

Numerical Simulation of Rayleigh Benard Convection and Radiation Heat Transfer in Two-Dimensional Enclosure

Authors : Raoudha Chaabane, Faouzi Askri, Sassi Ben Nasrallah

Abstract : A new numerical algorithm is developed to solve coupled convection-radiation heat transfer in a two dimensional enclosure. Radiative heat transfer in participating medium has been carried out using the control volume finite element method (CVFEM). The radiative transfer equations (RTE) are formulated for absorbing, emitting and scattering medium. The density, velocity and temperature fields are calculated using the two double population lattice Boltzmann equation (LBE). In order to test the efficiency of the developed method the Rayleigh Benard convection with and without radiative heat transfer is analyzed. The obtained results are validated against available works in literature and the proposed method is found to be efficient, accurate and numerically stable.

Keywords : participating media, LBM, CVFEM- radiation coupled with convection

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