Numerical Investigation of Mixed Convection Heat Transfer of Nanofluid in a Lid Driven Square Cavity with Three Triangular Heating Blocks

International Journal of Computer Applications
Foundation of Computer Science (FCS), NY, USA

Volume 143
Number 6

Year of Publication: 2016

Authors:
Zoubair Boulahia, Abderrahim Wakif, Rachid Sehaqui

10.5120/ijca2016910227

Abstract

The present investigation addressed mixed convection heat transfer of nanofluid in a lid driven square cavity with three triangular heating blocks. Finite volume discretization method with SIMPLE algorithm is employed for solving the two-dimensional Navier-Stokes and energy balance equations. The method used is validated against previous works. Two cases were considered depending on the position of three triangular heating blocks. Effects of pertinent parameters such as: position of triangular heating blocks, the Richardson number (0.1 ≤ Ri ≤ 100), the Prandtl number of the pure water (Pr = 6.2) and the volume fraction of nanoparticles (0 ≤ φ ≤ 0.05) on the flow and Nusselt number are investigated. The results of this study illustrate that, by reducing Richardson number and increasing the volume fraction of nanoparticles, the average Nusselt number increases. It is also found that there is an optimal position of triangular heating blocks where the heat transfer rate is maximized.

References


18. Z. Boulahia and R. Sehaqui, "Numerical Simulation of Natural Convection of Nanofluid in


Index Terms

Computer Science

Applied Sciences

Keywords

Mixed convection, Lid driven, Cavity, Triangular block, Nanofluid.