Abstract

Mohamed Abd El Fatah Mohamed Teamah

"Enhancement of Mixed Convection Heat Transfer in Lid-Driven Square Cavity Completely Filled with Porous Material by Sidewalls Sinusoidal Heating"

The present study is concerned numerically with the mixed convection in a square lid-driven cavity with moving upper surface filled with saturated porous material. Both upper and lower surfaces are being insulated while the vertical walls of the enclosure subjected to sinusoidal temperatures variation with different amplitude and phase angle in order to enhance the heat transfer.Steady state laminar regime is considered. The transport equations for continuity, momentum, energy are solved. The numerical results are reported for the effect of Richardson number (Ri), Darcy number (Da), Prandtl number (Pr), amplitude ratio (?) and phase deviation angle (?) on the iso-contours of streamline, and temperature. In addition, the predicted results for both local and average Nusselt numbers are presented and discussed for various parametric conditions. This study was done for 10-4 ? Da ? 10-2, 0 ? ? ? 1, 0 ? ? ? ? and 0.01 ? Pr ? 10. Through the study the Grashof number is kept constant at 105, while Richardson number has been varied from 0.01 to 100 to simulate forced convection dominated flow, mixed convection and natural convection dominated flow.