東北結び目セミナー 講演アブストラクト集

内田 吉昭 (神戸薬科大学薬学部)

デルタ型結び目解消操作と X 型結び目解消操作について

デルタ型結び目解消操作は結び目の Conway 多項式の 2 次の係数を ±1 変える. デルタ型結び目解消操作は X 型結び目解消操作 2 回で実現できる. そこで, デルタ型結び目解消操作に対して, 対応する X 型結び目解消操作を 1 回だけ施して得られる結び目の Conway 多項式の 2 次の係数との関連性を考察する.

岸本 健吾 (大阪市立大学数学研究所)

A note on local moves for knots

In this talk, we study certain local moves for knots. First we observe a relationship between a #-move and a Δ-move. For any knot K, we show that $u_{\#}(K) \leq 3u_{\Delta}(K)$, where $u_{\#}$ (resp. u_{Δ}) is the #-unknotting number (resp. the Δ-unknotting number). This inequality is best possible.

Second we consider a property of the #-Gordian graph. The #-Gordian graph $\mathcal{G}_{\#}$ is a bipartite graph because a single #-move changes the arf invariant. We show that, for any knot and any natural numbers m, n, there exists a complete bipartite graph $K_{m,n} \subset \mathcal{G}_{\#}$ such that $K_{m,n}$ contains the knot.

中西 康剛 (神戸大学大学院理学研究科)

Notes on sharp moves for knots

(中村 拓司 (大阪電気通信大学) との共同研究)

The sharp move is a one of local moves for oriented knots introduced by H. Murakami in 1995. It is known that the sharp move is a (generalized) unknotting operation. The sharp unknotting number is the minimum number of sharp moves to create the unknot. In this talk, we will show the non-additivity of the sharp unknotting number under the connected-sum. This is a generalization of results of H. Murakami and S. Sakai. This is a joint work with Takuji Nakamura.

清水 理佳 (大阪市立大学大学院理学研究科)

結び目図式のひずみ多項式について

向き付けられた結び目図式の各辺に, ひずみ度による番号を与えることにより, 「ひずみ多項式」を定義する. これは変数に -1 を代入すると 0 となる多項式である. さらに, 仮想結び目図式に対してもひずみ多項式を定義すると, 交差点での交差交換と仮想化により得られる 3 つの図式の組において, ある関係式が成り立つ.

河内 明夫 (大阪市立大学大学院理学研究科)

Immersed link cobordism and Alexander polynomial

We show that if a link L with r components is cobordant to a trivial link by a cobordism of immersed r annuli with $r-1$ double points, then the Alexander polynomial $A(t)$ of L has the form $(t-1)^{r-1}f(t)f(t^{-1})$ for an integral polynomial $f(t)$.

岡崎 真也 (大阪市立大学大学院理学研究科)

On a homeomorphism of Heegaard splitting obtained from bridge position of a knot

By a bridge position of a link in the three sphere, we have a Heegaard splitting of the three sphere such that the link is included standardly in one of the Heegaard handlebodies. This Heegaard splitting of the three sphere induces a Heegaard splitting of the zero surgery manifold along the link. In this paper, we show how a Heegaard surface homeomorphism of the zero surgery manifold is obtained from the Heegaard splitting of the three sphere in terms of the Suzuki generators of the mapping class group of the Heegaard surface.

市原 一裕 (日本大学文理学部)

Acylindrical surfaces in 3-manifolds of genus two

(小沢 誠 (駒澤大学), Hyam Rubinstein (University of Melbourne) との共同研究)

A closed incompressible orientable surface embedded in an orientable 3-manifold is called acylindrical if any embedded incompressible annulus which meets the surface at its ends is parallel into the surface. In this talk, it is shown that every acylindrical surface is non-separating in a closed orientable irreducible 3-manifold of Heegaard genus two, and is not invariant by the canonical involution if the manifold is hyperbolic. Based on these results, it is proved that hyperbolic 3-manifolds of Heegaard genus two contain no closed embedded totally geodesic surfaces.

野坂 武史 (京都大学数理解析研究所)

On quandle homotopy invariants of linked curves and surfaces for regular Alexander quandles

This talk discusses quandle homotopy invariants of linked curves and surfaces. These invariants are valued in $\pi_2(B^Q X)$ and $\pi_3(B^Q X)$, respectively, where $B^Q X$ is the quandle space of a finite quandle X. To begin, we determine the rational homotopy. Further, for a regular Alexander quandle whose second quandle homology vanishes, we show that $\pi_3(B^Q X)$ is isomorphic to the forth quandle homology of X. In particular, X is the dihedral quandle of prime order p, $\pi_3(B^Q X)$ is $\mathbb{Z}/p\mathbb{Z}$. Moreover, we show that, for such quandles, the quandle homotopy invariant of classical links is determined by the shadow cocycle invariants.

岩切 雅英 (大阪市立大学数学研究所)

Fox colorings and cocycle invariants of roll-spun knots

(佐藤 進 (神戸大学大学院理学研究科) との共同研究)

A roll-spun knot is a 2-knot constructed by deforming a classical knot with some rolls along the longitude. In this talk, we study the numbers of the Fox p-colorings and the cocycle invariants of roll-spun knots, and show that the dihedral quandle cocycle invariant of any roll-spun knot is always trivial.

鄭 仁大 (大阪市立大学数学研究所)

Seifert surgeries on $(-2, p, p)$-pretzel knots

(市原 一裕 (日本大学) との共同研究)

A Dehn surgery on a knot is called a Seifert surgery if it yields a Seifert fibered manifold. In this talk, we give a complete classification of Seifert surgeries on a $(-2, p, p)$-pretzel knot in the 3-sphere, where p is an odd positive integer.

茂手木 公彦 (日本大学文理学部)

Seifert Surgery Network and chain links

(Arnaud Deruelle (日本大学), 宮崎 桂 (東京電機大学) との共同研究)

Several works of Baker, Gordon, Luecke and Wu suggest that chain links seem to have special roles in a study of non-hyperbolic Dehn surgeries on hyperbolic knots. In particular, Baker clarifies a relationship between Berge's lens surgeries and chain links. We will discuss joint work in progress with Arnaud Deruelle and Katura Miyazaki on some relations between Seifert surgeries and chain links.

伊藤 昇 (早稲田大学基幹理工学部数学科)

Remarks on categorification of the colored Jones polynomial

We give a proof of the existence of a Khovanov-type bicomplex which has two homological degrees and q-degree for the colored Jones polynomial. We also introduce a colored Jones polynomial and its categorification for nanophrases, a generalization of links.

安部 哲哉 (大阪市立大学数学研究所)

等質結び目のラスムッセン不変量

等質結び目は, 交代結び目と正の結び目を含む結び目のクラスである. この講演では, 等質結び目のラスムッセン不変量を決定する. また, その応用として正結び目のラスムッセン不変量を用いた特徴付けを与える. 残りの時間で, 非等質結び目のラスムッセン不変量の考察をする. 特に, プレッツェル結び目 $P(3,-5,-7)$ のラスムッセン不変量について述べる.

新庄 玲子 (大阪市立大学数学研究所)

Exchange moves and non-conjugate braid representations of knots

(Alexander Stoimenow (Keimyung University) との共同研究)

Birman and Menasco introduced a move called exchange move, and proved that if a link has infinitely many conjugacy classes of n-braid representatives, the conjugacy classes divide into finitely many equivalence classes under the combination of exchange moves and conjugacy.

We prove that every knot has infinitely many conjugacy classes of n-braid representations if and only if it has one admitting an exchange move.