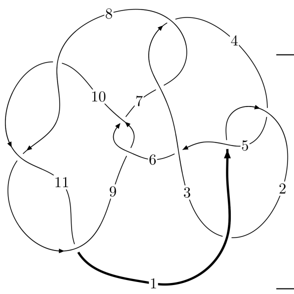
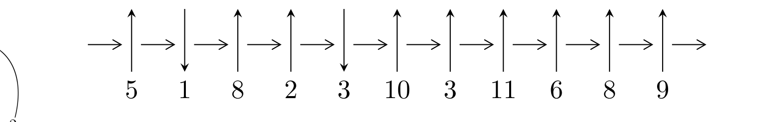
# $11n_{10}$ ($K11n_{10}$)




A knot diagram[1]

**Linearized knot diagam**




**Solving Sequence**

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

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

$$\begin{aligned}
I_1^u = \langle & 8787304659u^{35} - 103954721318u^{34} + \cdots + 4758166200466b - 403612228244, \\
& -377185205844u^{35} + 1123281301673u^{34} + \cdots + 475816620046a - 327197785091, \\
& u^{36} - 3u^{35} + \cdots + 2u + 1\rangle \\
I_2^u = \langle & -au + b + u,\ a^2 - au - 3a + 2,\ u^2 + u + 1\rangle
\end{aligned}$$

* 2 irreducible components of $\dim_{\mathbb{C}} = 0$, with total 40 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.**

$I_1^u = \langle 8.79\times10^{9}u^{35} - 1.04\times10^{11}u^{34} + \cdots + 4.76\times10^{11}b - 4.04\times10^{11},\ -3.77\times10^{11}u^{35} + 1.12\times10^{12}u^{34} + \cdots + 4.76\times10^{11}a - 3.27\times10^{11},\ u^{36} - 3u^{35} + \cdots + 2u + 1\rangle$

**(i) Arc colorings**

$$a_1 = \begin{pmatrix}1\\0\end{pmatrix}$$
$$a_5 = \begin{pmatrix}0\\u\end{pmatrix}$$
$$a_2 = \begin{pmatrix}1\\-u^2\end{pmatrix}$$
$$a_3 = \begin{pmatrix}u^2+1\\-u^2\end{pmatrix}$$
$$a_6 = \begin{pmatrix}-u^5-2u^3-u\\u^5+u^3+u\end{pmatrix}$$
$$a_4 = \begin{pmatrix}-u\\u^3+u\end{pmatrix}$$
$$a_9 = \begin{pmatrix}0.792711u^{35} - 2.36074u^{34} + \cdots - 7.92555u + 0.687655\\-0.0184678u^{35} + 0.218476u^{34} + \cdots + 2.06332u + 0.848252\end{pmatrix}$$
$$a_{11} = \begin{pmatrix}1.81069u^{35} - 3.83855u^{34} + \cdots - 5.73449u + 0.597631\\-1.42613u^{35} + 4.12609u^{34} + \cdots + 4.24671u + 1.60699\end{pmatrix}$$
$$a_8 = \begin{pmatrix}-1.48252u^{35} + 2.76287u^{34} + \cdots + 0.445446u + 2.16820\\1.68468u^{35} - 5.18476u^{34} + \cdots - 5.13324u - 1.48252\end{pmatrix}$$
$$a_7 = \begin{pmatrix}-3.01339u^{35} + 5.80035u^{34} + \cdots + 3.96183u + 2.75504\\3.24321u^{35} - 9.22497u^{34} + \cdots - 6.94504u - 2.40225\end{pmatrix}$$
$$a_{10} = \begin{pmatrix}-0.224280u^{35} - 0.364289u^{34} + \cdots - 6.62538u + 1.26123\\1.20451u^{35} - 3.50438u^{34} + \cdots - 0.486823u - 0.427974\end{pmatrix}$$
$$a_{10} = \begin{pmatrix}-0.224280u^{35} - 0.364289u^{34} + \cdots - 6.62538u + 1.26123\\1.20451u^{35} - 3.50438u^{34} + \cdots - 0.486823u - 0.427974\end{pmatrix}$$

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

**(iii) Cusp Shapes**
$= \frac{132200220423}{475816620046}u^{35} - \frac{80372153223}{237908310023}u^{34} + \cdots - \frac{2105018315229}{475816620046}u + \frac{2668832099181}{237908310023}$

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

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1, c_4$ | $u^{36} + 3u^{35} + \cdots - 2u + 1$ |
| $c_2$ | $u^{36} + 19u^{35} + \cdots - 30u + 1$ |
| $c_3, c_7$ | $u^{36} + 3u^{35} + \cdots - 80u + 16$ |
| $c_5$ | $u^{36} - 3u^{35} + \cdots - 552u + 97$ |
| $c_6, c_9$ | $u^{36} - 3u^{35} + \cdots + 7u^2 - 1$ |
| $c_8, c_{10}, c_{11}$ | $u^{36} + 3u^{35} + \cdots + 8u - 1$ |

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

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_4$ | $y^{36} + 19y^{35} + \cdots - 30y + 1$ |
| $c_2$ | $y^{36} - y^{35} + \cdots - 1390y + 1$ |
| $c_3, c_7$ | $y^{36} + 25y^{35} + \cdots + 384y + 256$ |
| $c_5$ | $y^{36} - 21y^{35} + \cdots - 232342y + 9409$ |
| $c_6, c_9$ | $y^{36} - 9y^{35} + \cdots - 14y + 1$ |
| $c_8, c_{10}, c_{11}$ | $y^{36} - 29y^{35} + \cdots - 14y + 1$ |

### (vi) Complex Volumes and Cusp Shapes

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.941953 + 0.318856I$<br>$a = 1.90171 - 0.06813I$<br>$b = -1.330950 + 0.428412I$ | $1.25207 - 7.91102I$ | $10.72087 + 4.98053I$ |
| $u = 0.941953 - 0.318856I$<br>$a = 1.90171 + 0.06813I$<br>$b = -1.330950 - 0.428412I$ | $1.25207 + 7.91102I$ | $10.72087 - 4.98053I$ |
| $u = -0.578922 + 0.827435I$<br>$a = 0.466797 - 0.077681I$<br>$b = 0.222633 - 0.152510I$ | $0.57502 - 2.28935I$ | $0.59495 + 6.49088I$ |
| $u = -0.578922 - 0.827435I$<br>$a = 0.466797 + 0.077681I$<br>$b = 0.222633 + 0.152510I$ | $0.57502 + 2.28935I$ | $0.59495 - 6.49088I$ |
| $u = -0.462897 + 0.928342I$<br>$a = 0.53466 - 3.01700I$<br>$b = 0.991548 - 0.131048I$ | $1.36980 - 2.39965I$ | $20.4935 - 7.9827I$ |
| $u = -0.462897 - 0.928342I$<br>$a = 0.53466 + 3.01700I$<br>$b = 0.991548 + 0.131048I$ | $1.36980 + 2.39965I$ | $20.4935 + 7.9827I$ |
| $u = -0.958743$<br>$a = 1.33018$<br>$b = -1.21120$ | $5.21748$ | $18.9740$ |
| $u = 0.390666 + 0.829574I$<br>$a = 1.76642 - 1.65948I$<br>$b = -1.64687 - 0.04349I$ | $8.65750 + 1.68497I$ | $4.45327 + 6.62838I$ |
| $u = 0.390666 - 0.829574I$<br>$a = 1.76642 + 1.65948I$<br>$b = -1.64687 + 0.04349I$ | $8.65750 - 1.68497I$ | $4.45327 - 6.62838I$ |
| $u = -0.352390 + 1.060720I$<br>$a = 0.288497 - 0.584924I$<br>$b = -0.100145 - 0.439780I$ | $-1.38239 - 2.67848I$ | $3.33680 + 4.36497I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.352390 - 1.060720I$<br>$a = 0.288497 + 0.584924I$<br>$b = -0.100145 + 0.439780I$ | $-1.38239 + 2.67848I$ | $3.33680 - 4.36497I$ |
| $u = 0.836718 + 0.162292I$<br>$a = 0.139245 + 0.541740I$<br>$b = 0.055080 - 0.891815I$ | $-3.08076 - 3.16131I$ | $6.74911 + 2.73736I$ |
| $u = 0.836718 - 0.162292I$<br>$a = 0.139245 - 0.541740I$<br>$b = 0.055080 + 0.891815I$ | $-3.08076 + 3.16131I$ | $6.74911 - 2.73736I$ |
| $u = -0.429143 + 0.677623I$<br>$a = -2.71700 + 1.40590I$<br>$b = 1.153580 + 0.008712I$ | $2.13722 - 1.37641I$ | $5.40609 + 5.14317I$ |
| $u = -0.429143 - 0.677623I$<br>$a = -2.71700 - 1.40590I$<br>$b = 1.153580 - 0.008712I$ | $2.13722 + 1.37641I$ | $5.40609 - 5.14317I$ |
| $u = 0.418004 + 1.152660I$<br>$a = -0.330548 + 0.337367I$<br>$b = 1.222910 - 0.619715I$ | $-2.79850 + 2.36350I$ | $5.53508 - 2.60014I$ |
| $u = 0.418004 - 1.152660I$<br>$a = -0.330548 - 0.337367I$<br>$b = 1.222910 + 0.619715I$ | $-2.79850 - 2.36350I$ | $5.53508 + 2.60014I$ |
| $u = -0.917196 + 0.828372I$<br>$a = 1.65210 + 0.46733I$<br>$b = -1.186090 + 0.089252I$ | $4.37030 - 3.28706I$ | $16.3776 + 6.4044I$ |
| $u = -0.917196 - 0.828372I$<br>$a = 1.65210 - 0.46733I$<br>$b = -1.186090 - 0.089252I$ | $4.37030 + 3.28706I$ | $16.3776 - 6.4044I$ |
| $u = 0.482228 + 1.156400I$<br>$a = -1.53682 + 1.54127I$<br>$b = 1.42553 + 0.42860I$ | $-2.33330 + 5.78583I$ | $6.12375 - 4.54634I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.482228 - 1.156400I$<br>$a = -1.53682 - 1.54127I$<br>$b = 1.42553 - 0.42860I$ | $-2.33330 - 5.78583I$ | $6.12375 + 4.54634I$ |
| $u = 0.355005 + 1.235300I$<br>$a = 0.736458 - 0.433010I$<br>$b = -0.170722 - 0.941275I$ | $-7.38923 + 0.84480I$ | $2.27275 - 0.94603I$ |
| $u = 0.355005 - 1.235300I$<br>$a = 0.736458 + 0.433010I$<br>$b = -0.170722 + 0.941275I$ | $-7.38923 - 0.84480I$ | $2.27275 + 0.94603I$ |
| $u = 0.528429 + 1.198920I$<br>$a = -0.764889 + 0.265751I$<br>$b = 0.118707 + 1.039180I$ | $-6.16236 + 8.15772I$ | $4.34763 - 5.90259I$ |
| $u = 0.528429 - 1.198920I$<br>$a = -0.764889 - 0.265751I$<br>$b = 0.118707 - 1.039180I$ | $-6.16236 - 8.15772I$ | $4.34763 + 5.90259I$ |
| $u = 0.191310 + 1.304130I$<br>$a = 0.267608 + 0.045241I$<br>$b = -1.157150 + 0.494867I$ | $-4.36779 - 4.25736I$ | $4.95189 + 4.14577I$ |
| $u = 0.191310 - 1.304130I$<br>$a = 0.267608 - 0.045241I$<br>$b = -1.157150 - 0.494867I$ | $-4.36779 + 4.25736I$ | $4.95189 - 4.14577I$ |
| $u = 0.667019 + 0.112397I$<br>$a = -2.55104 - 0.08549I$<br>$b = 1.252170 - 0.381251I$ | $0.59829 - 1.41278I$ | $9.58916 + 0.83279I$ |
| $u = 0.667019 - 0.112397I$<br>$a = -2.55104 + 0.08549I$<br>$b = 1.252170 + 0.381251I$ | $0.59829 + 1.41278I$ | $9.58916 - 0.83279I$ |
| $u = -0.076900 + 0.656111I$<br>$a = -0.25086 + 1.59937I$<br>$b = 0.571894 + 0.426603I$ | $0.502483 + 0.088457I$ | $8.19922 - 0.63999I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.076900 - 0.656111I$<br>$a = -0.25086 - 1.59937I$<br>$b = 0.571894 - 0.426603I$ | $0.502483 - 0.088457I$ | $8.19922 + 0.63999I$ |
| $u = 0.616178 + 1.196580I$<br>$a = 1.49880 - 1.41745I$<br>$b = -1.39338 - 0.48591I$ | $-1.43022 + 13.58250I$ | $8.11529 - 8.04740I$ |
| $u = 0.616178 - 1.196580I$<br>$a = 1.49880 + 1.41745I$<br>$b = -1.39338 + 0.48591I$ | $-1.43022 - 13.58250I$ | $8.11529 + 8.04740I$ |
| $u = -0.548564 + 1.246830I$<br>$a = 0.708615 + 0.979572I$<br>$b = -1.132080 + 0.226075I$ | $1.52668 - 5.32517I$ | $10.19862 + 8.96318I$ |
| $u = -0.548564 - 1.246830I$<br>$a = 0.708615 - 0.979572I$<br>$b = -1.132080 - 0.226075I$ | $1.52668 + 5.32517I$ | $10.19862 - 8.96318I$ |
| $u = -0.164250$<br>$a = 3.05031$<br>$b = 0.417861$ | $0.823260$ | $12.0950$ |

## II. $I_2^u = \langle -au + b + u,\ a^2 - au - 3a + 2,\ u^2 + u + 1 \rangle$

**(i) Arc colorings**

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

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

**(iii) Cusp Shapes** $= 3au + 6a - 2u + 10$

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

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

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

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

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

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.500000 + 0.866025I$<br>$a = 0.690983 - 0.535233I$<br>$b = 0.618034$ | $0.98696 - 2.02988I$ | $15.5000 - 2.3454I$ |
| $u = -0.500000 + 0.866025I$<br>$a = 1.80902 + 1.40126I$<br>$b = -1.61803$ | $8.88264 - 2.02988I$ | $15.5000 + 9.2736I$ |
| $u = -0.500000 - 0.866025I$<br>$a = 0.690983 + 0.535233I$<br>$b = 0.618034$ | $0.98696 + 2.02988I$ | $15.5000 + 2.3454I$ |
| $u = -0.500000 - 0.866025I$<br>$a = 1.80902 - 1.40126I$<br>$b = -1.61803$ | $8.88264 + 2.02988I$ | $15.5000 - 9.2736I$ |

### III. u-Polynomials

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $((u^2+u+1)^2)(u^{36}+3u^{35}+\cdots-2u+1)$ |
| $c_2$ | $((u^2+u+1)^2)(u^{36}+19u^{35}+\cdots-30u+1)$ |
| $c_3, c_7$ | $u^4(u^{36}+3u^{35}+\cdots-80u+16)$ |
| $c_4$ | $((u^2-u+1)^2)(u^{36}+3u^{35}+\cdots-2u+1)$ |
| $c_5$ | $((u^2+u+1)^2)(u^{36}-3u^{35}+\cdots-552u+97)$ |
| $c_6$ | $((u^2-u-1)^2)(u^{36}-3u^{35}+\cdots+7u^2-1)$ |
| $c_8$ | $((u^2-u-1)^2)(u^{36}+3u^{35}+\cdots+8u-1)$ |
| $c_9$ | $((u^2+u-1)^2)(u^{36}-3u^{35}+\cdots+7u^2-1)$ |
| $c_{10}, c_{11}$ | $((u^2+u-1)^2)(u^{36}+3u^{35}+\cdots+8u-1)$ |

## IV. Riley Polynomials

| Crossings | Riley Polynomials at each crossing |
| --- | --- |
| $c_1, c_4$ | $((y^2+y+1)^2)(y^{36}+19y^{35}+\cdots-30y+1)$ |
| $c_2$ | $((y^2+y+1)^2)(y^{36}-y^{35}+\cdots-1390y+1)$ |
| $c_3, c_7$ | $y^4(y^{36}+25y^{35}+\cdots+384y+256)$ |
| $c_5$ | $((y^2+y+1)^2)(y^{36}-21y^{35}+\cdots-232342y+9409)$ |
| $c_6, c_9$ | $((y^2-3y+1)^2)(y^{36}-9y^{35}+\cdots-14y+1)$ |
| $c_8, c_{10}, c_{11}$ | $((y^2-3y+1)^2)(y^{36}-29y^{35}+\cdots-14y+1)$ |