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Building Monomial Ideal with Fixed Betti Number

A minimal free resolution of an ideal produces a sequence of integers which are called "Betti numbers." In this talk, I will introduce a constructive method to add generators to a monomial ideal I while preserving most Betti numbers of I. The main method we use to find such monomials is simplicial collapsing from algebraic topology. I will start with an introduction on simplicial collapsing - making a simplicial complex smaller by deleting some faces – and how it interacts with free resolutions of monomial ideals. In my talk, I will show how one can change a monomial ideal, one generator at a time, and keep track of the Betti numbers at the same time using simplicial collapses. Furthermore, with this method, starting with a monomial ideal I, and by a sequence of operations, I will show that we can create infinitely many monomial ideals with arbitrarily many generators that have similar Betti numbers as I. And we can also create infinitely many monomial ideals with the same number generators as I which have exactly the same Betti numbers as I.