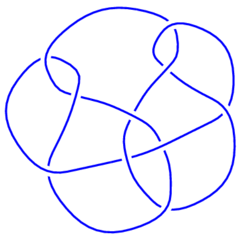
10_{89} $(K10a_{21})$



1

Arc Sequences

$\longrightarrow \uparrow \longrightarrow \uparrow \longrightarrow \downarrow \longrightarrow \uparrow \longrightarrow \uparrow \longrightarrow \uparrow \longrightarrow \downarrow \longrightarrow \uparrow \longrightarrow \uparrow \longrightarrow \downarrow \longrightarrow$

4 7 6 1 8 10 9 5 3 2

Solving Sequence

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

Representation Ideals

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

$$\begin{aligned} I_1^u = \langle & u^9 + 2u^8 + 4u^7 + 4u^6 + 5u^5 + 4u^4 + 4u^3 + 2u^2 + u - 1,\ a - 1, \\ & - u^7 - 2u^6 - 4u^5 - 4u^4 - 4u^3 - 3u^2 + b - 2u + 1\rangle \\ I_2^u = \langle & u^{40} - u^{39} + \cdots - 4u + 1,\ -1.50539 \times 10^{21}u^{39} - 8.54010 \times 10^{21}u^{38} + \cdots + 1.43109 \times 10^{22}b + 1.16133 \times 10^2 \\ & - 1.56356 \times 10^{21}u^{39} + 4.10513 \times 10^{21}u^{38} + \cdots + 1.43109 \times 10^{22}a - 4.19701 \times 10^{22}\rangle \end{aligned}$$

There are 2 irreducible components with 49 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. $I_1^u = \langle u^9 + 2u^8 + \cdots + u - 1,\ a - 1,\ -u^7 - 2u^6 + \cdots + b + 1\rangle$

(i) Arc colorings

$$a_5 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_8 = \begin{pmatrix} 1 \\ u^7 + 2u^6 + 4u^5 + 4u^4 + 4u^3 + 3u^2 + 2u - 1 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} u \\ u^8 + 2u^7 + 4u^6 + 4u^5 + 4u^4 + 3u^3 + 2u^2 \end{pmatrix}$$
$$a_1 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} 1 \\ u^7 + 2u^6 + 4u^5 + 4u^4 + 4u^3 + 2u^2 + 2u - 1 \end{pmatrix}$$
$$a_4 = \begin{pmatrix} -u \\ u \end{pmatrix}$$
$$a_2 = \begin{pmatrix} u^2 + 1 \\ -u^2 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} -u^6 - u^5 - 2u^4 - u^3 - u^2 \\ u^8 + 3u^7 + 7u^6 + 8u^5 + 7u^4 + 4u^3 + u^2 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} u^2 + 1 \\ u^7 + 2u^6 + 3u^5 + 2u^4 + 2u^3 + u \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} u^4 + u^2 + 1 \\ -u^4 \end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes $= -4u^8 - 4u^7 - 8u^6 - 4u^5 - 4u^4 + 4u^3 + 8u^2 + 8u + 6$

(iv) Complex Volumes and Cusp Shapes

Solution to I_1^u	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.870256 - 0.574591I$ $a = \quad 1.00000$ $b = -0.728103 - 0.109094I$	$4.84938 - 3.79988I$	$8.45408 + 1.48636I$
$u = -0.870256 + 0.574591I$ $a = \quad 1.00000$ $b = -0.728103 + 0.109094I$	$4.84938 + 3.79988I$	$8.45408 - 1.48636I$
$u = -0.695984 - 1.121926I$ $a = \quad 1.00000$ $b = -2.98028 - 0.25727I$	$1.4591 + 15.5661I$	$3.71332 - 9.69859I$
$u = -0.695984 + 1.121926I$ $a = \quad 1.00000$ $b = -2.98028 + 0.25727I$	$1.4591 - 15.5661I$	$3.71332 + 9.69859I$
$u = -0.168491 - 1.118820I$ $a = \quad 1.00000$ $b = -2.68249 - 0.54863I$	$-6.19752 - 0.38154I$	$-4.67885 + 0.54411I$
$u = -0.168491 + 1.118820I$ $a = \quad 1.00000$ $b = -2.68249 + 0.54863I$	$-6.19752 + 0.38154I$	$-4.67885 - 0.54411I$
$u = \quad 0.375070$ $a = \quad 1.00000$ $b = \quad 0.498694$	1.02805	10.2002
$u = \quad 0.547196 - 0.894013I$ $a = \quad 1.00000$ $b = -3.35847 + 2.85177I$	$0.19748 - 4.39098I$	$-9.5886 - 15.7654I$
$u = \quad 0.547196 + 0.894013I$ $a = \quad 1.00000$ $b = -3.35847 - 2.85177I$	$0.19748 + 4.39098I$	$-9.5886 + 15.7654I$

II. $I_2^u =$
$\langle u^{40}-u^{39}+\cdots-4u+1,\ -1.51\times10^{21}u^{39}-8.54\times10^{21}u^{38}+\cdots+1.43\times10^{22}b+1.16\times10^{21},\ -1.56\times10^{21}u^{39}+4.11\times10^{21}u^{38}+\cdots+1.43\times10^{22}a-4.20\times10^{22}\rangle$

(i) Arc colorings

$$a_5 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_8 = \begin{pmatrix} 0.109256u^{39} - 0.286854u^{38} + \cdots + 1.92156u + 2.93274 \\ 0.105192u^{39} + 0.596755u^{38} + \cdots + 1.86260u - 0.0811501 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} 1.06601u^{39} - 1.17669u^{38} + \cdots + 11.5374u - 0.964139 \\ -0.738303u^{39} + 1.38641u^{38} + \cdots + 0.219934u + 0.0521006 \end{pmatrix}$$
$$a_1 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} 0.109256u^{39} - 0.286854u^{38} + \cdots + 1.92156u + 2.93274 \\ 0.0224436u^{39} + 0.618071u^{38} + \cdots + 2.68225u - 0.258747 \end{pmatrix}$$
$$a_4 = \begin{pmatrix} -u \\ u \end{pmatrix}$$
$$a_2 = \begin{pmatrix} u^2+1 \\ -u^2 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} 0.383801u^{39} - 0.522164u^{38} + \cdots - 4.43995u - 3.75968 \\ 0.288379u^{39} - 1.18026u^{38} + \cdots + 3.94428u - 1.44465 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} 1.11303u^{39} - 1.15681u^{38} + \cdots + 12.7499u - 1.28985 \\ -0.746612u^{39} + 1.48670u^{38} + \cdots + 0.586706u + 0.00240648 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} u^4+u^2+1 \\ -u^4 \end{pmatrix}$$

(ii) Obstruction class $= -1$

(iii) Cusp Shapes $= \frac{7240880437793028884842 4}{14310892564212518359243}u^{39} - \frac{7796861415980171965239 6}{14310892564212518359243}u^{38} + \cdots - \frac{868162249864229052688 0}{622212720183152972141}u + \frac{760387852488103551017 10}{14310892564212518359243}$

(iv) Complex Volumes and Cusp Shapes

Solution to I_2^u	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.932276 - 0.516877I$ $a = \quad 0.079669 - 1.198293I$ $b = -0.272297 - 0.792744I$	$3.31734 - 9.59937I$	$6.13875 + 5.98964I$
$u = -0.932276 + 0.516877I$ $a = \quad 0.079669 + 1.198293I$ $b = -0.272297 + 0.792744I$	$3.31734 + 9.59937I$	$6.13875 - 5.98964I$
$u = -0.693643 - 1.075961I$ $a = \quad 0.055239 - 0.830848I$ $b = -0.272297 + 0.792744I$	$3.31734 + 9.59937I$	$6.13875 - 5.98964I$
$u = -0.693643 + 1.075961I$ $a = \quad 0.055239 + 0.830848I$ $b = -0.272297 - 0.792744I$	$3.31734 - 9.59937I$	$6.13875 + 5.98964I$
$u = -0.632900 - 0.810710I$ $a = -0.299367 + 1.004347I$ $b = \quad 0.412566 - 0.700752I$	$3.51067 + 0.70102I$	$13.30095 - 0.29053I$
$u = -0.632900 + 0.810710I$ $a = -0.299367 - 1.004347I$ $b = \quad 0.412566 + 0.700752I$	$3.51067 - 0.70102I$	$13.30095 + 0.29053I$
$u = -0.630140 - 0.869793I$ $a = -0.979789 + 0.450490I$ $b = \quad 1.068927 - 0.123272I$	$3.33020 + 4.24448I$	$12.4039 - 6.8707I$
$u = -0.630140 + 0.869793I$ $a = -0.979789 - 0.450490I$ $b = \quad 1.068927 + 0.123272I$	$3.33020 - 4.24448I$	$12.4039 + 6.8707I$
$u = -0.604828 - 0.939285I$ $a = -1.241551 - 0.022595I$ $b = \quad 2.54216 + 0.22786I$	$1.15558 + 6.98661I$	$6.87126 - 10.77467I$
$u = -0.604828 + 0.939285I$ $a = -1.241551 + 0.022595I$ $b = \quad 2.54216 - 0.22786I$	$1.15558 - 6.98661I$	$6.87126 + 10.77467I$

Solution to I_2^u	$\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$	Cusp shape
$u = -0.592803 - 0.720077I$ $a = 0.34689 + 1.37373I$ $b = -0.1086854 + 0.0064465I$	$1.83047 - 2.21575I$	$9.27050 + 4.60917I$
$u = -0.592803 + 0.720077I$ $a = 0.34689 - 1.37373I$ $b = -0.1086854 - 0.0064465I$	$1.83047 + 2.21575I$	$9.27050 - 4.60917I$
$u = -0.592384 - 0.373525I$ $a = 0.70906 + 1.45706I$ $b = -0.786214 + 0.152074I$	$-1.87648 - 2.61466I$	$1.96705 + 3.93297I$
$u = -0.592384 + 0.373525I$ $a = 0.70906 - 1.45706I$ $b = -0.786214 - 0.152074I$	$-1.87648 + 2.61466I$	$1.96705 - 3.93297I$
$u = -0.575991 - 1.044937I$ $a = -0.973674 - 0.482651I$ $b = 2.46129 - 0.06416I$	$-3.62992 + 7.26942I$	$-0.25897 - 8.20898I$
$u = -0.575991 + 1.044937I$ $a = -0.973674 + 0.482651I$ $b = 2.46129 + 0.06416I$	$-3.62992 - 7.26942I$	$-0.25897 + 8.20898I$
$u = -0.116121 - 0.708920I$ $a = 1.39782 + 0.79621I$ $b = -1.51786 - 0.78748I$	$-1.51323 - 2.73094I$	$0.60746 + 4.99024I$
$u = -0.116121 + 0.708920I$ $a = 1.39782 - 0.79621I$ $b = -1.51786 + 0.78748I$	$-1.51323 + 2.73094I$	$0.60746 - 4.99024I$
$u = 0.056488 - 1.295430I$ $a = -0.824454 - 0.408682I$ $b = 2.46129 + 0.06416I$	$-3.62992 - 7.26942I$	$-0.25897 + 8.20898I$
$u = 0.056488 + 1.295430I$ $a = -0.824454 + 0.408682I$ $b = 2.46129 - 0.06416I$	$-3.62992 + 7.26942I$	$-0.25897 - 8.20898I$

Solution to I_2^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u = 0.124209 - 1.127991I$ $a = 0.270039 - 0.554903I$ $b = -0.786214 + 0.152074I$	$-1.87648 - 2.61466I$	$1.96705 + 3.93297I$
$u = 0.124209 + 1.127991I$ $a = 0.270039 + 0.554903I$ $b = -0.786214 - 0.152074I$	$-1.87648 + 2.61466I$	$1.96705 - 3.93297I$
$u = 0.232545 - 0.154995I$ $a = 3.48074 - 1.33500I$ $b = 0.260340 - 0.435469I$	$0.59509 - 2.36716I$	$1.43169 + 3.69296I$
$u = 0.232545 + 0.154995I$ $a = 3.48074 + 1.33500I$ $b = 0.260340 + 0.435469I$	$0.59509 + 2.36716I$	$1.43169 - 3.69296I$
$u = 0.378614 - 0.869397I$ $a = -0.681164 + 0.732131I$ $b = 3.34169$	-0.714628	8.43291
$u = 0.378614 + 0.869397I$ $a = -0.681164 - 0.732131I$ $b = 3.34169$	-0.714628	8.43291
$u = 0.402129 - 1.083401I$ $a = 0.540148 - 0.307670I$ $b = -1.51786 - 0.78748I$	$-1.51323 - 2.73094I$	$0.60746 + 4.99024I$
$u = 0.402129 + 1.083401I$ $a = 0.540148 + 0.307670I$ $b = -1.51786 + 0.78748I$	$-1.51323 + 2.73094I$	$0.60746 - 4.99024I$
$u = 0.548393 - 0.820650I$ $a = -0.382602 + 0.923913I$ $b = -2.46215$	0.434649	-15.8981
$u = 0.548393 + 0.820650I$ $a = -0.382602 - 0.923913I$ $b = -2.46215$	0.434649	-15.8981

Solution to I_2^u	$\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$	Cusp shape
$u = 0.602510 - 0.849943I$ $a = 0.250453 + 0.096059I$ $b = 0.260340 - 0.435469I$	$0.59509 - 2.36716I$	$1.43169 + 3.69296I$
$u = 0.602510 + 0.849943I$ $a = 0.250453 - 0.096059I$ $b = 0.260340 + 0.435469I$	$0.59509 + 2.36716I$	$1.43169 - 3.69296I$
$u = 0.729702 - 1.179837I$ $a = -0.805178 - 0.014654I$ $b = 2.54216 - 0.22786I$	$1.15558 - 6.98661I$	$6.87126 + 10.77467I$
$u = 0.729702 + 1.179837I$ $a = -0.805178 + 0.014654I$ $b = 2.54216 + 0.22786I$	$1.15558 + 6.98661I$	$6.87126 - 10.77467I$
$u = 0.783556 - 1.064141I$ $a = 0.172799 - 0.684309I$ $b = -0.1086854 + 0.0064465I$	$1.83047 - 2.21575I$	$9.27050 + 4.60917I$
$u = 0.783556 + 1.064141I$ $a = 0.172799 + 0.684309I$ $b = -0.1086854 - 0.0064465I$	$1.83047 + 2.21575I$	$9.27050 - 4.60917I$
$u = 1.003704 - 0.392952I$ $a = -0.272565 - 0.914428I$ $b = 0.412566 - 0.700752I$	$3.51067 + 0.70102I$	$13.30095 - 0.29053I$
$u = 1.003704 + 0.392952I$ $a = -0.272565 + 0.914428I$ $b = 0.412566 + 0.700752I$	$3.51067 - 0.70102I$	$13.30095 + 0.29053I$
$u = 1.009238 - 0.568343I$ $a = -0.842519 + 0.387375I$ $b = 1.068927 + 0.123272I$	$3.33020 - 4.24448I$	$12.4039 + 6.8707I$
$u = 1.009238 + 0.568343I$ $a = -0.842519 - 0.387375I$ $b = 1.068927 - 0.123272I$	$3.33020 + 4.24448I$	$12.4039 - 6.8707I$

III. u-Polynomials

Crossings	u-Polynomials at each crossings
c_1, c_4, c_5 c_8	$(u^9 + 2u^8 + 4u^7 + 4u^6 + 5u^5 + 4u^4 + 4u^3 + 2u^2 + u - 1)$ $(u^{40} - u^{39} + \cdots - 4u + 1)$
c_2	$(u^9 + 13u^8 + \cdots + 152u + 32)$ $(-1 + 2u + 6u^2 - 20u^3 + u^4 + 66u^5 - 100u^6 + 14u^7 + 125u^8 - 148u^9 + 26u^{10} + 80u^{11} - 68u$
c_3	$(u^9 + 13u^8 + \cdots + 208u + 32)(u^{40} - 10u^{39} + \cdots - 12u + 1)$
c_6, c_9	$(u^9 - 2u^6 + \cdots + 3u - 1)(u^{40} + 5u^{39} + \cdots + 4u + 1)$
c_7	$(u^9 + 4u^8 + 10u^7 + 16u^6 + 19u^5 + 20u^4 + 18u^3 + 12u^2 + 5u - 1)$ $(u^{40} + 15u^{39} + \cdots + 120u^2 + 1)$
c_{10}	$(u^9 + 4u^8 + 10u^7 + 16u^6 + 19u^5 + 20u^4 + 18u^3 + 12u^2 + 5u - 1)$ $(u^{40} + 15u^{39} + \cdots + 120u^2 + 1)$

IV. Riley Polynomials

Crossings	Riley Polynomials at each crossings
c_1, c_4, c_5	$(y^9 + 4y^8 + 10y^7 + 16y^6 + 19y^5 + 20y^4 + 18y^3 + 12y^2 + 5y - 1)$
c_8	$(y^{40} + 15y^{39} + \cdots + 120y^2 + 1)$
c_2	$(y^9 - 25y^8 + \cdots - 192y - 1024)$ $(1 - 16y + 114y^2 - 452y^3 + 1135y^4 - 1956y^5 + 2610y^6 - 3236y^7 + 4163y^8 - 5216y^9 + 6152y$
c_3	$(y^9 - 23y^8 + \cdots + 8960y - 1024)(y^{40} - 14y^{39} + \cdots - 4y + 1)$
c_6	$(y^9 + 10y^7 + 4y^6 + 31y^5 + 16y^4 + 42y^3 - 12y^2 - 3y - 1)$ $(y^{40} - 5y^{39} + \cdots - 8y + 1)$
c_7	$(y^9 + 4y^8 + 10y^7 - 5y^5 + 8y^4 + 66y^3 + 76y^2 + 49y - 1)$ $(y^{40} + 19y^{39} + \cdots + 240y + 1)$
c_9	$(y^9 + 10y^7 + 4y^6 + 31y^5 + 16y^4 + 42y^3 - 12y^2 - 3y - 1)$ $(y^{40} - 5y^{39} + \cdots - 8y + 1)$
c_{10}	$(y^9 + 4y^8 + 10y^7 - 5y^5 + 8y^4 + 66y^3 + 76y^2 + 49y - 1)$ $(y^{40} + 19y^{39} + \cdots + 240y + 1)$