STABILITY OF STRATIFIED RIVLIN-ERICKSEN FLUID IN THE PRESENCE OF HORIZONTAL MAGNETIC FIELD AND UNIFORM HORIZONTAL ROTATION

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Abstract

The stability of stratified Rivlin-Ericksen viscoelastic fluid in the simultaneous presence of a uniform horizontal magnetic field $\vec{H}(H,0,0)$ and uniform horizontal rotation $\vec{\Omega}(\Omega,0,0)$ is considered. Assuming the stratifications in density, viscosity and viscoelasticity; the dispersion relation is obtained. The system have been found to be stable for all wave numbers for stable stratifications and unstable for unstable stratifications. The system, which was unstable for all wave numbers in the absence of magnetic field, can be made completely stabilized by large enough magnetic field for a certain wave number range, which have been shown graphically. The growth rates decrease with increase in viscosity and viscoelasticity for low wave numbers showing thereby the stabilizing effect on the system. The behaviour of growth rates with respect to fluid viscosity and viscoelasticity are also shown numerically.