

عنوان مقاله:

Effect of Magnetic Field on Natural Convection Heat Transfer in a Square Cavity Filled with NanoFerroFluid

محل انتشار:

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خلاصه مقاله:

Natural convection heat transfer of ferronano fluid in a square cavity has been investigated theoretically and experimentally in this work. The cavity is subjected to constant heat flux on one side and to cooling from the other, whereas the upper and lower side are insulated. The flow features are laminar, incompressible, Newtonian nanofluid at a range of Rayleigh number (Ra) (6.7×10^6 - 2.7×10^7). The nanofluid consists of ferric oxide (Fe_3O_4) nanoparticles of about (20nm), dispersed in a base fluid (water) and citric acid as a surfactant. The volume fraction of nanoparticles (ϕ) in the base fluid was considered between (0-0.07). The effect of magnetic field, represented as Hartmann number for two value of $Ha=(39.2)$ and $Ha=(58.6)$, on the heat transfer has been studied in this work. The theoretical work includes numerical solution of the resulting equation using the commercial software COMSOL3.5. The experimental results are discussed in terms of the effects of some parameters such as, heat flux represented as Rayleigh number, the concentration of nanoparticles represented as solid volume fraction and magnetic field represented as Hartmann number. A good agreement was observed between the predicated and experimental results. The effect of parameter on natural convection in nanofluid are shown as temperature distribution and Nusselt number. It is shown that Nusselt number increases as Rayleigh number (Ra) and volume fraction increase and decreases with the existence of (magnetic field). The numerical results are compared with the experimental ones for some value of (Ra, Ha and ϕ).

کلمات کلیدی:

Natural convection, Ferro Nanofluid, Magnetic, COMSOL

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