

Effect of CuO, Al₂O₃ and ZnO Nanoparticles on the Response Time for Natural Convection

Authors : Mefteh Bouhaleb

Abstract : With the recent progress in nanotechnology, nanofluids have excellent potentiality in many modern engineering processes, particularly for solar systems such as concentrated solar power plants (CSP). In this context, a numerical simulation is performed to investigate laminar natural convection nanofluids in an inclined rectangular enclosure. Mass conservation, momentum, and energy equations are numerically solved by the finite volume element method using the SIMPLER algorithm for pressure-velocity coupling. In this work, we tested the acting factors on the system response time, such as the particle volume fraction of nanoparticles, particle material, particle size, an inclination angle of enclosure and Rayleigh number. The results show that the diameter of solid particles and Rayleigh number plays an important role in the system response time. The orientation angle of the cavity affects the system response time. A phenomenon of hysteresis appears when the system does not return to its initial state.

Keywords : nanofluid, nanoparticles, heat transfer, time response

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