Queen's Algebraic Geometry
— Seminar —

Algorithms to Compute Chern-Schwartz-Macpherson Classes

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Abstract

Let V be a closed subscheme of a n dimensional projective space. We give algorithms to compute the Chern–Schwartz–MacPherson class, Euler characteristic and Segre class of V. These algorithms can be implemented using either symbolic or numerical methods. The basis for these algorithms is a method for calculating the projective degrees of a rational map defined by a homogeneous ideal. When combined with formula for the Chern–Schwartz–MacPherson class of a projective hypersurface and the Segre class of a projective variety in terms of the projective degrees of certain rational maps this gives us algorithms to compute the Chern–Schwartz–MacPherson class and Segre class of a projective variety. Since the Euler characteristic of V is the degree of the zero dimensional component of the Chern–Schwartz–MacPherson class of V our algorithm also computes the Euler characteristic of V. The algorithms are tested on several examples and are found to perform favourably compared to other algorithms for computing Chern–Schwartz–MacPherson classes, Segre classes and Euler characteristics. For the special case where V is a global complete intersection we develop a additional algorithm to compute the Chern–Schwartz–MacPherson class. This algorithm complements existing algorithms by providing performance improvements in the computation Chern–Schwartz–MacPherson class for some complete intersection schemes, particularly those which have few singular generators. These algorithms are implemented in Macaulay2.

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16:30–17:30
319 Jeffery Hall