Magneto Convective Rotating Fluid Flow Past an Isothermal Vertical Cylinder with Applied Vertical Magnetic Force

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Abstract

This paper presents an analytical solution of unsteady one-dimensional natural convective flow of a viscous incompressible and electrically conducting rotating fluid past an infinite isothermally heated vertical cylinder. Uniform vertical magnetic field is applied in normal direction of flow. Considered that the pressure is uniform in the whole flow field. Numerical computations for the transient temperature, velocity and magnetic field lines are computed and presented in graphs for fixed Prandtl number (Pr) of 0.7, Grashof number of 5.0 and different set of physical parametric values of Ekman number and magnetic field parameter M. Effects of M and Pr on velocity profile against time are presented. It is observed that initially velocity increases with time but for larger time, it approaches steady state.