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A CHARACTERIZATION OF MAGNETOCONVECTION IN COUPLE-STRESS FLUID

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Abstract

The thermal instability of a couple-stress fluid acted upon by uniform vertical magnetic field and heated from below is investigated. Following the linearized stability theory and normal mode analysis, the paper mathematically established the condition for Characterizing the oscillatory motions which may be neutral or unstable for free and perfectly conducting boundaries at the top and bottom of the fluid. It is established that all nondecaying slow motions starting from rest, in a couple-stress fluid of infinite horizontal extension and finite vertical depth, which is acted upon by uniform vertical magnetic field opposite to gravity and a constant vertical adverse temperature gradient, are necessarily nonoscillatory, in the regime

$$\frac{Qp_2}{\pi^2} \leq 1,$$

where Q is the Chandrasekhar number and p_2 is the magnetic Prandtl number. The result is important since the exact solutions of the problem investigated in closed form, are not obtainable.

Key Words : *Thermal convection, Couple-Stress Fluid, PES, Magnetic Field, Chandrasekhar number.*

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