



GEOMETRY SEMINAR

Algorithms to Compute Characteristic Classes of Closed Subschemes of Certain Toric Varieties

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Abstract

Let X be a complete smooth toric variety where all Cartier divisors in $\text{Pic}(X)$ are nef and let V be a closed subscheme of X . We give a new expression for the Segre class of the subscheme V , $s(V, X)$, in terms of the projective degrees of a rational map associated to V . We also give a concrete and computable expression for these projective degrees. These results are applied to develop effective algorithms for the computation of the Chern-Schwartz-MacPherson class, Segre class and the Euler characteristic of V . The algorithms will, in particular, be applicable to any subscheme of a product of projective spaces. In the case of smooth subschemes V this will also allow us to compute the total Chern class of V . The algorithms may be implemented symbolically using Groebner basis or numerically using homotopy continuation via a package such as Bertini or PHCPack. The algorithms have been implemented in Macaulay2 and an M2 package is available. The algorithms described perform favourably on a wide selection of examples in comparison to other known algorithms. Theoretical running time bounds for several of the algorithms are also given. In the talk we will focus on describing the algorithm in the special case where X is a projective space of dimension n to allow for a cleaner and more concrete exposition of concepts.

Date: November 27, 2015 (Friday)

Time: 4:00 – 5:00pm

Place: Room 210, Run Run Shaw Bldg., HKU

All are welcome