東北結び目セミナー 2016

アブストラクト集

直江 央寛（東北大学大学院理学研究科）

Acyclic 4-manifolds with shadow complexity zero and polyhedral collapsing

Any compact, oriented, smooth 4-manifold can be represented by a 2-dimensional polyhedron called a shadow. Costantino introduced the shadow complexity of a compact 4-manifold, which is defined as the minimum number of true vertices of a shadow of the manifold. The closed 4-manifolds with (special) shadow complexity zero have been completely classified by Costantino and Martelli. In this talk, we show that every acyclic 4-manifold with shadow complexity zero is diffeomorphic to a 4-ball.

田中 心（東京学芸大学）

Coherent and incoherent numbers of a knot

（新庄玲子氏（国士舘大学理工学部）との共同研究）

A complementary region of an oriented knot diagram on the two sphere is said to be coherent (resp. incoherent) if the orientation of its boundary is coherent (resp. incoherent). In this talk, we investigate the numbers of all coherent regions and all incoherent regions of an oriented knot diagram, and define two numerical invariants, called the coherent number and the incoherent number, of a(n oriented) knot. We also investigate relation between our two invariants and other numerical knot invariants such as the canonical genus, the braid index and the crosscap number of a knot, and characterize the knots with coherent number up to four. This is a joint work with Reiko Shinjo (Kokushikan University).

吉池 俊（日本大学大学院総合基礎科学研究科）

Forbidden detour number on virtual knot

We consider the forbidden detour move essentially introduced by Kanenobu and Nelson, which is shown to be an unknotting operation on virtual knots. The forbidden detour number of a virtual knot is defined to be the minimal number of forbidden detour moves necessary to transform the virtual knot into a trivial knot. In this talk, some upper and lower bounds on the forbidden detour number will be given.

茂手木 公彦（日本大学文理学部）
Knots with infinitely many non-characterizing slopes
（Ken Baker 氏（University of Miami）との共同研究）

A non-trivial slope r on a knot K in S^3 is called a characterizing slope if whenever the result of r–surgery on a knot K' is orientation preservingly homeomorphic to the result of r–surgery on K, then K' is isotopic to K. Ni and Zhang ask: for any hyperbolic knot K, is a slope $r = p/q$ with $|p| + |q|$ sufficiently large a characterizing slope? In this talk we give a general construction of knots with infinitely many non-characterizing slopes. As the simplest known example, the hyperbolic, two-bridge knot 8_6 has no integral characterizing slopes. This answers the above question in the negative. This is joint work with Ken Baker.

福田 瑞季（東北大学大学院理学研究科）
Distinguishing branched twist spins by knot determinants

A branched twist spin is a 2-knot which appeared in the study of locally smooth circle actions on the 4-sphere. Pao and Plotnick showed that a 2-knot is a branched twist spin if and only if it is a fibered 2-knot which has a periodic monodromy. In this talk, we give a sufficient condition to distinguish non-trivial branched twist spins by using the first elementary ideals of them.

伊藤 哲也（大阪大学大学院理学研究科）
Alexander invariant criterion for bi-orderability

It is known that under some assumptions (such as, being fibered), the Alexander polynomial gives an obstruction for a group to be bi-orderable. In this talk we give a non-bi-orderability criterion based on Alexander invariants, which can be applied for much wider class. For example, our criterion applies for all knot groups (without any assumptions).

村上 斉（東北大学大学院情報科学研究科）
The colored Jones polynomial, the Chern-Simons invariant, and the Reidemeister torsion

I will describe how the colored Jones polynomial of a knot determines the Chern-Simons invariant and the Reidemeister torsion associated with a certain representa-

tion for several knots.

高田 敏恵（九州大学大学院数理学研究院）
The slope conjecture and periodic construction
（茂手木公彦氏（日本大学文理学部）との共同研究）

The slope conjecture proposed by Garoufalidis asserts that the Jones slopes given by the sequence of degrees of the colored Jones polynomials are boundary slopes. We verify the slope conjecture for some non-adequate, periodic knots.

This is a joint work with Kimihiko Motegi.

谷山 公規（早稲田大学教育学部）
A common stabilization of diagrams of a knot
（松崎尚作氏（早稲田大学教育学部）との共同研究）

A stabilization of a knot diagram is a knot diagram obtained from it by a series of Reidemeister moves each of which does not decrease the number of crossings. We show that for any finite collection of knot diagrams of a knot, there is a knot diagram of the knot that is a common stabilization of the diagrams in the collection.

河内 明夫（大阪市立大学数学研究所）
Cross-index of a graph

By associating to every tree, a topological invariant of a connected graph called the cross-index is introduced so that it takes a non-negative integer or the infinity according to whether the tree is a maximal tree of the graph or not. It is shown how this invariant is independent of the other topological invariants of a connected graph such as the Euler characteristic, the crossing number and the genus.

市原 一裕（日本大学文理学部）
Hyperbolic small knots in lens spaces

It was conjectured by L.M. Lopez that small knots always exist in closed small 3-manifolds. In this talk, I will talk about the current status of this conjecture, and show that every lens space contains a hyperbolic small knot.

河村 建吾（大阪市立大学数学研究所）

Immersed surface-knots and quandle (co)homology groups

An immersed surface-knot is a closed connected and oriented surface generically immersed in a 4-space. In this talk, we introduce a modification of quandle (co)homology groups which is closely related to diagrams of immersed surface-knots.

合田 洋（東京農工大学）

Lifts of holonomy representations and the volume of a link complement

Let M be an oriented, complete, hyperbolic 3-manifold of finite volume. The hyperbolic structure of M yields the holonomy representation: $\mathrm{Hol}_M : \pi_1(M, p) \to \mathrm{Isom}^+\mathbb{H}^3$. $\mathrm{Isom}^+\mathbb{H}^3$ is naturally identified with $\mathrm{PSL}(2, \mathbb{C}) \cong \mathrm{SL}(2, \mathbb{C})/\{\pm 1\}$. It is known that Hol_M can be lifted to $\mathrm{SL}(2, \mathbb{C})$; moreover, such lifts are in canonical one to one correspondence with spin structures on M. In this talk, we discuss the lifts of the holonomy representations, and then we give a volume formula of a hyperbolic link complement using the twisted Alexander invariants.