Scopus

Documents

Alsabery, A.I., Gedik, E., Chamkha, A.J., Hashim, I.

Effects of two-phase nanofluid model and localized heat source/sink on natural convection in a square cavity with a solid circular cylinder
(2019) *Computer Methods in Applied Mechanics and Engineering*, 346, pp. 952-981. Cited 4 times.

Abstract
In the present study, natural convection heat transfer of Al2O3-water nanofluid inside a square cavity with a solid circular cylinder is investigated numerically. For numerical computations, the finite element method is used by taking into consideration Buongiorno's two-phase model. Parts of the vertical surfaces of cavity are kept at constant temperature (left wall Th and right wall Tc) while the other walls (horizontal walls and the remaining of the vertical walls) are taken as adiabatic. The effects of some pertinent parameters such as the Rayleigh number (103≤Ra≤106), nanoparticle volume fraction (0≤ϕ≤0.04), thermal conductivity of the solid cylinder (kw=0.28, 0.76, 1.95, 7 and 16), radius of solid cylinder (0.1≤R≤0.4), heat source/sink length (0.2≤D≤0.8), and the heat source/sink position (0.2≤B≤0.8) on the fluid flow and heat transfer characteristics are investigated. The obtained numerical results are depicted graphically and discussed in detail from the point of view of the streamlines, isotherms, nanoparticle volume fractions and the local and average Nusselt number Nu. It is indicated that the heat transfer is enhanced with an increase in the nanoparticle volume fraction for all studied Rayleigh numbers. Furthermore, the thermal conductivity, solid circular cylinder size, D and B parameters are the key factors to control and optimize the heat transfer inside the cavity that is partially heated and cooled. The proposed method is found to be in good agreement between previously published experimental and numerical results. © 2018 Elsevier B.V.

2-s2.0-85055042324
Document Type: Article
Publication Stage: Final
Source: Scopus