	$(u^2 - u - 1)(u^{29} + 2u^{28} + \dots - 10u^2 + 1)$ $\cdot (u^{127} - 2u^{126} + \dots - 91249u + 90319)$
$c_4$	$(u^2 + u - 1)(u^{29} - 10u^{27} + \dots + 2u + 1)(u^{127} + 2u^{126} + \dots - 15u - 1)$
$c_5$	$(u^2 - u - 1)(u^{29} + u^{28} + \dots - u + 1)(u^{127} + u^{126} + \dots - 6672u - 1153)$
$c_6$	$((u+1)^2)(u^{29} - 5u^{28} + \dots - 3u - 1)$ $\cdot (u^{127} - 2u^{126} + \dots - 934469u + 281173)$
$c_7$	$((u-1)^2)(u^{29} + 2u^{28} + \dots - 2u - 1)(u^{127} + u^{126} + \dots + 18u - 9)$
$c_8$	$((u+1)^2)(u^{29} + 10u^{28} + \dots + 10u + 1)$ $\cdot (u^{127} + 39u^{126} + \dots + 1944u + 81)$
$c_9$	$(u^2 - u - 1)(u^{29} - 10u^{27} + \dots + 2u - 1)(u^{127} + 2u^{126} + \dots - 15u - 1)$
$c_{10}$	$(u^2 + u - 1)(u^{29} + 10u^{28} + \dots - 12u - 1)$ $\cdot (u^{127} + 6u^{126} + \dots + 1248715953u + 143741087)$
$c_{11}$	$(u^2 + u - 1)(u^{29} - 2u^{28} + \dots + 10u^2 - 1)$ $\cdot (u^{127} - 2u^{126} + \dots - 91249u + 90319)$
$c_{12}$	$(u^2 + u - 1)(u^{29} - u^{28} + \dots - u - 1)(u^{127} + u^{126} + \dots - 6672u - 1153)$

### V. Riley Polynomials

Crossings	Riley Polynomials at each crossing
$c_1, c_8$	$((y-1)^2)(y^{29} + 26y^{28} + \dots - 6y - 1)$ $\cdot (y^{127} + 109y^{126} + \dots + 84564y - 6561)$
$c_2, c_7$	$((y-1)^2)(y^{29} - 10y^{28} + \dots + 10y - 1)$ $\cdot (y^{127} - 39y^{126} + \dots + 1944y - 81)$
$c_3, c_{11}$	$(y^2 - 3y + 1)(y^{29} - 28y^{28} + \dots + 20y - 1)$ $\cdot (y^{127} - 106y^{126} + \dots + 204122256495y - 8157521761)$
$c_4, c_9$	$(y^2 - 3y + 1)(y^{29} - 20y^{28} + \dots + 28y - 1)$ $\cdot (y^{127} - 66y^{126} + \dots + 191y - 1)$
$c_5, c_{12}$	$(y^2 - 3y + 1)(y^{29} - 17y^{28} + \dots + 7y - 1)$ $\cdot (y^{127} - 83y^{126} + \dots + 49166786y - 1329409)$
$c_6$	$((y-1)^2)(y^{29} - y^{28} + \dots + 17y - 1)$ $\cdot (y^{127} + 22y^{126} + \dots - 2134776124149y - 79058255929)$
$c_{10}$	$(y^2 - 3y + 1)(y^{29} + 2y^{27} + \dots + 12y - 1)$ $\cdot (y^{127} - 58y^{126} + \dots + 427269195188756631y - 20661500091941569)$