
Joseph P. Simonis
**A Numerical Study of Globalizations of Newton-GMRES
Methods for Fully-Coupled Solution of the Navier-Stokes
Equation**

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Newton's method is at the core of many algorithms used for solving nonlinear equations. A globalized Newton method is an implementation of Newton's method intended to enhance the likelihood of convergence to a solution from an arbitrary initial guess. A Newton-GMRES method is an implementation of Newton's method in which GMRES is used to solve approximately the linear system that characterizes the Newton step. A globalized Newton-GMRES method combines both globalization procedures and the GMRES scheme to develop robust and efficient algorithms for solving nonlinear equations. The aim of this talk is to present the results of a numerical study aimed at evaluating the relative merits of several globalized Newton-GMRES methods on large-scale 2D and 3D problems involving the steady-state Navier-Stokes equations. This work is joint with Roger Pawlowski, John Shadid, and Homer Walker.