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Investigation of Temperature Profile for Nanofluid, Ammonia and Methanol During a Heat Pipe

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Abstract

The authors investigate thermal performance of pure water, nanofluid, ammonia and methanol on the warmth pipe with 18 cm long and 0.01m in diameter during this paper, approximately. The typical difference between temperature profile of ethanol and methanol is about 36.4% during this case. The three polynomials with second order are defined during this study. The fluid passes through the warmth pipe, experimentally. The curve fitting and regression of the experimental correlations show the accuracy of three curves are proper then the predictions of temperature profile within the external zones are feasible.

Keywords: Engine • Cooling, Systems • Petroleum • Chemical plants • Technology, Communication • Drug • Pharmaceutical Industries

Introduction

Generally, attempts of humans during the economic history are attended higher heat transfer rates and making heat exchangers in smaller size. Although the metallic particles suspended within the fluids have higher thermal conductivities and had been proposed to heat transfer augmentation within the heat exchangers, but they are also responsible of abrasion corrosion, pressure drop and pipe blockage. Therefore, adding particles in millimetres or maybe micrometres size, have encountered problems. Suspensions with millimetre or micron sized particles are famous to cause severe problems in heat transfer apparatus. However, particles in large size tend to quickly settle out of suspension and cause to severe clogging by passing through micro channels. Thereby, the pressure drop increases severely. Furthermore, the abrasive actions of those particles cause to the erosion of pipelines and industrial equipments. Nowadays, developing technology represents the use of nanofluids as working fluids in heat transfer equipments. Nanotechnology is one among the important branches which uses substances in nano size in many revolutionary variations which will significantly improve device performance which relates to engine cooling systems, petroleum and chemical plants, technology of communication, resistor materials, sensor applications, drug delivery, pharmaceutical industries and a number of other area of practical importance. With the rapid development of this area of science, nano materials are used into the warmth transfer subfields as nanofluids which are produced by dispersing nano particles of metals within the working fluids. Heat pipes are utilized in cooling purposes in several fields of technology, excessively. Since these parts are low in cost in order that they are named highly reliable equipments. Their usage in high power cooling applications has been limited to custom applications requiring either low thermal resistance and/or having a severely restricted enclosure field. The thermal performance of warmth pipe together sort of highly effective heat transfer part in heat exchange apparatus are often improved by using nanofluids. There are different methods for providing the SnO nanoparticles which are briefly as; dissolving Sn salt within the deionized water to form a precursor solution; heating deionized water; adding solid alkali salt to the precursor solution to form a dispersion of SnO nanoparticles; and separating the SnO nano particles by solid-liquid separation and washing them with deionized water. Highly pure, crystalline SnO nanoparticles with spherical appearance and size distribution of fifty to 60nm (approximately) are often prepared quickly and at large scale and really low cost application of cheap materials via a stable low-temperature process, without employing a dispersant. The associated low-temperature, normal-pressure process produces few harmful materials and should be easily employed for preparing of stannum oxide nanoparticles. Surely, nano fluid may be a new sort of heat working fluid, which is formed by adding nano-level substances like metallic, non-metallic or polymeric solid particles into the liquid during a certain method and ratio.

In this paper, the thermal performance of pure water, nanofluid, ammonia, ethanol and methanol are investigated during this paper. Additionally the thermal resistance of pure water and nanofluid is evaluated within the different heat fluxes.

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