E-KOOK Seminar 2010

ABSTRACTS

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

Shin'ya Okazaki (Osaka City University)

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 talk, 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.

Toroidal Seifert fibered surgeries on Montesinos knots

In Dae Jong (OCAMI)
Joint work with Kazuhiro Ichihara (Nihon University)

We show that if a Montesinos knot admits a Dehn surgery yielding a toroidal Seifert fibered 3-manifold, then the knot is the trefoil knot and the surgery slope is longitudinal.

The Jones polynomial for symmetric unions

Toshifumi Tanaka (Gifu University)

A symmetric union is a generalization of a connected sum of a knot and its mirror image. Lamm showed that a symmetric union is a ribbon knot and asked if every ribbon knot is a symmetric union. In this talk, I will introduce a banded symmetric union which is obtained from a symmetric union by ambient isotopy. I will give some formulas of the Jones polynomials for banded symmetric unions to characterize a symmetric union.

Notes on sharp moves for knots

Takuji Nakamura (Osaka Electro-Communication University)

The sharp move is one of local moves for oriented knots introduced by H. Murakami in 1985. It is known that the sharp move is an unknotting operation. The sharp unknotting number for an oriented knot is the minimal number of sharp moves to create the unknot. In this talk, we will discuss several topics about sharp moves. In particular, 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 Yasutaka Nakanishi.

On simple ribbon moves on links

Tatsuya Tsukamoto (Osaka Institute of Technology)

We define and study local moves on links, called simple ribbon moves. Each simple ribbon move on a link L is a special kind of a band sum of L and trivial links. This is a joint work with Kazuaki Kobayashi and Tetsuo Shibuya.

The structure of the HOMFLY polynomial and admissible values

Yasuyuki Miyazawa (Yamaguchi University)

The HOMFLY polynomial is a well-known invariant for knots and links and it is an interesting problem for us to characterize the polynomial. In this talk, we show properties on the strucrure of the polynomial and, by using them, we give some admissible values of the polynomial.

A two dimensional lattice of knots by C_{2n}-moves

Sumiko Horiuchi, Yoshiyuki Ohyama (Tokyo Woman's Christian University)

We consider an infinite graph whose vertices are lattice points in R^2 satisfying that two vertices are connected by an edge if and only if Euclidean distance between the pair is equal to one. We call it a two dimensional lattice graph. We consider a local move and if two knots K_1 and K_2 are transformed into each other by a finite sequence of the local moves, we denote the minimum number of times of the local moves needed to transform K_1 into K_2 by $d_M(K_1, K_2)$. A two dimensional lattice of knots by the local move is the two dimensional lattice graph which satisfies the following: (1) The vertex set consists of oriented knots. (2) For any two vertices K_1 and K_2, $d(K_1, K_2) = d_M(K_1, K_2)$, where $d(K_1, K_2)$ means the distance on the graph, that is, the number of edges of the shortest path which connects K_1 and K_2. Local moves called C_n-moves are closely related to Vassiliev invariants. In this talk, we show that for any given knot K, there is a two dimensional lattice of knots by C_{2n}-moves with the vertex K.

The complete splitting number of a lassoed link

Ayaka Shimizu (Osaka City University)

We define a lassoing on a link, a local addition of a trivial knot to a link. Let K be an s-component link with the Conway polynomial non-zero. Let L be a link which is obtained from K by r-iterated lassoings. We show that the complete splitting number split(L) is greater than or equal to $r+s-1$, and less than or equal to r+split(K). In particular, we show that every $(r+1)$-component link L is obtained from any given knot by r-iterated component-lassoings is an algebraically completely splittable link with split(L) $= r$. Moreover, we shall construct a link L whose unlinking number is greater than split(L).

Braid presentation of handlebody-knots

Kengo Kishimoto (OCAMI)

A handlebody-knot is a handlebody embedded in the 3-sphere, which is represented by some spatial trivalent graph taking a regular neighborhood. A handlebody-knot has a braid presentation if there exists a braid such that a spatial trivalent graph obtained from the braid by closing the endpoints with trivalent vertices represents the handlebody-knot. We show that every handlebody-knot has a braid presentation.

The Rasmussen invariant of a homogeneous knot

Tetsuya Abe (OCAMI)

We will talk about the Rasmussen invariant of a homogeneous knot and its application.

On handle additions

Mingxing Zhang (JSPS at Osaka City University)

A compact, orientable 3-manifold M is said to be simple if it is irreducible, ∂-irreducible, anannular and atoroidal. By Thurston's theorem, a Haken 3-manifold M is hyperbolic if and only if M is simple. Let M be a simple manifold which has a boundary component F with $genus(F) \geq 2$. A separating slope α on F is degenerate if $M[a]$, the manifold obtained by attaching a 2-handle along α is non-simple. As an extension problem of the Dehn fillings, we consider the problem on the estimate of the geometric intersection number of two degenerate slopes. A similar graphic method is used as in the study of Dehn surgery.

Simple loops on 2-bridge spheres in 2-bridge link complements

Donghi Lee (Pusan National University) and Makoto Sakuma (Hiroshima University)

We discuss the following problems. (1) Which essential simple loops on a 2-bridges sphere are null-homotopic (or peripheral) in the 2-bridge link complements? (2) When two essential simple loops on a 2-bridge sphere are homotopic in the link complement? We also discuss the relation of these problems with a variation of McShane's identity for 2-bridge links.

Exchange moves and non-conjugate braid representations of knots

Reiko Shinjo (OCAMI)
Joint work with Alexander Stoimenow (Keimyung University)

In this talk we are concerned with the question when infinitely many conjugacy classes of n-braid representations of a given link occur.
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.

A bicomplex and spectral sequences for a categorification of the colored Jones polynomial

Noboru Ito (Waseda University)

We discuss the existence of a bicomplex which is a Khovanov-type complex associated with a categorification of the colored Jones polynomial. This is an answer to the question proposed by A. Beliakova and S. Wehrli. Then the second term of the spectral sequence of the bicomplex corresponds to the Khovanov-type homology. In this talk, we define this bicomplex and introduce spectral sequences derived from the bicomplex. If time permits, we define a generalized (or "colored") Rasmussen invariant of links for the colored Jones polynomial.

Toward Haken type theorems for essential laminations in 3-manifolds: Proposal of fundamental settings and applications

Tsuyoshi Kobayashi and Hiroko Murai (Nara Women's University)

Haken's Theorem shows that if a 3-manifold M is reducible, then for any Heegaard surface P of M, there is an essential 2-sphere which intersects P in a circle. Analogous results are given for essential surfaces in M with larger complexities by several authors. In this talk, we propose a formulation for searching similar results for essential laminations in M. We also give an application of our approach.