

POINCARÉ SERIES OF FACE RINGS AND KOSZUL HOMOLOGY

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In late 1950s J.-P.Serre proved that Poincaré series of a commutative local Noetherian ring is bounded by a certain rational function depending on the Betti numbers of the Koszul complex and the minimal number of generators in the maximal ideal. In 1962 E.S.Golod showed that Serre's inequality turns into equality if and only if multiplication and all Massey products in the Koszul homology of a local ring are trivial. Since that time the Serre–Kaplansky conjecture, which asserts that Poincaré series of local rings are rational, and the question of how to compute the denominators of the rational Poincaré series effectively have become the most important problems in homological theory of local rings.

In 1982 J.Backelin proved that Poincaré series of monomial rings are rational; among monomial rings there is the well-known class of face rings of simplicial complexes. In this talk we shall discuss the relations between algebraic problems mentioned above and toric topology. We shall see how the methods and objects of toric topology allow us to interpret the results on Poincaré series and Koszul homology of Stanley–Reisner rings as well as to get new results.

This talk is based on a joint work in progress with Taras Panov.

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