

Throughflow Effects on Thermal Convection in Variable Viscosity Ferromagnetic Liquids

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Abstract : The problem of thermal convection in temperature and magnetic field sensitive Newtonian ferromagnetic liquid is studied in the presence of uniform vertical magnetic field and throughflow. Using a combination of Galerkin and shooting techniques the critical eigenvalues are obtained for stationary mode. The effect of Prandtl number ($Pr > 1$) on onset is insignificant and nonlinearity of non-buoyancy magnetic parameter M_3 is found to have no influence on the onset of ferroconvection. The magnetic buoyancy number, M_1 and variable viscosity parameter, V have destabilizing influences on the system. The effect of throughflow Peclet number, Pe is to delay the onset of ferroconvection and this effect is independent of the direction of flow.

Keywords : ferroconvection, magnetic field dependent viscosity, temperature dependent viscosity, throughflow

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