On the permutation modules of certain class of diagram algebras

Sulakhana Chowdhury

Abstract

One of the interesting problems in the representation theory of symmetric groups is to study the decomposition of permutation modules into indecomposable Young modules over the field of prime characteristics. This topic is closely connected to the study of the representation theory of certain class of *diagram algebras*, which arise in the context of Schur-Weyl duality. In this thesis, we prove the decomposition of the permutation modules of walled Brauer algebras and Brauer algebras of type C over the field of prime characteristic. Moreover, we prove a sufficient condition to compare the cohomology between the categories of modules of diagram algebras and their respective input algebras via exact split pairs. This allows us to prove that the permutation modules and Young modules of these diagram algebras have a cell filtration and are relative projectivity in the category of modules having cell filtration.