DALHOUSIE MATHEMATICS COLLOQUIUM

Thursday March 28 2019, 2:30 pm, Chase 319

Speaker: Susan Morey
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Depths and Initially Regular Sequences for Ideals in Polynomial Rings

Given a polynomial ring over a field $R = k[x_1, \ldots, x_n]$, the number of variables provides a measure of the size of the ring that agrees with common notions of dimension. When generalizing to a ring R/I for an ideal I, there are several measures that are useful, one of which is the depth of the ring. One of the ways to measure the depth of R/I is by finding a regular sequence, which is an ordered set of polynomials that in a sense shares key independence properties with the set of variables in a polynomial ring. While quite useful, such a sequence is not always easy to find. The notion of an initially regular sequence was introduced in recent joint work with Tai Ha and Louiza Fouli. Such sequences share key properties with regular sequences, including providing a bound on the depth of the ring, and are generally straightforward to find using a graphical representation of a monomial ideal, called the initial ideal, associated with I. Using properties of Groebner bases, it can be shown that some initially regular sequences are actually regular sequences. Moreover, the lower bound provided by finding initially regular sequences is sufficiently robust to allow for the use of polarization when working with monomial ideals that are not square-free, resulting in applications of the work to more general classes of ideals. In addition, by focusing on initial ideals, the technique can be applied to general classes of ideals with a known Groebner basis, such as binomial edge ideals or the ideals of equations of Rees algebras of edge ideals of graphs. The talk will include definitions and examples for all of these notions that will illustrate the results.