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Investigate porous domestic vertical walls effects on reducing natural convection heat transfer in square cavity through Lattice Boltzmann methods

Seyedeh Kosar Yazdanparast[1], Vahid Dabirpour[2]

[1] M. A. student in mechanic engineering, construct and production, Iran University of Science and Technology

[2] 2. M. A. student in mechanic engineering, energy conversion, Payam Noor University of Mashhad

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Abstract

The aim of present study is to investigate porous domestic vertical walls effects on reducing natural convection heat transfer in square cavity through Lattice Boltzmann methods. It is assumed upper and down cavity walls are thermal insulation and right side had constant temperature and cold, and left side constant and heated temperature. The left and right walls consisted of thermal differentiation as 1. In order to modelling natural heat transfer process in cavity, Lattice Boltzmann method used. And Brinkman equations used to model porous space. The current study attempt to consider natural heat transfer for Prandtl number was 0.7 and Rayleigh number was 10^4, and it showed that porous walls may be reduce heat transfer and control it. The porosity of the separators, in addition to the effect of the heat transfer reducer, creates a smaller change in the overall shape of the flow pattern than the solid walls. Also, effect of porous wall distance from a wall in constant temperature and height considered and revealed that what time natural heat transfer in hole has minimum or maximum extent through domestic vertical porous walls.

[*]**Corresponding author:** vahid.dabirpour@gmail.com

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