

Effect of non-uniform temperature gradient and magnetic field on Marangoni convection in a micropolar fluid

ABSTRACT

Effect of a non-uniform basic temperature gradient and magnetic field on the onset of Marangoni convection in a horizontal micropolar fluid layer bounded below by a rigid plate and above by non-deformable free surface subjected to a constant heat flux, is investigated in this study. Six different non-uniform basic state temperature profiles are considered. The resulting eigenvalue problem is solved using the Rayleigh-Ritz technique, and the influence of various parameters on the onset of convection is discussed. It is observed that the micropolar fluid layer heated from below is more stable compared to the classical fluid layer.

Keyword: Marangoni convection; Non-uniform temperature; Magnetic field; Micropolar fluid