Effect of Corrugating Bottom Surface on Natural Convection in a Square Porous Enclosure

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Abstract : In this paper numerical investigation is performed to analyze natural convection heat transfer characteristics within a wavy-wall enclosure filled with fluid-saturated porous medium. The bottom wall which has the wavy geometry is maintained at a constant high temperature, while the top wall is straight and is maintained at a constant lower temperature. The left and right walls of the enclosure are both straight and insulated. The governing differential equations are solved by Finite-volume approach and grid generation is used to transform the physical complex domain to a computational regular space. The aim is to examine flow field, temperature distribution and heat transfer evolutions inside the cavity when Darcy number, Rayleigh number and undulations number values are varied. The results mainly indicate that the heat transfer is rather affected by the permeability and Rayleigh number values since increasing these values enhance the Nusselt number; although the exchanges are not highly affected by the undulations number.

Keywords : grid generation, natural convection, porous medium, wavy wall enclosure
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