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Approximate inverse preconditioners via sparse-sparse iterations. (English) Zbl 0922.65034
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The authors consider iteration methods for finding approximate inverse preconditioners M to the inverse A^{-1} of a given $(n \times n)$ -matrix A . The iterative methods aim at the minimization of the functional

$$F(M) := \|I - AM\|_F^2 = \sum_{j=1}^n \|e_j - Am_j\|_2^2$$

on the space of all $(n \times n)$ -matrices, where $\|\cdot\|_F$ denotes the Frobenius norm, $\|\cdot\|_2$ is the Euclidean norm in \mathbb{R}^n , e_j and m_j are the j th columns of the identity matrix I and of the matrix M , respectively. The authors propose and analyze several iterative methods (Newton, MR, GMRES) with several modifications (numerical dropping in the iterates or in the search directions, self-preconditioning etc.). The different techniques are compared numerically on several examples taken from the well-known Harwell-Boeing collection and from matrices generated by the fluid dynamics analysis package FIDAP.

Reviewer: [U.Langer \(Linz\)](#)

MSC:

- [65F35](#) Numerical computation of matrix norms, conditioning, scaling
- [65F10](#) Iterative numerical methods for linear systems
- [65F50](#) Computational methods for sparse matrices
- [65Y05](#) Parallel numerical computation

Cited in **72** Documents

Keywords:

sparse-sparse iterations; Krylov subspace methods; approximate inverse preconditioners; iterative methods

Software:

[FIDAP](#); [ILUS](#)

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