

Effects of Viscous Dissipation and Concentration Based Internal Heat Source on Convective Instability in A Porous Medium with Throughflow

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Abstract : Linear stability analysis of double diffusive convection in a horizontal porous layer saturated with fluid is examined by considering the effects of viscous dissipation, concentration based internal heat source and vertical throughflow. The basic steady state solution for Governing equations is computed. Linear stability analysis has been implemented numerically by using Runge-kutta method. Critical thermal Rayleigh number R_{ac} is obtained for various values of solutal Rayleigh number Sa , vertical Peclet number Pe , Gebhart number Ge , Lewis number Le and measure of concentration based internal heat source γ . It is observed that Ge has destabilizing effect for upward throughflow and stabilizing effect for downward throughflow. For sufficient value of Pe , γ has considerable destabilizing effect for upward throughflow, insignificant destabilizing effect for downward throughflow.

Keywords : porous medium, concentration based internal heat source, vertical throughflow, viscous dissipation

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