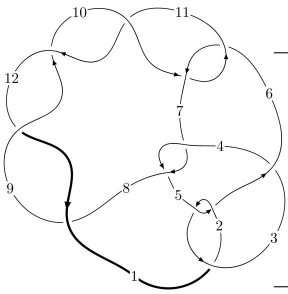
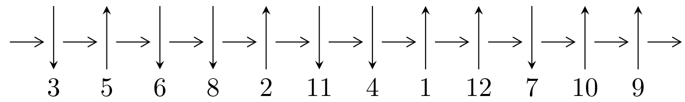
## $12a_{0009}$ $(K12a_{0009})$




A knot diagram[1]

**Linearized knot diagam**




**Solving Sequence**

$4{,}7 \xrightarrow[c_7]{} 8 \xrightarrow[c_4]{} 5{,}11 \xrightarrow[c_6]{} 6 \xrightarrow[c_3]{} 3 \xrightarrow[c_2]{} 2 \xrightarrow[c_1]{} 1 \xrightarrow[c_{10}]{} 10 \xrightarrow[c_{11}]{} 12 \xrightarrow[c_9]{} 9 \twoheadrightarrow c_5, c_8, c_{12}$

**Ideals for irreducible components[2] of $X_{\mathbf{par}}$**

$$\begin{aligned} I_1^u = \langle & 1.86386 \times 10^{139} u^{66} + 4.31229 \times 10^{138} u^{65} + \cdots + 1.98538 \times 10^{140} b + 5.26231 \times 10^{141}, \\ & 1.05918 \times 10^{140} u^{66} - 4.57520 \times 10^{138} u^{65} + \cdots + 7.94151 \times 10^{140} a + 2.63032 \times 10^{142}, \\ & u^{67} + u^{66} + \cdots + 384u + 256 \rangle \end{aligned}$$

$$I_1^v = \langle a,\ 18v^7 - 26v^6 + 12v^5 - 78v^4 + 71v^3 + 30v^2 + 19b + 6v - 2,\ v^8 - 2v^7 + v^6 - 4v^5 + 6v^4 + v^3 - 2v^2 - v + 1 \rangle$$

* 2 irreducible components of $\dim_{\mathbb{C}} = 0$, with total 75 representations.

[1] 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`).

[2] All coefficients of polynomials are rational numbers. But the coefficients are sometimes approximated in decimal forms when there is not enough margin.

**I.** $\boldsymbol{I_1^u = \langle 1.86 \times 10^{139} u^{66} + 4.31 \times 10^{138} u^{65} + \cdots + 1.99 \times 10^{140} b + 5.26 \times 10^{141},\ 1.06 \times 10^{140} u^{66} - 4.58 \times 10^{138} u^{65} + \cdots + 7.94 \times 10^{140} a + 2.63 \times 10^{142},\ u^{67} + u^{66} + \cdots + 384u + 256 \rangle}$

**(i) Arc colorings**

$$a_4 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$

$$a_7 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

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

$$a_5 = \begin{pmatrix} -u \\ -u^3 + u \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} -0.133372u^{66} + 0.00576112u^{65} + \cdots - 11.7330u - 33.1212 \\ -0.0938796u^{66} - 0.0217203u^{65} + \cdots - 6.32205u - 26.5053 \end{pmatrix}$$

$$a_6 = \begin{pmatrix} 0.209669u^{66} + 0.0230614u^{65} + \cdots + 21.6013u + 63.8657 \\ -0.0241755u^{66} + 0.0237769u^{65} + \cdots - 9.20588u - 1.31583 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} -0.142701u^{66} - 0.0190334u^{65} + \cdots - 17.1447u - 45.4624 \\ -0.0396775u^{66} - 0.0112029u^{65} + \cdots - 1.07906u - 14.6917 \end{pmatrix}$$

$$a_2 = \begin{pmatrix} -0.111576u^{66} + 0.000157764u^{65} + \cdots - 14.6284u - 30.1716 \\ -0.0827762u^{66} - 0.0101687u^{65} + \cdots - 6.98086u - 26.9277 \end{pmatrix}$$

$$a_1 = \begin{pmatrix} -0.185494u^{66} - 0.0468383u^{65} + \cdots - 12.3954u - 62.5498 \\ -0.120165u^{66} - 0.00728459u^{65} + \cdots - 14.9632u - 36.8117 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} -0.227252u^{66} - 0.0159592u^{65} + \cdots - 18.0550u - 59.6265 \\ -0.0938796u^{66} - 0.0217203u^{65} + \cdots - 6.32205u - 26.5053 \end{pmatrix}$$

$$a_{12} = \begin{pmatrix} -0.280258u^{66} - 0.0158075u^{65} + \cdots - 25.1937u - 78.0193 \\ -0.194157u^{66} - 0.0107796u^{65} + \cdots - 23.6385u - 52.3816 \end{pmatrix}$$

$$a_9 = \begin{pmatrix} -0.0947524u^{66} - 0.0190567u^{65} + \cdots - 3.59061u - 27.7303 \\ -0.0296424u^{66} - 0.00314345u^{65} + \cdots - 7.50843u - 12.6063 \end{pmatrix}$$

**(ii) Obstruction class** $= -1$

**(iii) Cusp Shapes** $= -0.257514u^{66} + 0.0210201u^{65} + \cdots - 47.1768u - 88.2413$

**(iv) u-Polynomials at the component**

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $u^{67}+35u^{66}+\cdots-6u-1$ |
| $c_2, c_5$ | $u^{67}+5u^{66}+\cdots+4u+1$ |
| $c_3$ | $u^{67}-5u^{66}+\cdots-4396u+833$ |
| $c_4, c_7$ | $u^{67}+u^{66}+\cdots+384u+256$ |
| $c_6, c_{10}$ | $u^{67}+3u^{66}+\cdots+3u^2+1$ |
| $c_8, c_9, c_{11}$ $c_{12}$ | $u^{67}-13u^{66}+\cdots-6u+1$ |

**(v) Riley Polynomials at the component**

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $y^{67} - y^{66} + \cdots + 26y - 1$ |
| $c_2, c_5$ | $y^{67} + 35y^{66} + \cdots - 6y - 1$ |
| $c_3$ | $y^{67} - 37y^{66} + \cdots - 10001782y - 693889$ |
| $c_4, c_7$ | $y^{67} - 45y^{66} + \cdots + 770048y - 65536$ |
| $c_6, c_{10}$ | $y^{67} + 13y^{66} + \cdots - 6y - 1$ |
| $c_8, c_9, c_{11}$ $c_{12}$ | $y^{67} + 85y^{66} + \cdots - 214y - 1$ |

**(vi) Complex Volumes and Cusp Shapes**

| Solutions to $I_1^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.056677 + 1.011830I$<br>$a = 0.252444 + 1.241020I$<br>$b = -0.625082 - 0.683742I$ | $-2.90819 + 1.25830I$ | $-6.22598 - 0.52297I$ |
| $u = 0.056677 - 1.011830I$<br>$a = 0.252444 - 1.241020I$<br>$b = -0.625082 + 0.683742I$ | $-2.90819 - 1.25830I$ | $-6.22598 + 0.52297I$ |
| $u = 0.906722 + 0.307406I$<br>$a = -0.59144 + 2.02468I$<br>$b = -0.162929 - 0.884018I$ | $1.04581 - 2.21513I$ | $3.46945 + 4.65316I$ |
| $u = 0.906722 - 0.307406I$<br>$a = -0.59144 - 2.02468I$<br>$b = -0.162929 + 0.884018I$ | $1.04581 + 2.21513I$ | $3.46945 - 4.65316I$ |
| $u = -0.259205 + 1.013680I$<br>$a = 0.20161 + 1.64344I$<br>$b = -0.585248 - 0.823431I$ | $-2.45553 - 5.81631I$ | $-4.24111 + 7.61398I$ |
| $u = -0.259205 - 1.013680I$<br>$a = 0.20161 - 1.64344I$<br>$b = -0.585248 + 0.823431I$ | $-2.45553 + 5.81631I$ | $-4.24111 - 7.61398I$ |
| $u = -1.05818$<br>$a = -0.130055$<br>$b = -0.564378$ | $-1.77256$ | $-5.82730$ |
| $u = 0.024549 + 1.103900I$<br>$a = 0.011764 + 1.076850I$<br>$b = 0.892018 - 0.929882I$ | $-8.60500 + 3.29350I$ | $0$ |
| $u = 0.024549 - 1.103900I$<br>$a = 0.011764 - 1.076850I$<br>$b = 0.892018 + 0.929882I$ | $-8.60500 - 3.29350I$ | $0$ |
| $u = 0.850621 + 0.246223I$<br>$a = 2.15946 - 0.58175I$<br>$b = 0.531404 + 0.791131I$ | $-0.45674 - 4.58253I$ | $-3.79920 + 9.11658I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.850621 - 0.246223I$<br>$a = 2.15946 + 0.58175I$<br>$b = 0.531404 - 0.791131I$ | $-0.45674 + 4.58253I$ | $-3.79920 - 9.11658I$ |
| $u = -1.117870 + 0.087817I$<br>$a = -0.34576 + 1.97594I$<br>$b = -0.269852 - 0.943591I$ | $-2.13038 + 1.08941I$ | $0$ |
| $u = -1.117870 - 0.087817I$<br>$a = -0.34576 - 1.97594I$<br>$b = -0.269852 + 0.943591I$ | $-2.13038 - 1.08941I$ | $0$ |
| $u = -1.168910 + 0.077988I$<br>$a = -1.115420 - 0.446467I$<br>$b = -0.898793 - 0.925547I$ | $-9.32041 - 0.45884I$ | $0$ |
| $u = -1.168910 - 0.077988I$<br>$a = -1.115420 + 0.446467I$<br>$b = -0.898793 + 0.925547I$ | $-9.32041 + 0.45884I$ | $0$ |
| $u = 1.169990 + 0.122396I$<br>$a = -1.54997 + 0.03674I$<br>$b = -0.893032 - 0.937574I$ | $-9.28166 - 6.15285I$ | $0$ |
| $u = 1.169990 - 0.122396I$<br>$a = -1.54997 - 0.03674I$<br>$b = -0.893032 + 0.937574I$ | $-9.28166 + 6.15285I$ | $0$ |
| $u = -0.801751 + 0.037628I$<br>$a = 1.81454 - 0.67480I$<br>$b = 0.533091 - 0.711518I$ | $-0.726291 - 0.492318I$ | $-6.66330 - 1.23227I$ |
| $u = -0.801751 - 0.037628I$<br>$a = 1.81454 + 0.67480I$<br>$b = 0.533091 + 0.711518I$ | $-0.726291 + 0.492318I$ | $-6.66330 + 1.23227I$ |
| $u = 0.565014 + 0.542577I$<br>$a = -1.22383 + 2.12227I$<br>$b = -0.010154 - 0.774344I$ | $2.09008 - 1.39139I$ | $6.88883 + 3.94894I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.565014 - 0.542577I$<br>$a = -1.22383 - 2.12227I$<br>$b = -0.010154 + 0.774344I$ | $2.09008 + 1.39139I$ | $6.88883 - 3.94894I$ |
| $u = -1.166070 + 0.351089I$<br>$a = -0.46834 - 2.13436I$<br>$b = -0.162727 + 0.958944I$ | $-1.53806 + 6.56529I$ | $0$ |
| $u = -1.166070 - 0.351089I$<br>$a = -0.46834 + 2.13436I$<br>$b = -0.162727 - 0.958944I$ | $-1.53806 - 6.56529I$ | $0$ |
| $u = 0.209708 + 0.728648I$<br>$a = -0.02695 - 1.51557I$<br>$b = -0.495464 + 0.766624I$ | $-0.11293 + 1.90039I$ | $0.16873 - 4.13136I$ |
| $u = 0.209708 - 0.728648I$<br>$a = -0.02695 + 1.51557I$<br>$b = -0.495464 - 0.766624I$ | $-0.11293 - 1.90039I$ | $0.16873 + 4.13136I$ |
| $u = -0.464969 + 0.565453I$<br>$a = -0.299278 - 0.865709I$<br>$b = -0.434046 + 0.466211I$ | $-0.85344 + 1.32721I$ | $-6.30018 - 4.02616I$ |
| $u = -0.464969 - 0.565453I$<br>$a = -0.299278 + 0.865709I$<br>$b = -0.434046 - 0.466211I$ | $-0.85344 - 1.32721I$ | $-6.30018 + 4.02616I$ |
| $u = 1.191720 + 0.459562I$<br>$a = 1.14460 - 1.50739I$<br>$b = 0.580446 + 0.918238I$ | $-3.08979 - 6.51525I$ | $0$ |
| $u = 1.191720 - 0.459562I$<br>$a = 1.14460 + 1.50739I$<br>$b = 0.580446 - 0.918238I$ | $-3.08979 + 6.51525I$ | $0$ |
| $u = -1.240190 + 0.334781I$<br>$a = 0.053213 + 0.132726I$<br>$b = 0.717680 + 0.579006I$ | $-4.20067 + 1.70229I$ | $0$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -1.240190 - 0.334781I$<br>$a = 0.053213 - 0.132726I$<br>$b = 0.717680 - 0.579006I$ | $-4.20067 - 1.70229I$ | $0$ |
| $u = -0.601061 + 0.371818I$<br>$a = 0.128143 + 0.972761I$<br>$b = 0.851577 - 0.886506I$ | $-7.28010 + 1.81664I$ | $-8.55201 - 4.80888I$ |
| $u = -0.601061 - 0.371818I$<br>$a = 0.128143 - 0.972761I$<br>$b = 0.851577 + 0.886506I$ | $-7.28010 - 1.81664I$ | $-8.55201 + 4.80888I$ |
| $u = 1.281160 + 0.200682I$<br>$a = 0.0251805 + 0.1116100I$<br>$b = -0.659788 - 0.071314I$ | $-4.97897 - 4.12056I$ | $0$ |
| $u = 1.281160 - 0.200682I$<br>$a = 0.0251805 - 0.1116100I$<br>$b = -0.659788 + 0.071314I$ | $-4.97897 + 4.12056I$ | $0$ |
| $u = -1.280000 + 0.267333I$<br>$a = 0.84169 + 1.26843I$<br>$b = 0.647196 - 0.914761I$ | $-7.47404 + 3.11915I$ | $0$ |
| $u = -1.280000 - 0.267333I$<br>$a = 0.84169 - 1.26843I$<br>$b = 0.647196 + 0.914761I$ | $-7.47404 - 3.11915I$ | $0$ |
| $u = 0.565494 + 0.375805I$<br>$a = 0.148591 + 1.093030I$<br>$b = 0.839438 - 0.928418I$ | $-7.15245 + 4.47005I$ | $-7.71055 + 0.32064I$ |
| $u = 0.565494 - 0.375805I$<br>$a = 0.148591 - 1.093030I$<br>$b = 0.839438 + 0.928418I$ | $-7.15245 - 4.47005I$ | $-7.71055 - 0.32064I$ |
| $u = -0.394937 + 0.543945I$<br>$a = -2.11231 - 2.23101I$<br>$b = 0.104773 + 0.712271I$ | $0.99271 - 2.93977I$ | $4.97131 + 1.61882I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-0.394937-0.543945I$ <br> $a=-2.11231+2.23101I$ <br> $b=\ 0.104773-0.712271I$ | $0.99271+2.93977I$ | $4.97131-1.61882I$ |
| $u=\ 0.183363+1.320840I$ <br> $a=-0.033195-1.055920I$ <br> $b=\ 0.911335+0.923319I$ | $-11.93250+0.86287I$ | $0$ |
| $u=\ 0.183363-1.320840I$ <br> $a=-0.033195+1.055920I$ <br> $b=\ 0.911335-0.923319I$ | $-11.93250-0.86287I$ | $0$ |
| $u=-0.222777+1.317480I$ <br> $a=-0.010363-1.118770I$ <br> $b=\ 0.898644+0.948171I$ | $-11.85170-7.53264I$ | $0$ |
| $u=-0.222777-1.317480I$ <br> $a=-0.010363+1.118770I$ <br> $b=\ 0.898644-0.948171I$ | $-11.85170+7.53264I$ | $0$ |
| $u=\ 0.508545+0.407974I$ <br> $a=-0.23707-1.67495I$ <br> $b=-0.386976+0.820574I$ | $0.19428+1.92540I$ | $-0.71393-3.09643I$ |
| $u=\ 0.508545-0.407974I$ <br> $a=-0.23707+1.67495I$ <br> $b=-0.386976-0.820574I$ | $0.19428-1.92540I$ | $-0.71393+3.09643I$ |
| $u=\ 1.375410+0.137221I$ <br> $a=\ 0.136625+0.141678I$ <br> $b=\ 0.765167-0.641306I$ | $-8.37009+2.07396I$ | $0$ |
| $u=\ 1.375410-0.137221I$ <br> $a=\ 0.136625-0.141678I$ <br> $b=\ 0.765167+0.641306I$ | $-8.37009-2.07396I$ | $0$ |
| $u=-1.297480+0.545966I$ <br> $a=\ 0.99218+1.66578I$ <br> $b=\ 0.578591-0.954312I$ | $-5.83001+11.50930I$ | $0$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -1.297480 - 0.545966I$<br>$a = 0.99218 - 1.66578I$<br>$b = 0.578591 + 0.954312I$ | $-5.83001 - 11.50930I$ | $0$ |
| $u = 1.36159 + 0.46010I$<br>$a = -0.1117340 - 0.0569109I$<br>$b = 0.759058 - 0.543606I$ | $-7.18404 - 6.58171I$ | $0$ |
| $u = 1.36159 - 0.46010I$<br>$a = -0.1117340 + 0.0569109I$<br>$b = 0.759058 + 0.543606I$ | $-7.18404 + 6.58171I$ | $0$ |
| $u = -0.226790 + 0.512847I$<br>$a = -1.193550 + 0.040521I$<br>$b = 0.239619 + 0.182955I$ | $-0.33336 + 1.65382I$ | $-2.71310 - 4.65579I$ |
| $u = -0.226790 - 0.512847I$<br>$a = -1.193550 - 0.040521I$<br>$b = 0.239619 - 0.182955I$ | $-0.33336 - 1.65382I$ | $-2.71310 + 4.65579I$ |
| $u = 1.38489 + 0.55760I$<br>$a = -1.17727 + 1.10112I$<br>$b = -0.891489 - 0.970679I$ | $-12.8397 - 9.2457I$ | $0$ |
| $u = 1.38489 - 0.55760I$<br>$a = -1.17727 - 1.10112I$<br>$b = -0.891489 + 0.970679I$ | $-12.8397 + 9.2457I$ | $0$ |
| $u = -1.39960 + 0.53092I$<br>$a = -0.017508 - 0.147534I$<br>$b = -0.927330 - 0.902590I$ | $-13.06210 + 2.54998I$ | $0$ |
| $u = -1.39960 - 0.53092I$<br>$a = -0.017508 + 0.147534I$<br>$b = -0.927330 + 0.902590I$ | $-13.06210 - 2.54998I$ | $0$ |
| $u = -1.42700 + 0.68349I$<br>$a = -1.05188 - 1.26038I$<br>$b = -0.889746 + 0.979952I$ | $-15.7150 + 14.6442I$ | $0$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -1.42700 - 0.68349I$<br>$a = -1.05188 + 1.26038I$<br>$b = -0.889746 - 0.979952I$ | $-15.7150 - 14.6442I$ | 0 |
| $u = 1.44635 + 0.66308I$<br>$a = 0.138752 + 0.035309I$<br>$b = -0.935151 + 0.894911I$ | $-15.9934 - 7.9304I$ | 0 |
| $u = 1.44635 - 0.66308I$<br>$a = 0.138752 - 0.035309I$<br>$b = -0.935151 - 0.894911I$ | $-15.9934 + 7.9304I$ | 0 |
| $u = -1.55039 + 0.42301I$<br>$a = -0.949405 - 0.872633I$<br>$b = -0.906199 + 0.967999I$ | $-17.8393 + 5.4177I$ | 0 |
| $u = -1.55039 - 0.42301I$<br>$a = -0.949405 + 0.872633I$<br>$b = -0.906199 - 0.967999I$ | $-17.8393 - 5.4177I$ | 0 |
| $u = 1.56628 + 0.38972I$<br>$a = -0.218508 - 0.080153I$<br>$b = -0.933842 + 0.917694I$ | $-18.0048 + 1.3484I$ | 0 |
| $u = 1.56628 - 0.38972I$<br>$a = -0.218508 + 0.080153I$<br>$b = -0.933842 - 0.917694I$ | $-18.0048 - 1.3484I$ | 0 |

**II.**

$$\boldsymbol{I_1^v = \langle a,\ 18v^7-26v^6+\cdots+19b-2,\ v^8-2v^7+v^6-4v^5+6v^4+v^3-2v^2-v+1\rangle}$$

**(i) Arc colorings**

$$a_4 = \begin{pmatrix} v \\ 0 \end{pmatrix}$$

$$a_7 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

$$a_8 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

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

$$a_{11} = \begin{pmatrix} 0 \\ -0.947368v^7 + 1.36842v^6 + \cdots - 0.315789v + 0.105263 \end{pmatrix}$$

$$a_6 = \begin{pmatrix} 1 \\ -1.26316v^7 + 2.15789v^6 + \cdots - 0.421053v + 1.47368 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} 0.368421v^7 - 0.421053v^6 + \cdots + 0.789474v - 1.26316 \\ 0.263158v^7 - 0.157895v^6 + \cdots + 2.42105v - 0.473684 \end{pmatrix}$$

$$a_2 = \begin{pmatrix} 0.0526316v^7 + 0.368421v^6 + \cdots + 0.684211v - 0.894737 \\ 0.263158v^7 - 0.157895v^6 + \cdots + 2.42105v - 0.473684 \end{pmatrix}$$

$$a_1 = \begin{pmatrix} -1 \\ 1.26316v^7 - 2.15789v^6 + \cdots + 0.421053v - 1.47368 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} -0.947368v^7 + 1.36842v^6 + \cdots - 0.315789v + 0.105263 \\ -0.947368v^7 + 1.36842v^6 + \cdots - 0.315789v + 0.105263 \end{pmatrix}$$

$$a_{12} = \begin{pmatrix} -0.789474v^7 + 1.47368v^6 + \cdots - 0.263158v + 2.42105 \\ -1.73684v^7 + 2.84211v^6 + \cdots - 0.578947v + 2.52632 \end{pmatrix}$$

$$a_9 = \begin{pmatrix} 1.26316v^7 - 2.15789v^6 + \cdots + 0.421053v - 0.473684 \\ 0.473684v^7 - 0.684211v^6 + \cdots + 0.157895v + 1.94737 \end{pmatrix}$$

**(ii) Obstruction class** $= 1$

**(iii) Cusp Shapes** $= -\frac{23}{19}v^7 - \frac{9}{19}v^6 + \frac{67}{19}v^5 + \frac{49}{19}v^4 + \frac{94}{19}v^3 - \frac{298}{19}v^2 + \frac{43}{19}v + \frac{11}{19}$

**(iv) u-Polynomials at the component**

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1, c_3, c_5$ | $(u^2 - u + 1)^4$ |
| $c_2$ | $(u^2 + u + 1)^4$ |
| $c_4, c_7$ | $u^8$ |
| $c_6$ | $(u^4 + u^3 + u^2 + 1)^2$ |
| $c_8, c_9$ | $(u^4 + u^3 + 3u^2 + 2u + 1)^2$ |
| $c_{10}$ | $(u^4 - u^3 + u^2 + 1)^2$ |
| $c_{11}, c_{12}$ | $(u^4 - u^3 + 3u^2 - 2u + 1)^2$ |

**(v) Riley Polynomials at the component**

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_2, c_3$<br>$c_5$ | $(y^2 + y + 1)^4$ |
| $c_4, c_7$ | $y^8$ |
| $c_6, c_{10}$ | $(y^4 + y^3 + 3y^2 + 2y + 1)^2$ |
| $c_8, c_9, c_{11}$<br>$c_{12}$ | $(y^4 + 5y^3 + 7y^2 + 2y + 1)^2$ |

**(vi) Complex Volumes and Cusp Shapes**

| Solutions to $I_1^v$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $v = 0.576953 + 0.283088I$<br>$a = 0$<br>$b = -0.851808 - 0.911292I$ | $-6.79074 - 1.13408I$ | $-2.09237 - 2.48762I$ |
| $v = 0.576953 - 0.283088I$<br>$a = 0$<br>$b = -0.851808 + 0.911292I$ | $-6.79074 + 1.13408I$ | $-2.09237 + 2.48762I$ |
| $v = -0.533637 + 0.358112I$<br>$a = 0$<br>$b = -0.851808 - 0.911292I$ | $-6.79074 - 5.19385I$ | $-2.75261 + 7.88731I$ |
| $v = -0.533637 - 0.358112I$<br>$a = 0$<br>$b = -0.851808 + 0.911292I$ | $-6.79074 + 5.19385I$ | $-2.75261 - 7.88731I$ |
| $v = 1.54112 + 0.21492I$<br>$a = 0$<br>$b = 0.351808 - 0.720342I$ | $0.211005 - 0.614778I$ | $2.55284 - 0.89520I$ |
| $v = 1.54112 - 0.21492I$<br>$a = 0$<br>$b = 0.351808 + 0.720342I$ | $0.211005 + 0.614778I$ | $2.55284 + 0.89520I$ |
| $v = -0.58443 + 1.44211I$<br>$a = 0$<br>$b = 0.351808 + 0.720342I$ | $0.21101 - 3.44499I$ | $-2.20786 + 6.97475I$ |
| $v = -0.58443 - 1.44211I$<br>$a = 0$<br>$b = 0.351808 - 0.720342I$ | $0.21101 + 3.44499I$ | $-2.20786 - 6.97475I$ |

**III. u-Polynomials**

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $((u^2-u+1)^4)(u^{67}+35u^{66}+\cdots-6u-1)$ |
| $c_2$ | $((u^2+u+1)^4)(u^{67}+5u^{66}+\cdots+4u+1)$ |
| $c_3$ | $((u^2-u+1)^4)(u^{67}-5u^{66}+\cdots-4396u+833)$ |
| $c_4, c_7$ | $u^8(u^{67}+u^{66}+\cdots+384u+256)$ |
| $c_5$ | $((u^2-u+1)^4)(u^{67}+5u^{66}+\cdots+4u+1)$ |
| $c_6$ | $((u^4+u^3+u^2+1)^2)(u^{67}+3u^{66}+\cdots+3u^2+1)$ |
| $c_8, c_9$ | $((u^4+u^3+3u^2+2u+1)^2)(u^{67}-13u^{66}+\cdots-6u+1)$ |
| $c_{10}$ | $((u^4-u^3+u^2+1)^2)(u^{67}+3u^{66}+\cdots+3u^2+1)$ |
| $c_{11}, c_{12}$ | $((u^4-u^3+3u^2-2u+1)^2)(u^{67}-13u^{66}+\cdots-6u+1)$ |

## IV. Riley Polynomials

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $((y^2+y+1)^4)(y^{67}-y^{66}+\cdots+26y-1)$ |
| $c_2, c_5$ | $((y^2+y+1)^4)(y^{67}+35y^{66}+\cdots-6y-1)$ |
| $c_3$ | $((y^2+y+1)^4)(y^{67}-37y^{66}+\cdots-1.00018\times10^7y-693889)$ |
| $c_4, c_7$ | $y^8(y^{67}-45y^{66}+\cdots+770048y-65536)$ |
| $c_6, c_{10}$ | $((y^4+y^3+3y^2+2y+1)^2)(y^{67}+13y^{66}+\cdots-6y-1)$ |
| $c_8, c_9, c_{11}$ $c_{12}$ | $((y^4+5y^3+7y^2+2y+1)^2)(y^{67}+85y^{66}+\cdots-214y-1)$ |