On Grid Homology for Lens Space Links

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Abstract

Knot Floer homology is a suite of invariants for links in 3-manifolds, first introduced as an adaptation of the Heegaard Floer homology invariants for closed, oriented 3-manifolds in the early 2000s. The original definition relies on a number of analytic choices and so can be hard to compute in general. In the years since its introduction, knot Floer homology has proved incredibly powerful, leading to a number of advances in low-dimensional topology.

A few years later, a combinatorial definition of these invariants was provided for links in S^3. This combinatorial version has been developed as a standalone theory, known as grid homology, with a proof of invariance, extension to integral coefficients, and more through treatment all of which do not rely on the equivalence with knot Floer homology.

Baker, Grigsby, and Hedden provided a combinatorial definition of knot Floer homology for links in lens spaces. This thesis contributes to the development of that combinatorial theory, providing a combinatorial proof that the grid homology of links in lens spaces is a link invariant. Further, using the sign assignment defined by Celoria, we prove that the generalization of grid homology to integer coefficients is a link invariant.