Abstract

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"Numerical simulation of double-diffusive natural convective flow in an inclined rectangular enclosure in the presence of magnetic field and heat source"

Double-diffusive natural convective flow in an inclined rectangular enclosure with the shortest sides being insulated and impermeable is investigated numerically. Constant temperatures and concentration are imposed along the longest sides of the enclosure. In addition, a uniform magnetic field is applied perpendicular to the longest sides. Laminar regime is considered under steady-state condition. The transport equations for continuity, momentum, energy and species transfer are solved using the finite volume technique. The validity of the numerical code used is ascertained and good agreement was found with published results. The numerical results are reported for the effect of thermal Rayleigh number on the contours of streamline, temperature, and concentration. In addition, results for the average Nusselt and Sherwood numbers are presented and discussed for various parametric conditions. This study is done for constant Prandtl number, Pr ¼ 0.7 aspect ratio, A ¼ 2 and Lewis number, Le ¼ 2. Computations are carried out for thermal Rayleigh number ranging from 103 to 5 105, inclination angle range of 0 g 180 , dimensionless heat generation and absorption oefficients range of 40 F 40, buoyancy ratio range of 5 N 5 and the Hartmann number range of 0 Ha 70.