Plan of Research

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Litherland's Alexander polynomial for handlebody-knots

A genus g handlebody-knot is a genus g handlebody embedded in the 3-sphere. The Alexander polynomial is an invariant of a pair of handlebody-knot and its meridian system. Replacing a meridian system of a handlebody-knot acts on the Alexander invariant as an action of $GL(g, \mathbb{Z})$. We introduced an invariant G_H for handlebody-knots by using an invariant of the action of $GL(g, \mathbb{Z})$ from the Alexander polynomial [2].

R. Litherland introduced the Alexander polynomial for θ_g-curves [1]. In general, the elementary ideal of the Alexander invariant is not principal for θ_g-curves. Thus, there are infinitely many θ_g-curves whose Alexander invariant is non-trivial and Alexander polynomial is trivial. However, the elementary ideal of Litherland's Alexander invariant is principal, and Litherland's Alexander polynomial is non-trivial for θ_g-curve.

We extended Litherland's Alexander polynomial of a θ_g-curve to that a pair of H and its meridian system with base point and understood how act replacing a meridian system for Litherland's Alexander polynomial of handlebody-knot 4_1. We would like to consider that how act replacing a meridian system for Litherland's Alexander polynomial of other handlebody-knots.

Twisted Alexander polynomial for handlebody-knots

We have some property of irreducibility of H and constituent link of H by using the Alexander polynomial as previous research. We considered representations of $SL(2, \mathbb{Z}_2)$ and $SL(2, \mathbb{Z}_3)$ for the handlebody-knot group of 4_1. I would like to consider how replacing a meridian system of a handlebody-knot 4_1 acts to twisted Alexander invariant of 4_1.

References

[1] R. Litherland, The Alexander module of a knotted theta-curve,*Math. Proc. Camb. Phil. Soc.*, 106 (1989), 95–106.

[2] S. Okazaki, An invariant coming from the Alexander polynomial for handlebody-knots, to appear in Osaka Journal of Mathematics.