

研究集会 Intelligence of Low-dimensional Topology

京都大学数理解析研究所 RIMS 研究集会として、また、大阪市立大学数学研究所から後援を受けて、標記の研究集会を開催いたします。この研究集会はトポロジープロジェクトの一環として科学研究費補助金 基盤研究 A 「3次元多様体論の深化」(課題番号 22244004、研究代表者 小島定吉氏(東京工業大学))の援助を受けています。

日程：2010年6月2日(水)～4日(金)

場所：京都大学 数理解析研究所 420 大講演室

アクセス：<http://www.kurims.kyoto-u.ac.jp/ja/access-01.html>

6月2日(水)

13:20～14:10 松田浩(広島大学大学院理学研究科)

An extension of Burau representation, and a deformation of Alexander polynomial

14:30～15:20 野坂武史(京都大学数理解析研究所)

4-fold symmetric quandle invariants of 3-manifolds (畠中英里氏(東京農工大学)との共同研究)

15:40～16:30 蒲谷祐一(大阪市立大学数学研究所)

Quandle cocycles from group cocycles

6月3日(木)

10:00～10:50 谷山公規(早稲田大学教育学部)

Multiplicity distance of knots

11:10～12:00 岩切雅英(大阪市立大学数学研究所)

Invariants of conjugacy classes of surface braids derived from Alexander quandles or core quandles

13:20～14:10 安原晃(東京学芸大学)

Finite type invariants of string links and the HOMFLYPT polynomial of knots (with Jean-Baptiste Meilhan, University of Grenoble 1)

14:30～15:20 佐藤信哉(立教大学理学部)

An introduction to the planar algebras

15:40～ Problem Session

6月4日(金)

10:00 ~ 10:50 逆井卓也(東京工業大学大学院理工学研究科)

Factorization formulas of higher-order Alexander invariants for homologically fibered knots (合田洋氏(東京農工大学)との共同研究)

11:10 ~ 12:00 金英子(東京工業大学大学院情報理工学研究科)

Bounds of minimal dilatation for pseudo-Anosovs and the magic 3-manifold (高沢光彦氏(東京工業大学)との共同研究)

13:20 ~ 14:10 安部哲哉(大阪市立大学数学研究所、日本学術振興会特別研究員 PD)

Lee's homology and Rasmussen invariant

14:30 ~ 15:20 András Juhász (University of Cambridge)

Classifying minimal genus Seifert surfaces

組織委員: 河内明夫、河野俊丈、金信泰造、鎌田聖一、大槻知忠、葉廣和夫

世話人: 大槻知忠、葉廣和夫(京大数理研)

Intelligence of Low-dimensional Topology

June 2–4, 2010

Room 420, RIMS, Kyoto University

Access: <http://www.kurims.kyoto-u.ac.jp/en/access-01.html>

Program

June 2 (Wed)

13:20–14:10 Hiroshi Matsuda (Hiroshima University)

An extension of Burau representation, and a deformation of Alexander polynomial

14:30–15:20 Takefumi Nosaka (RIMS, Kyoto university)

4-fold symmetric quandle invariants of 3-manifolds (joint work with Eri Hatakenaka (Tokyo University of Agriculture and Technology))

15:40–16:30 Yuichi Kabaya (OCAMI, Osaka City University)

Quandle cocycles from group cocycles

June 3 (Thu)

10:00–10:50 Kouki Taniyama (Waseda University)

Multiplicity distance of knots

11:10–12:00 Masahide Iwakiri (OCAMI, Osaka City University)

Invariants of conjugacy classes of surface braids derived from Alexander quandles or core quandles

13:20–14:10 Akira Yasuhara (Tokyo Gakugei University)

Finite type invariants of string links and the HOMFLYPT polynomial of knots (with Jean-Baptiste Meilhan, University of Grenoble 1)

14:30–15:20 Nobuya Sato (Rikkyo University)

An introduction to the planar algebras

15:40– Problem Session

June 4 (Fri)

10:00–10:50 Takuya Sakasai (Tokyo Institute of Technology)

Factorization formulas of higher-order Alexander invariants for homologically fibered knots (joint work with Hiroshi Goda (Tokyo University of Agriculture and Technology))

11:10–12:00 Eiko Kin (Tokyo Institute of Technology)

Bounds of minimal dilatation for pseudo-Anosovs and the magic 3-manifold (joint work with Mitsuhiro Takasawa (Tokyo Institute of Technology))

13:20–14:10 Tetsuya Abe (OCAMI, Osaka City University, JSPS research fellow PD)

Lee's homology and Rasmussen invariant

14:30–15:20 András Juhász (University of Cambridge)

Classifying minimal genus Seifert surfaces

Scientific Committee: Akio Kawauchi, Toshitake Kohno, Taizo Kanenobu,
Seiichi Kamada, Tomotada Ohtsuki, Kazuo Habiro

Organizers: Tomotada Ohtsuki, Kazuo Habiro (RIMS, Kyoto University)

Intelligence of Low-dimensional Topology

June 2–4, 2010

RIMS, Kyoto University

Abstract

Tetsuya Abe (OCAMI, Osaka City University, JSPS research fellow PD)
Lee’s homology and Rasmussen invariant

The Rasmussen invariant is a concordance invariant which is defined by cycles of Lee’s complex. We introduce the notion of state cycles for Lee’s complex. We describe “good” state cycles whose homology classes form a basis of Lee’s homology of a knot. As a corollary, we give a new proof of the sharper-Bennequin inequality for the Rasmussen invariant, which was first proved by Kawamura. We also consider Kawamura-Lobb’s inequality for the Rasmussen invariant which is stronger than the sharper-Bennequin inequality and show that the equality holds for the homogeneous knots.

Masahide Iwakiri (OCAMI, Osaka City University)
Invariants of conjugacy classes of surface braids derived from Alexander quandles or core quandles

In this talk, we introduce new invariants of conjugacy classes of surface braids via colorings by Alexander quandles or core quandles of groups. By the invariants, we give an infinite sequence of mutually non-conjugate surface braids with same degree representing the trivial surface-link with at least two components and a pair of non-conjugate surface braids with same degree representing a spun $(2, t)$ -torus knot for $t \geq 3$.

András Juhász (University of Cambridge)
Classifying minimal genus Seifert surfaces

First, I will review two different notions of equivalence for Seifert surfaces. Then I will show how sutured Floer homology helps in the classification of minimal genus Seifert surfaces up to both types of equivalence.

Yuichi Kabaya (OCAMI, Osaka City University)
Quandle cocycles from group cocycles

A quandle is an algebraic structure whose axioms are motivated by knot theory and conjugation in a group. Carter, Jelsovsky, Kamada, Langford and Saito introduced quandle homology theory and they defined the quandle cocycle invariants for classical knots and surface knots. In this talk, I will give a construction of a quandle cocycle from a group cocycle, then discuss on the quandle cocycle invariant for classical knots and the topology of cyclic branched coverings.

Eiko Kin (Tokyo Institute of Technology)

Bounds of minimal dilatation for pseudo-Anosovs and the magic 3-manifold (joint work with Mitsuhiro Takasawa (Tokyo Institute of Technology))

We consider pseudo-Anosovs which occur as the monodromies on fibers for Dehn fillings of the so called magic manifold. By using these pseudo-Anosovs, we discuss the questions on the minimal dilatation for pseudo-Anosov homeomorphisms (with orientable invariant foliations).

Hiroshi Matsuda (Hiroshima University)

An extension of Burau representation, and a deformation of Alexander polynomial

We define an extension of Burau representation of the braid groups. Following the construction of Alexander polynomial of knots from Burau representation, we will construct a knot invariant from our extension of Burau representation.

Takefumi Nosaka (RIMS, Kyoto university)

4-fold symmetric quandle invariants of 3-manifolds (joint work with Eri Hatakenaka (Tokyo University of Agriculture and Technology))

We introduce 4-fold symmetric quandles, and define a 4-fold symmetric quandle homotopy invariant of closed 3-manifolds valued in a group ring of a quotient of the homotopy group of the quandle space. We classify 4-fold symmetric quandles, and show that a category composed of them is equivalent to the category of pointed groups. We determine the inner automorphism groups of finite 4-fold symmetric quandles. We define the fundamental quandle and the fundamental class of a 3-manifold, and give a geometric interpretation of our invariant. As a corollary, using bordism groups, our invariant turns, out to be at least as strong as Dijkgraaf-Witten invariants.

Takuya Sakasai (Tokyo Institute of Technology)

Factorization formulas of higher-order Alexander invariants for homologically fibered knots (joint work with Hiroshi Goda (Tokyo University of Agriculture and Technology))

Homology cylinders over a surface defined by Goussarov and Habiro play an important role in the recent theory of mapping class groups and finite-type invariants of 3-manifolds.

In this talk, we focus on higher-order Alexander invariants for homology cylinders arising from a class of knots called homologically fibered knots and see that they are generally factorized into two parts: Reidemeister torsions and Magnus matrices. We discuss the meaning of the factorizations and give their applications to the topology of homologically fibered knots.

Nobuya Sato (Rikkyo University)

An introduction to the planar algebras

The notion of planar algebras was introduced by V. F. R. Jones in the late 1990's to analyze the invariants of subfactors, which are certain inclusions of finite dimensional multi-matrix algebras, in a 'pictorial' way. As the word "planar" suggests, a planar algebra is a filtered algebra with the algebra structure governed by planar tangles.

In my talk, I will review the basics of planar algebras with examples, and will mention some attempts to apply the theory of planar algebras to the low dimensional topology.

Kouki Taniyama (Waseda University)

Multiplicity distance of knots

We define multiplicity and multiplicity distance in a category. We define neighbourhood category of knots and discuss its multiplicity distance.

Akira Yasuhara (Tokyo Gakugei University)

Finite type invariants of string links and the HOMFLYPT polynomial of knots (with Jean-Baptiste Meilhan, University of Grenoble 1)

A family of finite type invariants of string link is given by the HOMFLYPT polynomial of knots that are obtained by various closure operations on (cabled) string links. In this talk we will show the following:

- (1) These invariants, together with Milnor invariants of length ≤ 5 , give classifications of n -string links up to C_k -equivalence for $k \leq 5$, and give a complete set of finite type invariants of degree ≤ 4 .
- (2) Any Milnor invariant of length $n + 1 (> 2)$ of a C_n -trivial string link is expressed as a linear combination of such invariants.