Infinite Cohen-Macaulay complexes and non-Noetherian Stanley-Reisner rings

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Abstract

There is a very natural construction that associates to every simplicial complex a commutative ring–the Stanley-Reisner ring. A remarkable theorem of Reisner shows that a finite simplicial complex has the homology of a bouquet of spheres precisely when the Stanley-Reisner ring is Cohen-Macaulay. This theorem has a number of geometric implications and greatly simplifies the task of deciding whether a complex has this sphere-bouquet homology type. When the complex is infinite, however, the SR ring is not Noetherian, the traditional definition of Cohen-Macaulay does not make sense.

I will discuss these constructions and some of their implications; and I will describe some joint work with J. Tanton on a natural generalization of the Cohen-Macaulay property to non-Noetherian rings and an extension of Reisner's theorem to infinite simplicial complexes.