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A preconditioning technique based on element matrix factorizations. (English) Zbl 0576.65022
Comput. Methods Appl. Mech. Eng. 55, 201-220 (1986).

The task of making an incomplete factorization of the finite element stiffness matrix using only element matrices is concerned. We present a technique for realizing this and obtain a method which, for many problems solved in practice, requires an amount of core storage that is independent of the number of unknowns in the discrete model, i.e., of the mesh size parameter. On the other hand data transfers from/to the desk and more arithmetic operations than in a corresponding completely-in-core method are required. Theoretical estimates of the rate of convergence of the corresponding preconditioned conjugate gradient method are derived for a model problem and a number of test examples are examined.

MSC:

- 65F10 Iterative numerical methods for linear systems
- 65N30 Finite element, Rayleigh-Ritz and Galerkin methods for boundary value problems involving PDEs
- 74S05 Finite element methods applied to problems in solid mechanics
- 15A23 Factorization of matrices

Cited in 4 Documents

Keywords:

incomplete factorization; finite element stiffness matrix; data transfers; rate of convergence; preconditioned conjugate gradient method; test examples

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