

Abstract

Preconditioning Block Toeplitz matrices with small blocksize

by

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We consider iterative solvers for ill-conditioned symmetric positive definite Block Toeplitz matrices with small non-Toeplitz blocks. Circulant Preconditioners, Schur-Complement Preconditioners, and band preconditioners based on the generating matrix function are defined, analysed and compared. We try to extend the known iterative Toeplitz solvers to the block case. It turns out that in many examples the block case leads to much harder problems than scalar Toeplitz matrices.

Futhermore, the formulation of an associated Block Toeplitz matrix gives bounds on the spectrum of Schur complements and preconditioned normal equations for Toeplitz matrices. These bounds are very helpful, e.g. in solving regularized linear equations.