RELATIONS BETWEEN VARIOUS FORMS OF ITERATIVE METHODS FOR LINEAR SYSTEMS

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Abstract

Young and Jea (1980, 1983) established a common framework for the ORTHOMIN, ORTHORES, and ORTHODIR forms of the Generalized Conjugate Gradient method in various settings and for the corresponding methods based on the nonsymmetric Lanczos process. Joubert and Young (1987) addressed in particular the incidences of short recurrences and thus extended the Faber-Manteuffel-Voevodin result. Here we will point out that by consequent usage of matrix formulations for the recurrences we can make this common framework and the relations between these algorithms much more transparent. In particular, relations between breakdown conditions and between short recurrences for the various forms become readily apparent. We will also make clear that these connections are not restricted to methods based on orthogonalization or biorthogonalizations.

Part of this talk is based on earlier joint work with Steve Ashby.