Abstract

The work presented in this paper deals with combined heat and mass transfer by natural convection in porous media. The aim is to investigate numerically the effect of control parameters on the flow behavior as well as the enhancement of heat transfer in vertical porous enclosure. The side wall temperature is periodic function of time which is the case in several physical problems. The Darcy's flow model coupled with the energy and mass equations is considered. The numerical results show that the flow's behavior is strongly dependent on the buoyancy ratio values. Three types of flows take place: chimney, reversal and top aspiration flow. Further, the effect of buoyancy ratio (N) at which the different flow types occur is significantly influenced by the values of control parameters. The relative heat transfer enhancement between constant and periodical wall temperature is profoundly affected by thermal Rayleigh number (Ra), buoyancy ratio and dimensionless amplitude (XA). In the case of opposing double diffusive flow, the relative difference becomes to the favor of the stationary case for high Ra and XA.