Research program

Hideo Takioka

The following researches are projected.

• Cable versions of the Γ and Jones polynomials
I will study the problem "Which is strong, cable version of the Γ-polynomial or cable version of the Jones polynomial?"

• The (p, q)-cable version of the Γ-polynomial for sufficiently large p
Considering the (p, q)-cable version of the Γ-polynomial for sufficiently large p, I will study whether we can obtain geometric information of knots like the volume conjecture.

• Cable version of the first coefficient HOMFLYPT polynomial for mutant knots
It was shown that cable version of the zeroth coefficient HOMFLYPT polynomial, that is, the Γ-polynomial is invariant under mutation by Tetsuya Ito. Our interest is the case of cable version of the first coefficient HOMFLYPT polynomial.

• Relation between the Γ-polynomial, its $(2, 1)$-cable version, HOMFLYPT and Kauffman polynomials
We have already shown that there exist infinitely many knots with the trivial $(2, 1)$-cable version of the Γ-polynomial and the knots have the trivial Γ-polynomial and the trivial first coefficient HOMFLYPT and Kauffman polynomials. I consider whether any knot with the trivial $(2, 1)$-cable version of the Γ-polynomial has the trivial Γ-polynomial and the trivial first coefficient HOMFLYPT and Kauffman polynomials.

• Characterization of the Γ-polynomials of knots by using knots with clasp number at most two
It is known that the Γ-polynomials of knots are characterized by using 2-bridge knots with unknotting number one. I consider whether the Γ-polynomials of knots can be characterized by using knots with clasp number at most two.

• Knots which bound clasp disks of type 0
There exist two homeomorphic classes of clasp disks with two clasp singularities, which are called types 0 and 1. It is known that $\mathrm{clasp}(K\#K') = 2$ for knots K and K' with $\mathrm{clasp}(K) = \mathrm{clasp}(K') = 1$. We see easily that $K\#K'$ bounds a clasp disk of type 1. I consider whether $K\#K'$ bounds a clasp disk of type 0.

• Minimal grid diagrams and minimal closed braid diagrams
(Joint work with Hwa Jeong Lee)
Every knot has minimal grid diagrams. We consider whether there always exists a minimal grid diagram which presents a minimal closed braid diagram.