Reading and Thinking

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A TECHNIQUE FOR ACCELERATING THE CONVERGENCE OF RESTARTED GMRES*

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Abstract. We have observed that the residual vectors at the end of each restart cycle of restarted GMRES often alternate direction in a cyclic fashion, thereby slowing convergence. We present a new technique for accelerating the convergence of restarted GMRES by disrupting this alternating pattern. The new algorithm resembles a full conjugate gradient method with polynomial preconditioning, and its implementation requires minimal changes to the standard restarted GMRES algorithm.

Key words. GMRES, iterative methods, Krylov subspace, restart, nonsymmetric linear systems

AMS subject classification. 65F10

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- Do you need to solve non-symmetric problems in your applications?
- What linear solvers do you use for solving these problems?
- Have you used some of the Krylov methods to solve non-symmetric problems?
- How do they perform? How do they scale?
- If not yet, try …