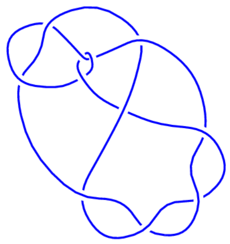
# $11a_{37}$ $(K11a_{37})$



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### Arc Sequences

$$\rightarrow \downarrow_{4} \rightarrow \downarrow_{1} \rightarrow \uparrow_{8} \rightarrow \downarrow_{2} \rightarrow \downarrow_{11} \rightarrow \downarrow_{10} \rightarrow \uparrow_{3} \rightarrow \uparrow_{5} \rightarrow \downarrow_{7} \rightarrow \downarrow_{6} \rightarrow \uparrow_{9} \rightarrow$$

### Solving Sequence

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

### Representation Ideals

$$I = \bigcap_{i=1}^{2} I_i^u$$

$$I_1^u = \langle a^4 + a^3 + 3a^2 + 2a + 1,\ b + 1,\ u - 1\rangle$$
$$I_2^u = \langle u^{50} - 5u^{49} + \cdots - u + 1,\ -u^{11} + 3u^9 - 2u^8 - 4u^7 + 4u^6 + u^5 - 4u^4 + u^3 + 2u^2 + b - u,$$
$$- u^{49} + 4u^{48} + \cdots + 8a - 15\rangle$$

There are 2 irreducible components with 54 representations.

[1] The knot diagram image is adapter from "C. Livingston and A. H. Moore, KnotInfo: Table of Knot Invariants, http://www.indiana.edu/ knotinfo"

## I. $I_1^u = \langle a^4 + a^3 + 3a^2 + 2a + 1,\ b + 1,\ u - 1 \rangle$

**(i) Arc colorings**

$$a_5 = \begin{pmatrix} 0 \\ 1 \end{pmatrix}$$
$$a_{11} = \begin{pmatrix} a \\ -1 \end{pmatrix}$$
$$a_2 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} -a^2 \\ a + 1 \end{pmatrix}$$
$$a_4 = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$
$$a_1 = \begin{pmatrix} 0 \\ -1 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} a^3 + a \\ -a^2 - a - 1 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} a^3 + a^2 + 2a + 1 \\ a^3 + a^2 + 2a + 1 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} a^3 + a^2 + 2a + 1 \\ 0 \end{pmatrix}$$
$$a_8 = \begin{pmatrix} a^3 + a^2 + 2a + 1 \\ a^3 + a^2 + 2a + 1 \end{pmatrix}$$
$$a_8 = \begin{pmatrix} a^3 + a^2 + 2a + 1 \\ a^3 + a^2 + 2a + 1 \end{pmatrix}$$

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

**(iii) Cusp Shapes =unknown**

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

| Solution to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.00000$<br>$a = -0.395123 - 0.506844I$<br>$b = -1.00000$ | $-1.85594 - 1.41510I$ | $-4.47493 + 4.18840I$ |
| $u = 1.00000$<br>$a = -0.395123 + 0.506844I$<br>$b = -1.00000$ | $-1.85594 + 1.41510I$ | $-4.47493 - 4.18840I$ |
| $u = 1.00000$<br>$a = -0.10488 - 1.55249I$<br>$b = -1.00000$ | $5.14581 - 3.16396I$ | $-2.02507 + 3.47609I$ |
| $u = 1.00000$<br>$a = -0.10488 + 1.55249I$<br>$b = -1.00000$ | $5.14581 + 3.16396I$ | $-2.02507 - 3.47609I$ |

**II.**

$\boldsymbol{I_2^u = \langle u^{50}-5u^{49}+\cdots-u+1,\ -u^{11}+3u^9+\cdots+b-u,\ -u^{49}+4u^{48}+\cdots+8a-15\rangle}$

**(i) Arc colorings**

$$a_5 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_{11} = \begin{pmatrix} \frac{1}{8}u^{49} - \frac{1}{2}u^{48} + \cdots + u + \frac{15}{8} \\ u^{11} - 3u^9 + 2u^8 + 4u^7 - 4u^6 - u^5 + 4u^4 - u^3 - 2u^2 + u \end{pmatrix}$$
$$a_2 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} -2.87500u^{49} + 11.7500u^{48} + \cdots - 3.75000u + 3.12500 \\ -\frac{1}{8}u^{49} + \frac{1}{2}u^{48} + \cdots + u + \frac{1}{8} \end{pmatrix}$$
$$a_4 = \begin{pmatrix} u \\ u \end{pmatrix}$$
$$a_1 = \begin{pmatrix} -u^2 + 1 \\ -u^2 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} u^4 - u^2 + 1 \\ u^4 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} 7u^{49} - \frac{63}{2}u^{48} + \cdots - \frac{7}{2}u - 9 \\ \frac{1}{4}u^{49} - \frac{5}{4}u^{48} + \cdots + \frac{3}{4}u - \frac{1}{2} \end{pmatrix}$$
$$a_7 = \begin{pmatrix} 15u^{49} - \frac{249}{4}u^{48} + \cdots - \frac{9}{4}u - \frac{55}{4} \\ \frac{31}{4}u^{49} - \frac{131}{4}u^{48} + \cdots + \frac{1}{4}u - 9 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} \frac{63}{4}u^{49} - \frac{267}{4}u^{48} + \cdots - \frac{7}{4}u - 16 \\ \frac{27}{4}u^{49} - \frac{59}{2}u^{48} + \cdots + \frac{5}{2}u - \frac{29}{4} \end{pmatrix}$$
$$a_8 = \begin{pmatrix} \frac{63}{4}u^{49} - \frac{267}{4}u^{48} + \cdots - \frac{7}{4}u - 16 \\ \frac{27}{2}u^{49} - \frac{249}{4}u^{48} + \cdots - \frac{5}{4}u - \frac{77}{4} \end{pmatrix}$$
$$a_8 = \begin{pmatrix} \frac{63}{4}u^{49} - \frac{267}{4}u^{48} + \cdots - \frac{7}{4}u - 16 \\ \frac{27}{2}u^{49} - \frac{249}{4}u^{48} + \cdots - \frac{5}{4}u - \frac{77}{4} \end{pmatrix}$$

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

**(iii) Cusp Shapes =unknown**

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

| Solution to $I_2^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -1.311521 - 0.106975I$<br>$a = 0.011695 + 1.216432I$<br>$b = -1.003080 - 0.558600I$ | $6.58516 + 4.39707I$ | $2.33431 - 3.80929I$ |
| $u = -1.311521 + 0.106975I$<br>$a = 0.011695 - 1.216432I$<br>$b = -1.003080 + 0.558600I$ | $6.58516 - 4.39707I$ | $2.33431 + 3.80929I$ |
| $u = -1.250996 - 0.108910I$<br>$a = -0.274657 + 0.550765I$<br>$b = -1.064820 - 0.172714I$ | $-1.11589 + 2.48404I$ | $0.38342 - 6.62934I$ |
| $u = -1.250996 + 0.108910I$<br>$a = -0.274657 - 0.550765I$<br>$b = -1.064820 + 0.172714I$ | $-1.11589 - 2.48404I$ | $0.38342 + 6.62934I$ |
| $u = -1.131351 - 0.330216I$<br>$a = -0.370473 - 1.219237I$<br>$b = -1.93836 - 0.66448I$ | $3.45731 - 1.19827I$ | $-2.52664 + 0.20290I$ |
| $u = -1.131351 + 0.330216I$<br>$a = -0.370473 + 1.219237I$<br>$b = -1.93836 + 0.66448I$ | $3.45731 + 1.19827I$ | $-2.52664 - 0.20290I$ |
| $u = -1.123513 - 0.157529I$<br>$a = -0.355911 - 0.168516I$<br>$b = -1.169291 - 0.102022I$ | $-2.34402 - 0.36505I$ | $-5.85432 - 1.95692I$ |
| $u = -1.123513 + 0.157529I$<br>$a = -0.355911 + 0.168516I$<br>$b = -1.169291 + 0.102022I$ | $-2.34402 + 0.36505I$ | $-5.85432 + 1.95692I$ |
| $u = -0.957660 - 0.583300I$<br>$a = 0.84028 + 1.16267I$<br>$b = 3.97548 - 0.79374I$ | $7.74509 - 6.95904I$ | $1.19456 + 5.23759I$ |
| $u = -0.957660 + 0.583300I$<br>$a = 0.84028 - 1.16267I$<br>$b = 3.97548 + 0.79374I$ | $7.74509 + 6.95904I$ | $1.19456 - 5.23759I$ |

| Solution to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-0.947722-0.527766I$<br>$a=0.666145+0.358554I$<br>$b=2.06368-0.87027I$ | $-0.06909-4.84703I$ | $-1.29691+7.27549I$ |
| $u=-0.947722+0.527766I$<br>$a=0.666145-0.358554I$<br>$b=2.06368+0.87027I$ | $-0.06909+4.84703I$ | $-1.29691-7.27549I$ |
| $u=-0.928435-0.426925I$<br>$a=0.366264-0.326426I$<br>$b=0.210661-0.626849I$ | $-1.61695-1.61236I$ | $-6.30739+1.92987I$ |
| $u=-0.928435+0.426925I$<br>$a=0.366264+0.326426I$<br>$b=0.210661+0.626849I$ | $-1.61695+1.61236I$ | $-6.30739-1.92987I$ |
| $u=-0.701181-0.467599I$<br>$a=-0.138543-0.893740I$<br>$b=-0.996286+0.791665I$ | $0.729964+0.675494I$ | $1.06714-1.67748I$ |
| $u=-0.701181+0.467599I$<br>$a=-0.138543+0.893740I$<br>$b=-0.996286-0.791665I$ | $0.729964-0.675494I$ | $1.06714+1.67748I$ |
| $u=-0.682129-0.592727I$<br>$a=-1.08241-1.40996I$<br>$b=-2.15646+2.15038I$ | $8.58536+2.27131I$ | $2.70256+0.00041I$ |
| $u=-0.682129+0.592727I$<br>$a=-1.08241+1.40996I$<br>$b=-2.15646-2.15038I$ | $8.58536-2.27131I$ | $2.70256-0.00041I$ |
| $u=-0.101318-0.238648I$<br>$a=2.02509-0.34173I$<br>$b=-0.024637-0.361286I$ | $-0.000511-1.051122I$ | $-0.14079+6.76805I$ |
| $u=-0.101318+0.238648I$<br>$a=2.02509+0.34173I$<br>$b=-0.024637+0.361286I$ | $-0.000511+1.051122I$ | $-0.14079-6.76805I$ |

| Solution to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.004533 - 0.531412I$<br>$a = 2.88583 - 0.12192I$<br>$b = 0.989135 - 0.554243I$ | $6.72549 - 2.13344I$ | $2.98920 + 3.27411I$ |
| $u = 0.004533 + 0.531412I$<br>$a = 2.88583 + 0.12192I$<br>$b = 0.989135 + 0.554243I$ | $6.72549 + 2.13344I$ | $2.98920 - 3.27411I$ |
| $u = 0.429603 - 0.933534I$<br>$a = -1.37419 + 0.77797I$<br>$b = -1.82724 - 1.72314I$ | $12.7949 - 7.4878I$ | $5.12788 + 3.72934I$ |
| $u = 0.429603 + 0.933534I$<br>$a = -1.37419 - 0.77797I$<br>$b = -1.82724 + 1.72314I$ | $12.7949 + 7.4878I$ | $5.12788 - 3.72934I$ |
| $u = 0.435613 - 0.882797I$<br>$a = -0.459571 + 0.759123I$<br>$b = -0.805456 - 0.754951I$ | $4.77931 - 5.21174I$ | $3.15504 + 5.31436I$ |
| $u = 0.435613 + 0.882797I$<br>$a = -0.459571 - 0.759123I$<br>$b = -0.805456 + 0.754951I$ | $4.77931 + 5.21174I$ | $3.15504 - 5.31436I$ |
| $u = 0.469477 - 0.811158I$<br>$a = 0.404209 + 0.480681I$<br>$b = 0.158310 - 0.048192I$ | $2.92925 - 1.64742I$ | $-0.497780 + 0.432754I$ |
| $u = 0.469477 + 0.811158I$<br>$a = 0.404209 - 0.480681I$<br>$b = 0.158310 + 0.048192I$ | $2.92925 + 1.64742I$ | $-0.497780 - 0.432754I$ |
| $u = 0.582859 - 0.818130I$<br>$a = 0.851090 - 0.203961I$<br>$b = 1.349849 + 0.373604I$ | $5.74926 + 1.32005I$ | $5.01799 - 3.45627I$ |
| $u = 0.582859 + 0.818130I$<br>$a = 0.851090 + 0.203961I$<br>$b = 1.349849 - 0.373604I$ | $5.74926 - 1.32005I$ | $5.01799 + 3.45627I$ |

| Solution to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.632917 - 0.878463I$<br>$a = 1.27081 - 0.81492I$<br>$b = 2.94336 + 0.73691I$ | $14.1472 + 2.8867I$ | $6.24429 - 2.33035I$ |
| $u = 0.632917 + 0.878463I$<br>$a = 1.27081 + 0.81492I$<br>$b = 2.94336 - 0.73691I$ | $14.1472 - 2.8867I$ | $6.24429 + 2.33035I$ |
| $u = 0.803708 - 0.317036I$<br>$a = 0.51044 - 1.71089I$<br>$b = -0.412797 - 0.001631I$ | $5.81553 - 2.38249I$ | $3.49858 - 1.94330I$ |
| $u = 0.803708 + 0.317036I$<br>$a = 0.51044 + 1.71089I$<br>$b = -0.412797 + 0.001631I$ | $5.81553 + 2.38249I$ | $3.49858 + 1.94330I$ |
| $u = 0.861919 - 0.408962I$<br>$a = -0.257577 - 0.735996I$<br>$b = -0.754273 + 0.170939I$ | $-1.048050 - 0.087468I$ | $-1.42204 - 0.46193I$ |
| $u = 0.861919 + 0.408962I$<br>$a = -0.257577 + 0.735996I$<br>$b = -0.754273 - 0.170939I$ | $-1.048050 + 0.087468I$ | $-1.42204 + 0.46193I$ |
| $u = 0.935093 - 0.462361I$<br>$a = -0.639711 + 0.110299I$<br>$b = -1.102590 + 0.321289I$ | $-1.42561 + 3.60776I$ | $-3.44955 - 7.46646I$ |
| $u = 0.935093 + 0.462361I$<br>$a = -0.639711 - 0.110299I$<br>$b = -1.102590 - 0.321289I$ | $-1.42561 - 3.60776I$ | $-3.44955 + 7.46646I$ |
| $u = 1.027464 - 0.497180I$<br>$a = -0.631571 + 1.114430I$<br>$b = -1.42801 + 0.69223I$ | $4.51917 + 5.78869I$ | $-0.24695 - 6.50759I$ |
| $u = 1.027464 + 0.497180I$<br>$a = -0.631571 - 1.114430I$<br>$b = -1.42801 - 0.69223I$ | $4.51917 - 5.78869I$ | $-0.24695 + 6.50759I$ |

| Solution to $I_2^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 1.028107 - 0.728538I$<br>$a = -0.707898 + 1.089301I$<br>$b = -2.27182 - 1.56729I$ | $12.94610 + 3.03404I$ | $4.70765 - 2.85325I$ |
| $u = 1.028107 + 0.728538I$<br>$a = -0.707898 - 1.089301I$<br>$b = -2.27182 + 1.56729I$ | $12.94610 - 3.03404I$ | $4.70765 + 2.85325I$ |
| $u = 1.036304 - 0.664231I$<br>$a = -0.205688 + 0.704642I$<br>$b = -0.854773 - 0.436229I$ | $4.37658 + 4.22003I$ | $3.03418 - 2.36823I$ |
| $u = 1.036304 + 0.664231I$<br>$a = -0.205688 - 0.704642I$<br>$b = -0.854773 + 0.436229I$ | $4.37658 - 4.22003I$ | $3.03418 + 2.36823I$ |
| $u = 1.100009 - 0.633178I$<br>$a = 0.353036 + 0.351683I$<br>$b = 0.687151 + 0.428616I$ | $1.03930 + 7.06574I$ | $-3.38500 - 4.72007I$ |
| $u = 1.100009 + 0.633178I$<br>$a = 0.353036 - 0.351683I$<br>$b = 0.687151 - 0.428616I$ | $1.03930 - 7.06574I$ | $-3.38500 + 4.72007I$ |
| $u = 1.133289 - 0.650060I$<br>$a = 0.612216 - 0.284017I$<br>$b = 2.19653 + 0.41864I$ | $2.67414 + 10.86915I$ | $-0.08281 - 9.42092I$ |
| $u = 1.133289 + 0.650060I$<br>$a = 0.612216 + 0.284017I$<br>$b = 2.19653 - 0.41864I$ | $2.67414 - 10.86915I$ | $-0.08281 + 9.42092I$ |
| $u = 1.154931 - 0.665889I$<br>$a = 0.701102 - 0.991474I$<br>$b = 3.73573 + 0.16301I$ | $10.5867 + 13.3384I$ | $2.25336 - 7.77835I$ |
| $u = 1.154931 + 0.665889I$<br>$a = 0.701102 + 0.991474I$<br>$b = 3.73573 - 0.16301I$ | $10.5867 - 13.3384I$ | $2.25336 + 7.77835I$ |

## III. u-Polynomials

| Crossings | u-Polynomials at each crossings |
|---|---|
| $c_1$ | $(u-1)^4(u^{50}+5u^{49}+\cdots+u+1)$ |
| $c_2$ | $(u+1)^4(u^{50}+23u^{49}+\cdots-15u+1)$ |
| $c_3, c_7$ | $u^4(u^{50}+u^{49}+\cdots+24u+16)$ |
| $c_4$ | $(u+1)^4(u^{50}+5u^{49}+\cdots+u+1)$ |
| $c_5, c_6$ | $(u^4-u^3+3u^2-2u+1)(u^{50}+2u^{49}+\cdots+3u+1)$ |
| $c_8$ | $(u^4+u^3+u^2+1)(u^{50}+2u^{49}+\cdots+1491u+445)$ |
| $c_9, c_{10}$ | $(u^4+u^3+3u^2+2u+1)(u^{50}+2u^{49}+\cdots+3u+1)$ |
| $c_{11}$ | $(u^4+u^3+u^2+1)(u^{50}+14u^{49}+\cdots+1257u+131)$ |

**IV. Riley Polynomials**

| Crossings | Riley Polynomials at each crossings |
|---|---|
| $c_1, c_4$ | $(y-1)^4(y^{50} - 23y^{49} + \cdots + 15y + 1)$ |
| $c_2$ | $(y-1)^4(y^{50} + 13y^{49} + \cdots + 3y + 1)$ |
| $c_3, c_7$ | $y^4(y^{50} - 27y^{49} + \cdots - 2624y + 256)$ |
| $c_5, c_6, c_9$ $c_{10}$ | $(y^4 + 5y^3 + \cdots + 2y + 1)(y^{50} + 58y^{49} + \cdots + y + 1)$ |
| $c_8$ | $(y^4 + y^3 + 3y^2 + 2y + 1)(y^{50} - 22y^{49} + \cdots - 648671y + 198025)$ |
| $c_{11}$ | $(y^4 + y^3 + 3y^2 + 2y + 1)(y^{50} - 10y^{49} + \cdots + 86009y + 17161)$ |