

Research Results

(1) Invariant Morse-Smale function

In Witten's Morse theory, we focus on the structure of the entire of negative gradient flows which connects two critical points whose Morse indices differ by 1. In this research, I proved that for a given invariant Morse-Smale function, every connected component of the entire of negative gradient flows which connects two critical points whose Morse indices differ by 2 is diffeomorphic to the cylinder over the circle. I also showed that the group action on the connected component is given by the rotation of the 2-sphere.

(2) Alexander polynomials of mixed links

For a mixed link, which was introduced by Lambropoulou, I defined its Alexander polynomial and deduced a certain relation between the usual Alexander polynomial.

(3) Equivariant diffeomorphisms and representation covering

I introduced the notion of a representation covering, and proved that it gives an obstruction for the existence of invariant Morse functions (more generally, certain equivariant hyperbolic diffeomorphisms). Conversely, I showed that in case of certain holomorphic torus actions, the existence of a representation covering implies the existence of a certain equivariant hyperbolic diffeomorphism.