Effect of Place and size of heater on the natural convection in a triangular cavity filled with a nanofluid-saturated porous media using thermal non-Equilibrium

Saber Kord[1], Mohammad Ghalambaz[2,*]

[1,2] Department of Mechanical Engineering, Dezful Branch, Islamic Azad University, Dezful, Iran

Received: April 2016, Revised: May 2016, Accept: May 2016

Abstract

Natural convection heat transfer of a nanofluid in a right angle triangular enclosure saturated by a porous medium is investigated. A heater sited on left vertical wall and diagonal and horizontal walls are respectively in lower temperature and insulated. A local thermal non-equilibrium model including three thermal equations for the phases of fluid, nanoparticles and solid porous matrix is utilized. Moreover, in order to determine comprehensive behavior of dispersed nanoparticles inside the fluid phase, a non- homogeneous model (Buongiorno's model) is employed. Governing equations in present study are coupled and transformed into a non-dimensional form and finally are solved by using the finite element method. Considering three thermal equations, the Nusselt number as well as interaction between three phases are evaluated. Also effects of variation on size and place of heater on heat transfer rate on solid phase, fluid phase and for nanoparticles are examined. The obtained results indicate that the average Nusselt number for the nanofluid phase has the higher heat transfer rate as average Nusselt number for the solid phase, because fluid and nanoparticle phase in circulation..

[*]**Corresponding author:** m.ghalambaz@gmail.com

Keywords: Natural convection heat transfer, Right angle triangular, Porous media, Nanofluid, Local thermal non- equilibrium.

Please cite this article as:

S. Kord, M. Ghalambaz, Effect of Place and size of heater on the natural convection in a triangular cavity filled with a nanofluid-saturated porous media using thermal non-Equilibrium, Journal of Energy Conversion, 2(2)(2016)21-30 [In Persian]