1016-65-223 **Charles W. Wampler***, MC 480-106-359, 30500 Mound Road, Warren, MI 48090-9055, and **Daniel J. Bates** (dbates1@nd.edu) and **Andrew J. Sommese** (sommese@nd.edu). *Adaptive Multiprecision Path Tracking.* Preliminary report.

The core numerical process in continuation methods for solving polynomial systems is path tracking. Systems of high total degree and systems with singular solutions call for higher precision arithmetic to achieve accuracy and robustness. A path tracking algorithm that adaptively adjusts precision is presented. By adjusting the level of precision in accordance with the numerical conditioning of the path, the algorithm achieves high reliability with less computational cost than would be incurred by raising precision across the board. Using an analysis of the behavior of Newton's method in floating point arithmetic, we develop simple rules for adjusting precision. We show how to integrate these into an algorithm that also adaptively adjusts the step size. The behavior of the method is illustrated on several examples arising as homotopies for solving systems of polynomial equations. (Received February 13, 2006)