Electronic Transactions on Numerical Analysis.
Volume 6, pp. 271-290, December 1997.

ISSN 1068-9613.

ETNA
Kent State University
etna@mcs.kent.edu

KRYLOV SUBSPACE ACCELERATION FOR NONLINEAR MULTIGRID SCHEMES*

T. WASHIO† AND C. W. OOSTERLEE‡

Abstract. In this paper we present a Krylov acceleration technique for nonlinear PDEs. As a 'preconditioner' we use nonlinear multigrid schemes such as the Full Approximation Scheme (FAS) [1]. The benefits of nonlinear multigrid used in combination with the new accelerator are illustrated by difficult nonlinear elliptic scalar problems, such as the Bratu problem, and for systems of nonlinear equations, such as the Navier-Stokes equations.

Key words. nonlinear Krylov acceleration, nonlinear multigrid, robustness, restarting conditions.

AMS subject classifications. 65N55, 65H10, 65Bxx.

---

*Receive May 15, 1997. Accepted for publication August 30, 1997. Communicated by S. McCormick.

†C&C Research Laboratories, NEC Europe Ltd., D-53757 Sankt Augustin, Germany (email: washio @ ccrl-nece.technopark.gmd.de)

‡GMD, Institute for Algorithms and Scientific Computing, D-53754 Sankt Augustin, Germany (oosterlee@gmd.de)