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Mortar element method for flow problems in primitive variables form. (English)
Zbl 0927.76047

Summary: Parallel implementation of the finite element method for the Helmholtz equation and the Stokes equations is discussed in the environment of a distributed-memory massively parallel computer where data are shared among the processors by communication procedures called message passing. For implementation of the finite element methods based on domain decomposition, we introduce "pre-assembly type" and "restriction type" for data on nodal points. They simplify the implementation and reduce the amount of message passing between subdomains. In order to reduce this further, the mortar element method is applied to the primitive variables of the Stokes equations. It maintains natural treatment of stress boundary conditions, which is an advantage of the finite element method. Its implementation can be described concisely by the idea of the two data types.

MSC:

76M10	Finite element methods applied to problems in fluid mechanics
76D07	Stokes and related (Oseen, etc.) flows
65Y05	Parallel numerical computation

Keywords:

Helmholtz equation; Stokes equation; distributed-memory massively parallel computer; message passing; domain decomposition

Full Text: DOI Link

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