

FAST DIRECT LINEAR SOLVERS FOR THE BOUNDARY ELEMENT METHOD

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In recent years, new linear solvers for elliptic PDEs and integral equations have appeared based on an LU factorization of the matrix, accelerated using low-rank approximation methods. These solvers can be applied to a class of matrices where various off-diagonal blocks can be approximated using low-rank matrices. The fast multipole method, hierarchical matrices and hierarchically semi-separable matrices (HSS) are examples of such matrices. Such solvers have a running time and memory storage that scale like $O(N \ln^a N)$ ($a = \{0, 1, 2\}$) where N is the matrix size. We will present new developments in this class of solvers, showing how they can compete against traditional solvers, both direct and iterative.

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