Uniform solution on the combined effect of magnetic field and internal heat generation on Rayleigh–Benard convection in micropolar fluid

ABSTRACT

Combined effect of magnetic field and internal heat generation on the onset of Rayleigh–Bénard convection in a horizontal micropolar fluid layer is studied. The bounding surfaces of the liquids are considered to be rigid-free, rigid-rigid, and free-free with combination isothermal on the spin-vanishing boundaries. A linear stability analysis is used and the Galerkin method is employed to find the critical stability parameters numerically. The influence of various parameters on the onset of convection has been analyzed. It is shown that the presence of magnetic field always has a stability effect on the Rayleigh–Bénard convection in micropolar fluid.

Keyword: Rayleigh–Benard convection; Magnetic field; Micropolar fluid; Internal heat generation