

On SSOR-like Preconditioners for Non-Hermitian Positive Definite Matrices

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Abstract

We construct, analyze and implement SSOR-like preconditioners for non-Hermitian positive definite system of linear equations when its coefficient matrix possesses either a dominant Hermitian part or a dominant skew-Hermitian part. We derive tight bounds for eigenvalues of the preconditioned matrices and obtain convergence rates of the corresponding SSOR-like iteration methods as well as the corresponding preconditioned GMRES iteration methods. Numerical implementations show that Krylov subspace iteration methods such as GMRES, when accelerated by the SSOR-like preconditioners, are efficient solvers for these classes of non-Hermitian positive definite linear systems.

Keywords: non-Hermitian matrix, positive definiteness, preconditioning, SSOR iteration, eigenvalue distribution.

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