RESEARCH PLAN

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The themes of the plan of my research is "studying properties of spaces which consists of knots". In the following, I introduce concrete plans of my future research.

For a local move λ on knots, I will consider the λ-Gordian graph and the λ-Gordian complex which are particular ones of the spaces consists of knots. As mentioned in "Research Achievements", in general, it is difficult to study properties (in particular, global properties) on the λ-Gordian graph and the λ-Gordian complex. Then I propose the (ι, λ)-Gordian graph (resp. the (ι, λ)-Gordian complex) which is regarded as "a quotient image of the λ-Gordian graph (resp. the λ-Gordian complex) by using a knot invariant ι", and I will study them. It is known by Gambaudo-Ghys that the Gordian graph is not Gromov hyperbolic. Then by taking a quotient of the Gordian graph by using a knot invariant ι, it is expected that the quotient space has a "nice" geometric property (e.g. being Gromov hyperbolic). I will consider the global properties of λ-Gordian graph and the λ-Gordian complex by using the properties obtained by the above approach. Problems I am interested in are the following.

(1) I will study the properties on the (ι, λ)-Gordian graph for given pair of a knot invariant ι and a local move λ. In particular, the (v_n, C_n)-Gordian graph is an interesting object. Here the (v_n, C_n)-Gordian graph is the graph in the case where the knot invariant is a finite type invariant (Vassiliev type invariant), and the local move is Goussarov-Habiro's C_n-move. The (v_n, C_n)-Gordian graph is a generalization of the (∇, Δ)-Gordian graph introduced in "Research Achievements" in the sense of degrees of finite type invariants.

(2) As mentioned above, it is expected that spaces obtained by taking a quotient become to be Gromov hyperbolic space. Then for a Gromov hyperbolic space, I can consider the ideal boundary, and I can regard the boundary as "a limit set of knots". As mentioned in "Research Achievements", the (∇, Δ)-Gordian graph is quasi-isometric to the real line, and thus the ideal boundary consists of 2 points. Taking the pair of an invariant and a local move, which is different from the pair (∇, Δ), it is expected that I obtain a Gromov hyperbolic space which has a large ideal boundary, and then I can obtain information on a limit set of knots. I will study a limit set of knots by the above approach.

(3) There are many interpretations of a limit set of knots. I think that one of them is a wild knots. For a wild knots there is no study to classify them and approaches using in the (tame) knot theory cannot be applied. However it is expected that I can give some classifications of wild knots by using the above approach. Then it is expected that information of ideal boundary of such spaces can be used to study wild knots.