

Double-Diffusive Magneto Convection in a Compressible Couple-Stress Fluid Through Porous Medium

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The double-diffusive convection in a compressible couple-stress fluid layer heated and soluted from below through porous medium is considered in the presence of a uniform vertical magnetic field. Following the linearized stability theory and normal mode analysis, the dispersion relation is obtained. For stationary convection, the compressibility, stable solute gradient, magnetic field, and couple-stress postpone the onset of convection whereas medium permeability hastens the onset of convection. Graphs have been plotted by giving numerical values to the parameters to depict the stability characteristics. The stable solute gradient and magnetic field introduce oscillatory modes in the system, which were non-existent in their absence. A condition for the system to be stable is obtained by using the Rayleigh-Ritz inequality. The sufficient conditions for the non-existence of overstability are also obtained.

Key words: Double-Diffusive Convection; Compressible Couple-Stress Fluid; Magnetic Field; Porous Medium.