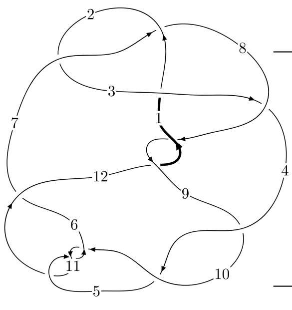
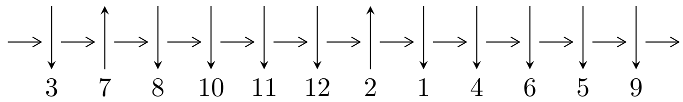
# $12a_{0539}$ ($K12a_{0539}$)




A knot diagram[1]

**Linearized knot diagam**




**Solving Sequence**

$2,8 \underset{c_7}{\rightarrow} 7 \underset{c_2}{\rightarrow} 3 \underset{c_3}{\rightarrow} 4 \underset{c_1}{\rightarrow} 1 \underset{c_8}{\rightarrow} 9 \underset{c_9}{\rightarrow} 10 \underset{c_4}{\rightarrow} 5 \underset{c_{12}}{\rightarrow} 12 \underset{c_6}{\rightarrow} 6 \underset{c_{11}}{\rightarrow} 11 \triangleright c_5, c_{10}$

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

$$I_1^u = \langle u^{72} - u^{71} + \cdots + 2u - 1 \rangle$$

* 1 irreducible components of $\dim_{\mathbb{C}} = 0$, with total 72 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. $I_1^u = \langle u^{72} - u^{71} + \cdots + 2u - 1 \rangle$

**(i) Arc colorings**

$$a_2 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_8 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} 1 \\ u^2 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} u \\ u^3 + u \end{pmatrix}$$
$$a_4 = \begin{pmatrix} -u^3 \\ u^3 + u \end{pmatrix}$$
$$a_1 = \begin{pmatrix} u^3 \\ u^5 + u^3 + u \end{pmatrix}$$
$$a_9 = \begin{pmatrix} u^8 + u^6 + u^4 + 1 \\ u^{10} + 2u^8 + 3u^6 + 2u^4 + u^2 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} -u^{16} - 3u^{14} - 5u^{12} - 4u^{10} - u^8 + 1 \\ u^{16} + 4u^{14} + 8u^{12} + 10u^{10} + 8u^8 + 6u^6 + 4u^4 + 2u^2 \end{pmatrix}$$
$$a_5 = \begin{pmatrix} u^{29} + 6u^{27} + \cdots - 2u^3 - u \\ -u^{29} - 7u^{27} + \cdots - u^3 + u \end{pmatrix}$$
$$a_{12} = \begin{pmatrix} u^{13} + 2u^{11} + 3u^9 + 2u^7 + 2u^5 + 2u^3 + u \\ u^{15} + 3u^{13} + 6u^{11} + 7u^9 + 6u^7 + 4u^5 + 2u^3 + u \end{pmatrix}$$
$$a_6 = \begin{pmatrix} -u^{26} - 5u^{24} + \cdots - u^2 + 1 \\ -u^{28} - 6u^{26} + \cdots - 8u^6 - 3u^4 \end{pmatrix}$$
$$a_{11} = \begin{pmatrix} -u^{70} - 15u^{68} + \cdots - 2u^2 + 1 \\ -u^{71} + u^{70} + \cdots + 2u - 1 \end{pmatrix}$$

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

**(iii) Cusp Shapes** $= 4u^{70} - 4u^{69} + \cdots + 4u^3 - 14$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $u^{72} + 33u^{71} + \cdots - 4u + 1$ |
| $c_2, c_7$ | $u^{72} + u^{71} + \cdots - 2u - 1$ |
| $c_3$ | $u^{72} - u^{71} + \cdots - 16u - 5$ |
| $c_4, c_6, c_9$ | $u^{72} + u^{71} + \cdots - 134u - 17$ |
| $c_5, c_{10}, c_{11}$ | $u^{72} - u^{71} + \cdots - 2u - 1$ |
| $c_8, c_{12}$ | $u^{72} + 5u^{71} + \cdots - 200u - 112$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $y^{72} + 13y^{71} + \cdots - 44y + 1$ |
| $c_2, c_7$ | $y^{72} + 33y^{71} + \cdots - 4y + 1$ |
| $c_3$ | $y^{72} - 7y^{71} + \cdots - 2136y + 25$ |
| $c_4, c_6, c_9$ | $y^{72} - 67y^{71} + \cdots - 1296y + 289$ |
| $c_5, c_{10}, c_{11}$ | $y^{72} + 57y^{71} + \cdots - 4y + 1$ |
| $c_8, c_{12}$ | $y^{72} + 45y^{71} + \cdots + 601312y + 12544$ |

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

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = \phantom{-}0.172419 + 0.991426I$ | $-1.44608 - 0.98958I$ | $-12.61715 + 4.90173I$ |
| $u = \phantom{-}0.172419 - 0.991426I$ | $-1.44608 + 0.98958I$ | $-12.61715 - 4.90173I$ |
| $u = -0.318135 + 0.909490I$ | $-0.68624 - 1.38252I$ | $-7.50677 + 4.40904I$ |
| $u = -0.318135 - 0.909490I$ | $-0.68624 + 1.38252I$ | $-7.50677 - 4.40904I$ |
| $u = -0.092850 + 1.035860I$ | $3.48317 + 2.96658I$ | $-8.00000 + 0.I$ |
| $u = -0.092850 - 1.035860I$ | $3.48317 - 2.96658I$ | $-8.00000 + 0.I$ |
| $u = \phantom{-}0.451317 + 0.795658I$ | $4.06665 + 1.95432I$ | $-1.34897 - 3.98186I$ |
| $u = \phantom{-}0.451317 - 0.795658I$ | $4.06665 - 1.95432I$ | $-1.34897 + 3.98186I$ |
| $u = -0.334405 + 1.034030I$ | $-0.352842 - 0.754332I$ | 0 |
| $u = -0.334405 - 1.034030I$ | $-0.352842 + 0.754332I$ | 0 |
| $u = -0.711256 + 0.568219I$ | $2.51457 - 7.38557I$ | $-3.77605 + 5.97833I$ |
| $u = -0.711256 - 0.568219I$ | $2.51457 + 7.38557I$ | $-3.77605 - 5.97833I$ |
| $u = \phantom{-}0.695101 + 0.570467I$ | $-1.80575 + 3.08765I$ | $-8.13416 - 3.50896I$ |
| $u = \phantom{-}0.695101 - 0.570467I$ | $-1.80575 - 3.08765I$ | $-8.13416 + 3.50896I$ |
| $u = \phantom{-}0.734062 + 0.501946I$ | $8.75219 + 2.02527I$ | $0.78996 - 3.11041I$ |
| $u = \phantom{-}0.734062 - 0.501946I$ | $8.75219 - 2.02527I$ | $0.78996 + 3.11041I$ |
| $u = \phantom{-}0.423779 + 1.030820I$ | $-3.02780 + 3.22598I$ | 0 |
| $u = \phantom{-}0.423779 - 1.030820I$ | $-3.02780 - 3.22598I$ | 0 |
| $u = \phantom{-}0.188200 + 1.102820I$ | $-3.98290 + 1.23875I$ | 0 |
| $u = \phantom{-}0.188200 - 1.102820I$ | $-3.98290 - 1.23875I$ | 0 |
| $u = -0.668416 + 0.572385I$ | $1.69424 + 1.19477I$ | $-4.64927 - 0.12638I$ |
| $u = -0.668416 - 0.572385I$ | $1.69424 - 1.19477I$ | $-4.64927 + 0.12638I$ |
| $u = -0.757496 + 0.446047I$ | $8.45065 + 4.71910I$ | $0.04795 - 3.89451I$ |
| $u = -0.757496 - 0.446047I$ | $8.45065 - 4.71910I$ | $0.04795 + 3.89451I$ |
| $u = -0.173483 + 1.108280I$ | $-7.57950 + 3.24708I$ | 0 |
| $u = -0.173483 - 1.108280I$ | $-7.57950 - 3.24708I$ | 0 |
| $u = \phantom{-}0.161280 + 1.111690I$ | $-3.31379 - 7.69294I$ | 0 |
| $u = \phantom{-}0.161280 - 1.111690I$ | $-3.31379 + 7.69294I$ | 0 |
| $u = \phantom{-}0.777942 + 0.396034I$ | $1.59745 - 10.02910I$ | $-4.83717 + 5.89276I$ |
| $u = \phantom{-}0.777942 - 0.396034I$ | $1.59745 + 10.02910I$ | $-4.83717 - 5.89276I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.564081 + 0.980678I$ | $0.48282 - 5.98689I$ | 0 |
| $u = -0.564081 - 0.980678I$ | $0.48282 + 5.98689I$ | 0 |
| $u = -0.770444 + 0.389664I$ | $-2.75389 + 5.60782I$ | $-9.09073 - 3.48263I$ |
| $u = -0.770444 - 0.389664I$ | $-2.75389 - 5.60782I$ | $-9.09073 + 3.48263I$ |
| $u = -0.702506 + 0.478205I$ | $3.31998 - 0.34736I$ | $-3.96101 + 3.81426I$ |
| $u = -0.702506 - 0.478205I$ | $3.31998 + 0.34736I$ | $-3.96101 - 3.81426I$ |
| $u = 0.758581 + 0.382713I$ | $0.727256 - 1.140350I$ | $-5.89808 + 0.03834I$ |
| $u = 0.758581 - 0.382713I$ | $0.727256 + 1.140350I$ | $-5.89808 - 0.03834I$ |
| $u = 0.726636 + 0.438210I$ | $3.10145 - 2.70836I$ | $-5.06584 + 4.86724I$ |
| $u = 0.726636 - 0.438210I$ | $3.10145 + 2.70836I$ | $-5.06584 - 4.86724I$ |
| $u = 0.589755 + 0.997182I$ | $-3.06999 + 1.86350I$ | 0 |
| $u = 0.589755 - 0.997182I$ | $-3.06999 - 1.86350I$ | 0 |
| $u = -0.499108 + 1.047760I$ | $0.74579 - 5.90124I$ | 0 |
| $u = -0.499108 - 1.047760I$ | $0.74579 + 5.90124I$ | 0 |
| $u = -0.602770 + 1.004150I$ | $1.22167 + 2.34739I$ | 0 |
| $u = -0.602770 - 1.004150I$ | $1.22167 - 2.34739I$ | 0 |
| $u = 0.412148 + 1.119210I$ | $-6.27521 - 0.70052I$ | 0 |
| $u = 0.412148 - 1.119210I$ | $-6.27521 + 0.70052I$ | 0 |
| $u = -0.422158 + 1.120470I$ | $-10.15880 - 3.84096I$ | 0 |
| $u = -0.422158 - 1.120470I$ | $-10.15880 + 3.84096I$ | 0 |
| $u = 0.431683 + 1.120450I$ | $-6.14371 + 8.37408I$ | 0 |
| $u = 0.431683 - 1.120450I$ | $-6.14371 - 8.37408I$ | 0 |
| $u = -0.581035 + 1.059340I$ | $1.60163 - 4.59387I$ | 0 |
| $u = -0.581035 - 1.059340I$ | $1.60163 + 4.59387I$ | 0 |
| $u = 0.602211 + 1.052310I$ | $7.11960 + 3.07095I$ | 0 |
| $u = 0.602211 - 1.052310I$ | $7.11960 - 3.07095I$ | 0 |
| $u = 0.585230 + 1.080920I$ | $1.20694 + 7.72305I$ | 0 |
| $u = 0.585230 - 1.080920I$ | $1.20694 - 7.72305I$ | 0 |
| $u = -0.599587 + 1.085080I$ | $6.55743 - 9.86310I$ | 0 |
| $u = -0.599587 - 1.085080I$ | $6.55743 + 9.86310I$ | 0 |

| Solutions to $I_1^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = \quad 0.582885 + 1.108830I$ | $-1.41051 + 6.21578I$ | 0 |
| $u = \quad 0.582885 - 1.108830I$ | $-1.41051 - 6.21578I$ | 0 |
| $u = -0.588616 + 1.110260I$ | $-4.88283 - 10.73590I$ | 0 |
| $u = -0.588616 - 1.110260I$ | $-4.88283 + 10.73590I$ | 0 |
| $u = \quad 0.593040 + 1.110450I$ | $-0.5179 + 15.1939I$ | 0 |
| $u = \quad 0.593040 - 1.110450I$ | $-0.5179 - 15.1939I$ | 0 |
| $u = \quad 0.647464 + 0.025154I$ | $-3.10856 - 4.45932I$ | $-8.81823 + 3.38292I$ |
| $u = \quad 0.647464 - 0.025154I$ | $-3.10856 + 4.45932I$ | $-8.81823 - 3.38292I$ |
| $u = -0.647786$ | $-7.05606$ | $-12.6660$ |
| $u = -0.511650 + 0.239012I$ | $2.81969 + 1.84387I$ | $-4.86066 - 3.97880I$ |
| $u = -0.511650 - 0.239012I$ | $2.81969 - 1.84387I$ | $-4.86066 + 3.97880I$ |
| $u = \quad 0.376318$ | $-0.707375$ | $-13.9230$ |

**II. u-Polynomials**

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $u^{72}+33u^{71}+\cdots-4u+1$ |
| $c_2, c_7$ | $u^{72}+u^{71}+\cdots-2u-1$ |
| $c_3$ | $u^{72}-u^{71}+\cdots-16u-5$ |
| $c_4, c_6, c_9$ | $u^{72}+u^{71}+\cdots-134u-17$ |
| $c_5, c_{10}, c_{11}$ | $u^{72}-u^{71}+\cdots-2u-1$ |
| $c_8, c_{12}$ | $u^{72}+5u^{71}+\cdots-200u-112$ |

### III. Riley Polynomials

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1$ | $y^{72} + 13y^{71} + \cdots - 44y + 1$ |
| $c_2, c_7$ | $y^{72} + 33y^{71} + \cdots - 4y + 1$ |
| $c_3$ | $y^{72} - 7y^{71} + \cdots - 2136y + 25$ |
| $c_4, c_6, c_9$ | $y^{72} - 67y^{71} + \cdots - 1296y + 289$ |
| $c_5, c_{10}, c_{11}$ | $y^{72} + 57y^{71} + \cdots - 4y + 1$ |
| $c_8, c_{12}$ | $y^{72} + 45y^{71} + \cdots + 601312y + 12544$ |