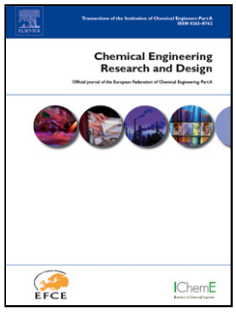

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Effect of angle of applied magnetic field on natural convection in an open ended cavity with partially active walls

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HIGHLIGHTS

- In this work, lattice Boltzmann simulation is presented for MHD free convection in open ended cavity.
- Cavity is partially heated with heater placed at the center of one of vertical wall.
- Effect of heater size, Ha, Ra and angle of magnetic field is discussed.
- Magnetic field applied at angle of 45^o shown higher deterioration of heat transfer rate.

ABSTRACT

In this work, 2D, steady, natural convection in a partially active/heated open ended square cavity subjugated to the magnetic field for incompressible, Newtonian fluid is studied and presented. A simplified double distribution function (DDF)-thermal lattice Boltzmann method (TLBM) based on single relaxation time (SRT) is utilized for solving field controlling equations. One of the vertical walls of open cavity is exposed to the heat source (i.e., heater) partially; while another vertical wall is open to ambient. In particular, the influence of various geometric as well as parametric conditions, such as heater size (L_H=0.25, 0.5, 0.75), angle of magnetic field (θ_M=0^o,45^o and 90^o), Hartmann number ($0 \leq Ha \leq 100$) and Rayleigh number ($10^3 \leq Ra \leq 10^5$) on local and global convection features have been investigated. The dependence of average Nusselt number with magneto-