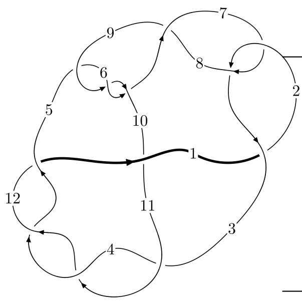
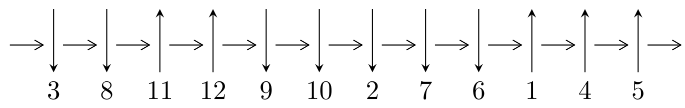
$12a_{0789}$ $(K12a_{0789})$



A knot diagram[1]

Linearized knot diagam



Solving Sequence

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

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

$$I_1^u = \langle -u^{55} + 32u^{53} + \cdots + b + 1,\ u^{55} + u^{54} + \cdots + a - 3,\ u^{56} - 2u^{55} + \cdots + 4u + 1\rangle$$
$$I_2^u = \langle b,\ a - u - 1,\ u^2 + u - 1\rangle$$

* 2 irreducible components of $\dim_{\mathbb{C}} = 0$, with total 58 representations.

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[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.

$\boldsymbol{I_1^u = \langle -u^{55}+32u^{53}+\cdots+b+1,\ u^{55}+u^{54}+\cdots+a-3,\ u^{56}-2u^{55}+\cdots+4u+1\rangle}$

(i) Arc colorings

$$a_3 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} 0 \\ u \end{pmatrix}$$

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

$$a_{12} = \begin{pmatrix} u \\ -u^3+u \end{pmatrix}$$

$$a_5 = \begin{pmatrix} -u^2+1 \\ u^4-2u^2 \end{pmatrix}$$

$$a_8 = \begin{pmatrix} -u^{55}-u^{54}+\cdots+3u+3 \\ u^{55}-32u^{53}+\cdots-6u-1 \end{pmatrix}$$

$$a_2 = \begin{pmatrix} -u^5+2u^3+u \\ u^5-3u^3+u \end{pmatrix}$$

$$a_1 = \begin{pmatrix} -u^3+2u \\ u^5-3u^3+u \end{pmatrix}$$

$$a_7 = \begin{pmatrix} u^{55}-u^{54}+\cdots-2u+2 \\ -u^{55}+32u^{53}+\cdots+3u+1 \end{pmatrix}$$

$$a_9 = \begin{pmatrix} -u^{55}-u^{54}+\cdots+5u+3 \\ u^{55}-32u^{53}+\cdots-6u-1 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} -u^7+4u^5-4u^3 \\ u^9-5u^7+7u^5-2u^3+u \end{pmatrix}$$

$$a_6 = \begin{pmatrix} -u^{54}+u^{53}+\cdots+2u+3 \\ -u^{29}+17u^{27}+\cdots-2u^2-u \end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes $= 4u^{55}-u^{54}+\cdots+5u-11$

(iv) u-Polynomials at the component

Crossings	u-Polynomials at each crossing
c_1, c_8	$u^{56} + 15u^{55} + \cdots + 216u + 16$
c_2, c_7	$u^{56} + u^{55} + \cdots - 4u - 4$
c_3, c_4, c_{11} c_{12}	$u^{56} - 2u^{55} + \cdots + 4u + 1$
c_5, c_6, c_9	$u^{56} - 3u^{55} + \cdots - u - 1$
c_{10}	$u^{56} + 18u^{55} + \cdots + 6542u + 1153$

(v) Riley Polynomials at the component

Crossings	Riley Polynomials at each crossing
c_1, c_8	$y^{56} + 49y^{55} + \cdots - 800y + 256$
c_2, c_7	$y^{56} - 15y^{55} + \cdots - 216y + 16$
c_3, c_4, c_{11} c_{12}	$y^{56} - 66y^{55} + \cdots - 16y + 1$
c_5, c_6, c_9	$y^{56} - 45y^{55} + \cdots + 29y + 1$
c_{10}	$y^{56} - 30y^{55} + \cdots - 62348032y + 1329409$

(vi) Complex Volumes and Cusp Shapes

Solutions to I_1^u	$\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 0.861614 + 0.380828I$ $a = 1.202800 + 0.472116I$ $b = -0.915762 - 0.737386I$	$2.07733 - 3.75955I$	$0. + 2.06314I$
$u = 0.861614 - 0.380828I$ $a = 1.202800 - 0.472116I$ $b = -0.915762 + 0.737386I$	$2.07733 + 3.75955I$	$0. - 2.06314I$
$u = -0.776749 + 0.490571I$ $a = -0.50179 + 2.16195I$ $b = -1.024790 - 0.785571I$	$1.24745 - 10.95200I$	$-0.88355 + 9.10486I$
$u = -0.776749 - 0.490571I$ $a = -0.50179 - 2.16195I$ $b = -1.024790 + 0.785571I$	$1.24745 + 10.95200I$	$-0.88355 - 9.10486I$
$u = 0.917254$ $a = -0.937794$ $b = 0.865247$	-2.32133	-4.40840
$u = 0.813380 + 0.406723I$ $a = -1.172270 - 0.567248I$ $b = 0.827652 + 0.819827I$	$6.04894 + 0.47222I$	$4.63325 - 1.43874I$
$u = 0.813380 - 0.406723I$ $a = -1.172270 + 0.567248I$ $b = 0.827652 - 0.819827I$	$6.04894 - 0.47222I$	$4.63325 + 1.43874I$
$u = -0.782454 + 0.456203I$ $a = 0.58253 - 2.23050I$ $b = 0.943810 + 0.783646I$	$5.68928 - 6.47510I$	$3.47548 + 7.00475I$
$u = -0.782454 - 0.456203I$ $a = 0.58253 + 2.23050I$ $b = 0.943810 - 0.783646I$	$5.68928 + 6.47510I$	$3.47548 - 7.00475I$
$u = 0.768228 + 0.434814I$ $a = 1.144950 + 0.658680I$ $b = -0.742662 - 0.902492I$	$2.13106 + 4.71480I$	$0.47050 - 5.02848I$

Solutions to I_1^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u = 0.768228 - 0.434814I$ $a = 1.144950 - 0.658680I$ $b = -0.742662 + 0.902492I$	$2.13106 - 4.71480I$	$0.47050 + 5.02848I$
$u = -0.778193 + 0.407597I$ $a = -0.71065 + 2.31160I$ $b = -0.838906 - 0.752287I$	$2.31622 - 1.89869I$	$0.70275 + 3.94226I$
$u = -0.778193 - 0.407597I$ $a = -0.71065 - 2.31160I$ $b = -0.838906 + 0.752287I$	$2.31622 + 1.89869I$	$0.70275 - 3.94226I$
$u = -0.570014 + 0.501355I$ $a = 0.76909 - 1.45994I$ $b = 1.087280 + 0.321819I$	$-6.02729 - 5.28844I$	$-6.96026 + 7.61800I$
$u = -0.570014 - 0.501355I$ $a = 0.76909 + 1.45994I$ $b = 1.087280 - 0.321819I$	$-6.02729 + 5.28844I$	$-6.96026 - 7.61800I$
$u = -0.544488 + 0.378983I$ $a = -1.32009 + 1.52978I$ $b = -0.842302 - 0.270646I$	$-0.55880 - 2.99317I$	$-2.43682 + 9.49735I$
$u = -0.544488 - 0.378983I$ $a = -1.32009 - 1.52978I$ $b = -0.842302 + 0.270646I$	$-0.55880 + 2.99317I$	$-2.43682 - 9.49735I$
$u = -0.079318 + 0.638620I$ $a = 0.556233 + 0.364082I$ $b = 0.992202 - 0.742680I$	$-0.82232 + 7.15155I$	$-4.60706 - 5.03276I$
$u = -0.079318 - 0.638620I$ $a = 0.556233 - 0.364082I$ $b = 0.992202 + 0.742680I$	$-0.82232 - 7.15155I$	$-4.60706 + 5.03276I$
$u = -0.316519 + 0.540275I$ $a = -0.814732 + 0.436386I$ $b = -1.068200 + 0.206607I$	$-6.75768 + 1.69595I$	$-9.62058 - 0.39515I$

Solutions to I_1^u	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.316519 - 0.540275I$ $a = -0.814732 - 0.436386I$ $b = -1.068200 - 0.206607I$	$-6.75768 - 1.69595I$	$-9.62058 + 0.39515I$
$u = 0.605204 + 0.139914I$ $a = 0.523878 + 0.514590I$ $b = -0.281922 - 0.406522I$	$1.104200 + 0.351253I$	$7.66165 - 1.23198I$
$u = 0.605204 - 0.139914I$ $a = 0.523878 - 0.514590I$ $b = -0.281922 + 0.406522I$	$1.104200 - 0.351253I$	$7.66165 + 1.23198I$
$u = -0.038185 + 0.607819I$ $a = -0.646423 - 0.466088I$ $b = -0.882448 + 0.766731I$	$3.48917 + 2.89621I$	$-0.22897 - 2.80424I$
$u = -0.038185 - 0.607819I$ $a = -0.646423 + 0.466088I$ $b = -0.882448 - 0.766731I$	$3.48917 - 2.89621I$	$-0.22897 + 2.80424I$
$u = 0.457801 + 0.362756I$ $a = -0.775748 - 0.907568I$ $b = 0.118428 + 0.812194I$	$-2.68266 + 1.34854I$	$-4.20838 - 4.89529I$
$u = 0.457801 - 0.362756I$ $a = -0.775748 + 0.907568I$ $b = 0.118428 - 0.812194I$	$-2.68266 - 1.34854I$	$-4.20838 + 4.89529I$
$u = 0.024733 + 0.567150I$ $a = 0.743934 + 0.615367I$ $b = 0.729699 - 0.800933I$	$-0.035156 - 1.335270I$	$-3.76168 + 0.44055I$
$u = 0.024733 - 0.567150I$ $a = 0.743934 - 0.615367I$ $b = 0.729699 + 0.800933I$	$-0.035156 + 1.335270I$	$-3.76168 - 0.44055I$
$u = 1.44775$ $a = -0.137478$ $b = 1.13818$	-1.53547	0

Solutions to I_1^u	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.316942 + 0.333544I$ $a = 1.67144 - 0.45362I$ $b = 0.730562 - 0.086920I$	$-1.184330 + 0.293211I$	$-7.24661 - 0.11134I$
$u = -0.316942 - 0.333544I$ $a = 1.67144 + 0.45362I$ $b = 0.730562 + 0.086920I$	$-1.184330 - 0.293211I$	$-7.24661 + 0.11134I$
$u = -1.54283 + 0.06225I$ $a = 0.45736 - 1.45447I$ $b = -0.258482 + 0.942392I$	$4.08661 - 2.66620I$	0
$u = -1.54283 - 0.06225I$ $a = 0.45736 + 1.45447I$ $b = -0.258482 - 0.942392I$	$4.08661 + 2.66620I$	0
$u = 1.54469 + 0.03373I$ $a = -0.851909 - 0.654429I$ $b = -0.876218 + 0.153382I$	$5.30389 + 0.47425I$	0
$u = 1.54469 - 0.03373I$ $a = -0.851909 + 0.654429I$ $b = -0.876218 - 0.153382I$	$5.30389 - 0.47425I$	0
$u = 1.54394 + 0.12483I$ $a = 0.126116 - 1.372580I$ $b = -1.122220 + 0.424521I$	$1.01324 + 7.50643I$	0
$u = 1.54394 - 0.12483I$ $a = 0.126116 + 1.372580I$ $b = -1.122220 - 0.424521I$	$1.01324 - 7.50643I$	0
$u = 1.55716 + 0.08171I$ $a = 0.395590 + 1.327910I$ $b = 0.950907 - 0.362288I$	$6.54610 + 4.55343I$	0
$u = 1.55716 - 0.08171I$ $a = 0.395590 - 1.327910I$ $b = 0.950907 + 0.362288I$	$6.54610 - 4.55343I$	0

<table>
<tr><th>Solutions to I_1^u</th><th>$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$</th><th>Cusp shape</th></tr>
<tr><td>$u=-1.59291+0.03318I$
$a=-0.437806+0.931798I$
$b=\ \ 0.277160-0.618435I$</td><td>$8.71978-0.96955I$</td><td>0</td></tr>
<tr><td>$u=-1.59291-0.03318I$
$a=-0.437806-0.931798I$
$b=\ \ 0.277160+0.618435I$</td><td>$8.71978+0.96955I$</td><td>0</td></tr>
<tr><td>$u=-1.62812+0.12417I$
$a=-1.23139+1.34321I$
$b=\ \ 0.773399-0.956394I$</td><td>$10.33130-6.82915I$</td><td>0</td></tr>
<tr><td>$u=-1.62812-0.12417I$
$a=-1.23139-1.34321I$
$b=\ \ 0.773399+0.956394I$</td><td>$10.33130+6.82915I$</td><td>0</td></tr>
<tr><td>$u=\ \ 1.62976+0.11604I$
$a=\ \ 0.00161+2.29347I$
$b=\ \ 0.911680-0.767070I$</td><td>$10.56670+3.88406I$</td><td>0</td></tr>
<tr><td>$u=\ \ 1.62976-0.11604I$
$a=\ \ 0.00161-2.29347I$
$b=\ \ 0.911680+0.767070I$</td><td>$10.56670-3.88406I$</td><td>0</td></tr>
<tr><td>$u=\ \ 1.63214+0.14225I$
$a=-0.26342+2.25155I$
$b=\ \ 1.041030-0.821782I$</td><td>$9.4693+13.3538I$</td><td>0</td></tr>
<tr><td>$u=\ \ 1.63214-0.14225I$
$a=-0.26342-2.25155I$
$b=\ \ 1.041030+0.821782I$</td><td>$9.4693-13.3538I$</td><td>0</td></tr>
<tr><td>$u=\ \ 1.63313+0.13047I$
$a=\ \ 0.15431-2.28786I$
$b=-0.980165+0.809362I$</td><td>$13.9539+8.7007I$</td><td>0</td></tr>
<tr><td>$u=\ \ 1.63313-0.13047I$
$a=\ \ 0.15431+2.28786I$
$b=-0.980165-0.809362I$</td><td>$13.9539-8.7007I$</td><td>0</td></tr>
</table>

Solutions to I_1^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u=-1.63993+0.11295I$ $a=\ \ 1.27230-1.22415I$ $b=-0.815467+0.876391I$	$14.4734-2.4457I$	0
$u=-1.63993-0.11295I$ $a=\ \ 1.27230+1.22415I$ $b=-0.815467-0.876391I$	$14.4734+2.4457I$	0
$u=-1.65226$ $a=\ \ 0.971661$ $b=-0.658927$	6.52621	0
$u=-1.65143+0.09936I$ $a=-1.30952+1.08207I$ $b=\ \ 0.855453-0.778423I$	$10.73980+1.94649I$	0
$u=-1.65143-0.09936I$ $a=-1.30952-1.08207I$ $b=\ \ 0.855453+0.778423I$	$10.73980-1.94649I$	0
$u=-0.340130$ $a=\ \ 2.97078$ $b=\ \ 0.476062$	-1.17659	-11.8220

II. $I_2^u = \langle b,\ a - u - 1,\ u^2 + u - 1\rangle$

(i) Arc colorings

$$a_3 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_{11} = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_4 = \begin{pmatrix} 1 \\ u - 1 \end{pmatrix}$$
$$a_{12} = \begin{pmatrix} u \\ -u + 1 \end{pmatrix}$$
$$a_5 = \begin{pmatrix} u \\ -u \end{pmatrix}$$
$$a_8 = \begin{pmatrix} u + 1 \\ 0 \end{pmatrix}$$
$$a_2 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_1 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} u + 1 \\ 0 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} u + 1 \\ 0 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} -u \\ u \end{pmatrix}$$
$$a_6 = \begin{pmatrix} 2u + 1 \\ -u \end{pmatrix}$$

(ii) Obstruction class $= 1$

(iii) Cusp Shapes $= 5$

(iv) u-Polynomials at the component

Crossings	u-Polynomials at each crossing
c_1, c_2, c_7 c_8	u^2
c_3, c_4	$u^2 + u - 1$
c_5, c_6	$(u-1)^2$
c_9	$(u+1)^2$
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_7 c_8	y^2
c_3, c_4, c_{10} c_{11}, c_{12}	$y^2 - 3y + 1$
c_5, c_6, c_9	$(y-1)^2$

(vi) Complex Volumes and Cusp Shapes

Solutions to I_2^u	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u = 0.618034$ $a = 1.61803$ $b = 0$	-0.657974	5.00000
$u = -1.61803$ $a = -0.618034$ $b = 0$	7.23771	5.00000

III. u-Polynomials

Crossings	u-Polynomials at each crossing
c_1, c_8	$u^2(u^{56} + 15u^{55} + \cdots + 216u + 16)$
c_2, c_7	$u^2(u^{56} + u^{55} + \cdots - 4u - 4)$
c_3, c_4	$(u^2 + u - 1)(u^{56} - 2u^{55} + \cdots + 4u + 1)$
c_5, c_6	$((u-1)^2)(u^{56} - 3u^{55} + \cdots - u - 1)$
c_9	$((u+1)^2)(u^{56} - 3u^{55} + \cdots - u - 1)$
c_{10}	$(u^2 - u - 1)(u^{56} + 18u^{55} + \cdots + 6542u + 1153)$
c_{11}, c_{12}	$(u^2 - u - 1)(u^{56} - 2u^{55} + \cdots + 4u + 1)$

IV. Riley Polynomials

Crossings	Riley Polynomials at each crossing
c_1, c_8	$y^2(y^{56} + 49y^{55} + \cdots - 800y + 256)$
c_2, c_7	$y^2(y^{56} - 15y^{55} + \cdots - 216y + 16)$
c_3, c_4, c_{11} c_{12}	$(y^2 - 3y + 1)(y^{56} - 66y^{55} + \cdots - 16y + 1)$
c_5, c_6, c_9	$((y-1)^2)(y^{56} - 45y^{55} + \cdots + 29y + 1)$
c_{10}	$(y^2 - 3y + 1)(y^{56} - 30y^{55} + \cdots - 6.23480 \times 10^7 y + 1329409)$