

1014-65-437

**Anton Leykin, Jan Verschelde and Ailing Zhao\*** (azhao1@uic.edu), Department of MSCS, University of Illinois at Chicago, 851 S. Morgan Street (M/C 249), Chicago, IL 60607. *Computing Isolated Singularities by Newton's Method with Deflation.*

For isolated singular solutions of polynomial systems, we propose a modification of Newton's method to restore quadratic convergence. Our method is symbolic-numeric: we produce a new polynomial system which has the original multiple solution as a regular root. The number of deflation stages is bounded by the multiplicity of the isolated root. At ISSAC'05, Dayton and Zeng gave tighter bounds on the number of deflations by analyzing dual basis.

Our modified method works well on selected applications, but the method suffers from expression swell after a couple of deflations. We describe how a directed acyclic graph of derivative operators guides an efficient evaluation of the Jacobian matrices produced by our deflation algorithm. (Received September 15, 2005)