

Numerical results for the simulation of natural convection in a square cavity with stabilized finite elements

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The non-isothermal incompressible Navier-Stokes equations with Boussinesq approximation for buoyancy effects are solved by a numerical method based on a stabilized finite element discretization and implicit-explicit Runge-Kutta methods. The computed solutions for a square cavity with differentially heated side walls and Rayleigh numbers up to $Ra = 10^8$ are compared to reference data and the influence of stabilization is studied on coarse and fine meshes. Especially we want to test some proposals for the stabilization parameters based on a-priori error analysis for the linearized subproblems and evaluate their performance for time-dependent problems.

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