

**Benítez, M.; Bermúdez, A.**

**A second order characteristics finite element scheme for natural convection problems.** (English) [Zbl 1429.76098](#)

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**Summary:** In this paper a second order characteristics finite element scheme is applied to the numerical solution of natural convection problems. Firstly, after recalling the mathematical model, a second order time discretization of the material time derivative is introduced. Next, fully discretized schemes are proposed by using finite element methods. Numerical results for the two-dimensional problem of buoyancy-driven flow in a square cavity with differentially heated side walls are given and compared with a reference solution.

**MSC:**

**76R10** Free convection

**76M10** Finite element methods applied to problems in fluid mechanics

Cited in 17 Documents

**Keywords:**

natural convection; finite elements methods; characteristics method; Lagrange-Galerkin methods

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