

TEMPLE UNIVERSITY  
Department of Mathematics

# Applied Mathematics and Scientific Computing Seminar

Room 617 Wachman Hall

Wednesday, 8 April 2009, 4:00 p.m.

## Progressive GMRES: A Minimum Residual Krylov Method Which is Equivalent to MINRES in the Symmetric Case

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### Abstract.

We provide analysis of Reichel and Beckermann's Progressive GMRES (ProGMRES) algorithm, a minimum residual method which approximates solutions to a linear system  $Ax = b$  where  $A \in \mathbb{C}^{n \times n}$  is nearly symmetric. We show that when  $A$  is symmetric, and possibly indefinite, the algorithm produces approximations equivalent in exact arithmetic to those produced by MINRES, an established iterative method for symmetric, indefinite linear systems. Numerical experiments imply that ProGMRES is computationally equivalent to MINRES for symmetric, possibly indefinite, matrices. However, in some experiments, ProGMRES appears to be less stable than MINRES.