Plan of Research

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Properties of the linking number of a handlebody-link

We introduced the linking number of a handlebody-link. For a 2-component handlebody-link $H = h_1 \cup h_2$, $lk(h_1, h_2) \neq lk(h_2, h_1)$. This is a property that does not occur with the linking number of 2-component link. I would like to investigate this property.

The Alexander polynomial $\Delta_{(H,\alpha)}(t)$ in the Results of my research is an invariant of some kind of handlebody-link homotopy which admit only self-crossing change of h_1. Thus, $lk(h_1, h_2)$ is also an invariant of some kind of handlebody-link homotopy. I would like to investigate the properties of linking number as an invariant of link homotopy.

In knot theory, the linking matrix of a framed link is an presentation matrix of the first homology group of the 3-manifold obtained from the 3-sphere by Dehn surgery along a framed link. I would like to investigate what is possible as an analogy for the linking matrix of a handle-body link.

A lower bound for the crossing number of a handlebody-knot

We have a lower bound for the crossing number of constituent links of a handlebody-knot. To prove this, we use a property of a C-complex of a constituent link of a handlebody-knot. We introduced a C-complex of a handlebody-knot. I would like to consider a lower bound for crossing number of a handlebody-knot as an analogy.

Alexander ideal of a handlebody-knot

We introduced the graph G_H as an invariant of handlebody-knot H derived from the Alexander polynomial. There is infinite many handlebody-knots whose Alexander polynomial is trivial and whose Alexander ideal is non-trivial. I would like to expand the invariant G_H by using the Alexander ideal of a handlebody-knot.

Twisted Alexander polynomial for handlebody-knots

We have some property of irreducibility of H and constituent link of H by using the graph G_H as previous research. I would like to expand this result for the twisted Alexander polynomial for a handlebody-knot.