

Benzi, Michele; Joubert, Wayne; Mateescu, Gabriel

Numerical experiments with parallel orderings for ILU preconditioners. (English)

Zbl 0923.65012

ETNA, *Electron. Trans. Numer. Anal.* 8, 88-114 (1999).

Incomplete factorization techniques such as ILU, ILUT, MILU provide a good preconditioning strategy for solving linear systems with Krylov subspace methods. These preconditioners can be parallelized using various techniques such as multicolor orderings and subdomain preconditioning. The authors' purpose is to perform numerical experiments to compare these techniques in order to establish the most effective ways to use preconditioning on serial and parallel computers.

The effect of symmetric reordering of the matrix for ILU preconditioners, and subdomain overlap for additive Schwarz preconditioners, on the convergence of preconditioned Krylov subspace method is studied. Some structurally symmetric matrices, arising from partial differential equations discretized on structured grids using finite differences, are considered. It is shown that parallel ordering can perform well even in a sequential environment especially for ILUT preconditioning of two-dimensional problems.

The numerical experiments show that preconditioners derived from finite difference matrices reordered with multicoloring strategies can outperform those derived from the naturally ordered system in a significant number of cases.

Reviewer: [D.Petcu \(Timișoara\)](#)

MSC:

- [65F10](#) Iterative numerical methods for linear systems
- [65F35](#) Numerical computation of matrix norms, conditioning, scaling
- [65Y05](#) Parallel numerical computation

Cited in **12** Documents

Keywords:

[Krylov subspace method](#); [preconditioning](#); [additive Schwarz methods](#); [parallel computing](#); [incomplete factorization](#); [multi-color orderings](#); [numerical experiments](#)

Software:

[PETSc](#)

Full Text: [EMIS](#) [EuDML](#)