Research plan

Kengo Kishimoto

1.Dealternating number and crossing number: The dealternating number of a knot is the minimal number of crossing changes needed to deform a diagram of the knot into an alternating diagram. The dealternating number is less than or equal to a quarter of the crossing number for knots whose delaternating number have been determined. I would like to show that the inequality holds for all knots.

2.Dealternating number and alternation number: The alternaiton number of a knot is the minimal number of crossing changes needed to deform the knot into an alternating knot. The defference between the dealternating number and the alternation number is whether the Reidemeister moves is admitted after a crossing change or not. There exists no example of a non-satellite knot whose dealternating number and alternation number do not conicide. I would like to find such a knot among knots with eleven or twelve crossings.

3.Positive knots and alternating knots: In the research related to positive knots of genus two, positive knots are closely related to alternating knots. An almost positive-alternating knot is a non-positive-alternating knot which has a diagram such that a single crossing change turns the diagram into positive-alternating one. For knots of genus two and knots with up to eleven crossings, it is true that if a knot is positive and almost alternating, then the knot is almost positive-alternating. I would like to show the proposition for all knots.

4.Table of genus two handlebody-knots: Ishii, Moriuchi, Suzuki and I listed genus two handlebody-knots with up to six crossings, and we distinguish between them except for two pairs by calculating the representations of the fundamental groups of their complements into finite groups. For the two pairs of handlebody-knots, we showed that their complements are homeomorphic respectively. To distinguish them, I would like to construct an invariant of handlebody-knots which is not depend on their complements.

5.Handlebody-knots and braid presentation: For a knot, many results are obtained through a study of the braid presentations. I would like to define the braid presentation for a handlebody-knot and construct the above invariant of handlebody-knots which is not depend on their complements through the braid presentations.