

Thermal and Hydraulic Behavior fluid in the Rectangular Enclosures under the Effect of Magnetic Field

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Abstract: A 2-D computational analysis of steady magnetohydrodynamic free convection in a rectangular enclosure filled with an electrically conducting fluid has been performed. The enclosure is differentially heated at two opposite vertical walls while the horizontal walls are at adiabatic condition. The governing equations (mass, momentum, and energy) are formulated and solved by a Finite Volume Method (FVM) subjected appropriate boundary conditions. A parametric study illustrating the influence of Grashof number, Prandtl number, Hartmann number and orientation of magnetic field on the flow and heat transfer characteristics such as Nusselt number, streamlines and isotherms is performed. It is observed that Nu rises with increasing Grashof and Prandtl numbers and decreasing Hartmann and orientation of magnetic field.

Keywords: Rectangular Cavity, magnetohydrodynamic free convection