

Stratified algebras and the skew resolution

Abstract

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Stratified algebras, in particular, quasi-hereditary algebras play an important role in the representation theory of finite dimensional algebras (or more generally, Artin algebras). These algebras and their suitable generalizations arise in the field of representation theory of algebraic groups and semisimple Lie algebras. The structure of quasi-hereditary algebras was studied in the works of V. Dlab and C. M. Ringel.

The stratification of algebras provides us tools to answer homological questions via induction on the number of (isoclasses of) simple modules. This method was used in order to show that the finitistic dimension of standardly stratified algebras and strictly stratified algebras is finite.

Determining, or just giving an upper bound for the finitistic dimension of a general finite dimensional algebra is not an easy task. While, for calculating the global dimension of an algebra, one only has to look at the projective dimensions of the simple modules, for determining the finitistic dimension, one has to find out first which modules have finite projective dimension. The famous *finitistic dimension conjecture*, whether the finitistic dimension of a finite dimensional algebra is always finite, is more than 60 years old now, and there are only special classes of algebras known to have finite finitistic dimension. Many other conjectures would also be proven true, if there were a positive answer to the finitistic dimension conjecture, so this is one of the main topics in the field of representation theory.

In this work, after a quick recap on homological dimensions, we recall some of the structure theory of stratified algebras. In the latter part of the thesis we introduce our new results via introducing the notion of the skew syzygies and the skew resolution. We give a conditional upper bound to the finitistic dimension of CPS-stratified algebras in terms of the skew resolution length. At the end of the last chapter we look at modules with small skew resolution length.