INFLUENCE OF DIAMOND/OIL NANOFLUID ON NATURAL CONVECTION IN HEATED CYLINDRICAL ENCLOSURE

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Abstract

The objective of the present paper is to investigate diamond/oil nanofluid natural convection in partially heated cylindrical enclosure numerically. For this purpose numerical simulation if natural convection in partially heated cylindrical is carried out with pure oil and diamond/oil nanofluid. Calculation is performed based on the finite volume technique for three different Grashof numbers ($10^4 \leq Gr \leq 10^5$) and the volume fraction of 0.04 ($\Phi = 0.04$). Results show that adding Nano diamond to pure oil not only changes the temperature field, but also alters the flow field significantly. It is demonstrated that by adding Nano diamond to the pure oil, thermal diffusion enhances to great extend which leads to the uniform radial distribution of temperature throughout the nanofluid in comparison to the pure oil. Moreover, thermal diffusion augmentation leads to the intensification of natural heat transfer and increasing of Nusselt number. It is also concluded that Nano diamond increases the viscosity of the nanofluid that results in the reduction of the vertical velocity especially at lower Grashof numbers.

Key words: diamond/oil nanofluid; natural convection heat transfer; numerical simulation; Grashof numbers.