

ON THE CONVERGENCE OF QOR AND QMR KRYLOV METHODS FOR SOLVING LINEAR SYSTEMS

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Abstract

We consider the problem of solving nonsingular linear systems $Ax = b$. The most popular iterative methods for solving such a possibly nonsymmetric linear system are Krylov methods. Most Krylov methods can be described as quasi-orthogonal (QOR) or quasi-minimum residual (QMR) methods.

In this talk we are interested in extending the results obtained by Greenbaum, Pták, Arioli and Strakoš for FOM/GMRES to other Krylov methods with non-orthonormal bases. We give parametrizations of the classes of matrices (with a prescribed spectrum) and right-hand sides giving prescribed QOR/QMR residual norms as well as practical ways of constructing such matrices and right-hand sides. In particular we show how to do this for BiCG. Then we give closed-form expressions of the QMR quasi-residual norms as functions of the eigenvalues and eigenvectors as well as the right-hand side and the basis vectors. Our aim is to show that most of the results known for FOM/GMRES can be extended to general QOR/QMR methods.