

On Superposed Couple-stress Fluids in Porous Medium in Hydromagnetics

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The Rayleigh-Taylor instability of two superposed couple-stress fluids of uniform densities in a porous medium in the presence of a uniform horizontal magnetic field is studied. For mathematical simplicity, the stability analysis is carried out for two highly viscous fluids of equal kinematic viscosity and equal couple-stress kinematic viscosity. A potentially stable configuration remains stable under certain conditions, and a potentially unstable configuration is stable under certain conditions. The magnetic field stabilizes a certain wave-number range $k > k^*$, which is unstable in the absence of the magnetic field.

Key words: Couple-stress Fluids; Porous Medium; Magnetic Field.