1023-51-1906   **Robert H Lewis*** (`rlewis@fordham.edu`), Department of Mathematics, Fordham University, Bronx, NY 10591. *Algorithmic Search for Flexibility Using Resultants of Polynomial Systems.* Preliminary report.

We describe the recent convergence of four topics: polynomial systems, flexibility of polyhedra, computational chemistry, and computer algebra.

We solve systems of polynomial equations with resultants by refining the Dixon method, which computes the determinant of a certain matrix. Our method often overcomes the spurious factor problem, i.e., that the resultant is usually only a small factor of a determinant so large that it may be virtually impossible to compute.

We apply our method to find the resultant of a system of equations that arises in computational chemistry from ideas of Bricard [1897] and Coutsias [2004]. The system, six polynomials in six variables and eleven parameters, models a set of quadrilaterals that is equivalent to some three dimensional structures, which represent molecules in chemistry. We describe and demonstrate an algorithm that examines the resultant to determine flexibility. We review ideas about flexibility of polyhedra, from Cauchy [1813] to Bricard [1897] to Connelly [1978]. Flexibility of molecules is an important topic in chemistry, as it is essential for protein folding. Crucial here has been Lewis's computer algebra system Fermat designed for polynomial-matrix computations. Similar problems were solved before by Lewis [2003]. (Received September 27, 2006)