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Numerical simulation of two-dimensional Rayleigh-Benard convection.

V.V Grigoriev, P.E Zakharov

Abstract

This paper considered Rayleigh-Benard convection (natural convection). This is a flow, which is formed in a viscous medium when heated from below and cooled from above. As a result, are formed vortices (convective cells). This process is described by a system of nonlinear differential equations in Oberbeck-Boussinesq approximation. As the governing parameters characterizing convection states Rayleigh number, Prandtl number are picked. The problem is solved by using finite element method with computational package FEniCS. Numerical results for different Rayleigh numbers are obtained. Numerical results are obtained for different Rayleigh numbers. Studied integral characteristic (Nusselt number) depending on the Rayleigh number.

Key words: natural convection, Oberbeck-Boussinesq approximation, finite element method, convection cells.

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