Wille, S.Ø.; **Staff, Ø.**; **Loula, A. F. D.**
Block and full matrix ILU preconditioners for parallel finite element solvers. (English)
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Summary: Parallel finite element solvers based on ILU preconditionings are developed, implemented and tested in two- and three-dimensional Laplace problems. The computational domain is decomposed into N subdomains for parallel processing. The structure of the parallel computer system consists of the main processor and N satellite processors. Two algorithms are developed: a block ILU preconditioner at the subdomain level, without communication between the satellite processors, and a full matrix ILU preconditioner coupling the subdomain degrees of freedom and requiring communication between the satellite processors. Different node orderings, mesh sizes and number of satellite processors are tested. The efficiency of both block and full matrix ILU preconditioners is strongly dependent on the node ordering inside each subdomain. The finite elements in each subdomain must be connected.

MSC:

65N30	Finite element, Rayleigh-Ritz and Galerkin methods for boundary value problems involving PDEs
65F10	Iterative numerical methods for linear systems
65F35	Numerical computation of matrix norms, conditioning, scaling
65Y05	Parallel numerical computation
35J05	Laplace operator, Helmholtz equation (reduced wave equation), Poisson equation

Cited in **3** Documents

Keywords:

Laplace equation; finite element; ILU preconditionings; parallel processing; node ordering

Software:

CGS

Full Text: DOI

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