

Heat Transfer Enhancement Using Aluminium Oxide Nanofluid: Effect of the Base Fluid

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Abstract : The flow and heat transfer is an important phenomenon in engineering systems due to its wide application in electronic cooling, heat exchangers, double pane windows etc.. The enhancement of heat transfer in these systems is an essential topic from an energy saving perspective. Lower heat transfer performance when conventional fluids, such as water, engine oil and ethylene glycol are used hinders improvements in performance and causes a consequent reduction in the size of such systems. The use of solid particles as an additive suspended into the base fluid is a technique for heat transfer enhancement. Therefore, the heat transfer enhancement in a horizontal circular tube that is maintained at a constant temperature under laminar regime has been investigated numerically. A computational code applied to the problem by use of the finite volume method was developed. Nanofluid was made by dispersion of Al_2O_3 nanoparticles in pure water and ethylene glycol. Results illustrate that the suspended nanoparticles increase the heat transfer with an increase in the nanoparticles volume fraction and for a considered range of Reynolds numbers. On the other hand, the heat transfer is very sensitive to the base fluid.

Keywords : Al_2O_3 nanoparticles, circular tube, heat transfert enhancement, numerical simulation

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