

Magnetoconvection With Variable Viscosity

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Abstract

The problem of magneto convection with variable viscosity confined between the two horizontal plates is investigated by the linear stability analysis. The transformed governing equations are numerically solved by using the Galerkin method. We have studied both stationary convection and oscillatory convection. The threshold values of Rayleigh number and wavenumber are computed and presented for various boundary conditions viz. rigid-rigid (R/R), free-rigid (F/R) and (F/F) and for different values of physical parameters viz., Chandrasekhar number Q , thermal Prandtl number Pr_1 , viscosity ratio c and magnetic Prandtl number Pr_2 . For rigid-rigid boundary conditions we have studied the effect of c , Q on the vertical velocity and temperature eigenfunctions at the onset. It is observed that the increasing intensity of the vertical magnetic field stabilizes the dynamical system. The occurrence of co-dimension two bifurcation point (CTP) is shown for (R/R) boundary conditions. We have also studied this linear stability analysis for the boundary conditions F/R and F/F.

References

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