1056-14-1120 **Daniel J. Bates*** (bates@math.colostate.edu), Department of Mathematics, 101 Weber Building, Colorado State University, Fort Collins, CO 80523, and **Jonathan D. Hauenstein**, **Tim McCoy**, **Chris Peterson** and **Andrew J. Sommese**. *Recovering exact results from numerical computation in algebraic geometry.*

Many problems in algebraic geometry can be studied via symbolic computation, typically based on the computation of one of more Groebner bases. Another option in many cases is numerical computation, typically rooted in homotopy continuation. Symbolic methods provide exact results but suffer from some complexity issues. Numerical methods are often more efficient but provide inexact output.

The focus of this talk is a new technique to move from exact input through inexact computations to exact output. In particular, given an ideal I of polynomials with rational coefficients, standard numerical methods will produce witness points (approximations of generic points) on each irreducible component of the algebraic set V(I). Given that information, lattice basis reduction algorithms such as LLL can be employed to find generators of the ideals corresponding to each irreducible component. These results can then be verified by (inexpensive) symbolic methods. This new method combines the efficiency of numerical computation with the certainty of symbolic computation. (Received September 21, 2009)