

Convection on binary fluid with cross diffusive coefficients and vertical magnetic field

ABSTRACT

This study deals theoretically with the effect of cross diffusion coefficients viz., Soret and Dufour effects subjected to uniform vertical magnetic field on the onset of stationary convection in a horizontal layer of binary fluid model. The upper surface of a binary fluid layer is non-deformable and the lower surface is assumed to be rigid and heated from below. In this investigation, the bounding system of the model are considered to be rigid-rigid and free-rigid which described the upper and free surfaces of the model. The eigenvalue equations of the perturbed state obtained from the normal mode analysis are solved by using the Galerkin method. The influences of magnetic field and cross diffusion parameter in binary fluid model are analyzed on the onset of convection. The results show that the effect of increasing the magnetic field strength is always to stabilize the binary fluid model although the onset of convection gets advanced when the Soret parameter is increase.

Keyword: Binary fluid; Cross diffusion coefficients; Vertical magnetic field