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Robust incomplete factorization for nonsymmetric matrices

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Abstract In this paper, a new incomplete *LU* factorization preconditioner for nonsymmetric matrices is being considered which is also breakdown-free (no zero pivots occurs) for positive definite matrices. To construct this preconditioner, only the information of matrix *A* is used and just one of the factors of the AINV process is computed. The *L* factor is extracted as a by-product of the AINV process. The pivots of the AINV process are used as diagonal entries of *U*. The new preconditioner has left and right-looking versions. To improve the efficiency of the preconditioner, we have used the inverse-based dropping strategies for both *L* and *U* factors. Numerical experiments show that the left-looking version of the preconditioner is significantly faster than its right-looking version in terms of preconditioning time and both are equally effective to reduce the number of iterations. Comparisons of the new preconditioner with AINV and ILUT preconditioners are also presented.

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