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Massively parallel finite element simulation of compressible and incompressible flows. (English) Zbl 0848.76040

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We present a review of where our research group stands in parallel finite element simulation of flow problems on the Connection Machines, an effort that started for our group in the fourth quarter of 1991. This review includes an overview of our work on computation of flow problems involving moving boundaries and interfaces, such as free surfaces, two-liquid interfaces, and fluid-structure and fluid-particle interactions. With numerous examples, we demonstrate that, with these new computational capabilities, today we are at a point where we routinely solve practical flow problems, including those in three dimensions and those involving moving boundaries and interfaces.

MSC:

76M10 Finite element methods applied to problems in fluid mechanics
76N10 Existence, uniqueness, and regularity theory for compressible fluids and gas dynamics
65Y05 Parallel numerical computation

Keywords:

vector supercomputers; Connection Machines; moving boundaries; two-liquid interfaces; fluid-particle interactions

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