AN ACCURATE 2-NORM CONDITION ESTIMATOR FOR INCOMPLETE FACTORIZATION

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Many algebraic preconditioners rely on incomplete factorization, where nonzero entries are dropped, based on some rule, during the factorization process. In a series of papers by Bollhöfer and Saad [2, 3, 4] it was shown that robust rules for both dropping and pivoting can be obtained from information about the inverses of the submatrices that are consecutively constructed. In particular, monitoring their condition numbers with a suited estimator plays an important role. In the talk we present an accurate 2-norm condition number estimator which is incremental. Incremental condition estimation for lower triangular matrices was proposed at the beginning of the nineties by Bischof [1]. It computes a sequence of approximate condition numbers of the leading upper left submatrices of growing dimension. The approximation for the current submatrix is obtained from an approximate left singular vector constructed without accessing the previous submatrices. This makes the procedure relatively inexpensive and particularly suited when a triangular matrix is computed one row or column at a time. A similar strategy based on approximate right singular vectors was proposed later by Duff and Vömel [5] and recommended for sparse matrices. We will show that when the inverse of the triangular matrix is computed along with the triangular matrix itself, a sophisticated combination of the two incremental techniques leads to an incremental condition estimator which is significantly more accurate [6].

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REFERENCES


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