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A Balanced Incomplete Factorization preconditioner

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In [3] a factorized approximate inverse preconditioner (AISM) based on the Sherman-Morrison formula is presented. In this work the structure of the factors is analyzed and it is proved that the L and D factors of the LDU factorization of a matrix are easily retrieved from one of them. Moreover columns of L and L^{-1} are computed in the same step which makes the application of dropping strategies proposed in [2] straightforward in the case of a symmetric positive definite coefficient matrix.

Numerical experiments on a set of symmetric positive definite matrices are done showing that this strategy, that we called Balanced Incomplete Factorization (BIF for short), is very robust for preconditioning very ill–conditioned problems using iterative methods. In addition BIF exhibits shorter setup times than RIF [1], a method of a similar and very high level of robustness.

Bibliography

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