Research program

Hideo Takioka

The following researches are projected.

• Can the (p,q)-cable version of the Γ-polynomial distinguish a mutant knot pair?
For $p = 1, 2, 3$, the (p,q)-cable version of the Γ-polynomial is invariant under mutation. Therefore, we study the (p,q)-cable version of the Γ-polynomial for mutant knots for $p \geq 4$. We have already shown that the $(4,1)$- and $(5,1)$-cable versions of the Γ-polynomial cannot distinguish a mutant pair of Kinoshita-Terasaka knot and Conway knot.

• Can the Γ-polynomials of knots be characterized 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 are prime?
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.

• Any knot with the trivial $(2,1)$-cable version of the Γ-polynomial has the trivial Γ-polynomial and the trivial first coefficient HOMFLYPT polynomial?
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 polynomial. 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 polynomial.

• Kawauchi's conjecture
Let K, K' be knots. If $\Gamma_{p/q}(K) = \Gamma_{p/q}(K')$ for any coprime integers $p(>0)$ and q, then $P(K) = P(K')$ and $F(K) = F(K')$, where $\Gamma_{p/q}$ is the (p,q)-cable version of the Γ-polynomial, P is the HOMFLYPT polynomial and F is the Kauffman polynomial.

• Every knot has a minimal grid diagram which presents a minimal closed braid diagram? (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.