1001-65-91   **Andrew J Sommese*** (`sommese@nd.edu`), Department of Mathematics, University of Notre Dame, Notre Dame, IN 46556-4618. *Homotopies to Compute Intersections of Solution Components of Polynomial Systems.*

We (Andrew Sommese, Jan Verschelde, and Charles Wampler) show how to use numerical continuation to compute the intersection $C = A \cap B$ of two irreducible algebraic sets A and B, where A, B, and C are numerically represented by witness sets. We show this by first showing how to find the irreducible decomposition of the solution set of a system of polynomials restricted to an algebraic set. The intersection of components A and B then follows by considering the decomposition of the diagonal system of equations $u - v = 0$ restricted to $\{u, v\} \in A \times B$. This *diagonal homotopy* also allows us to find the intersection of two components of two polynomial systems (possibly the same system), which is not possible with any previous numerical continuation approach. A major offshoot, of this new approach, which will be discussed in the talk of Charles Wampler, is that one can solve a large system of equations by finding the solution components of its subsystems and then intersecting these.

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