

Investigation of Heat Transfer of Nanofluids in Circular Microchannels

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Abstract : In industrial applications, the demand for the enhancement of heat transfer is a common engineering problem. The use of additives to heat transfer fluid is a technique applied to enhance the heat transfer performance of base fluids. In this study, the thermal performance of nanofluids consisting of SiO₂ particles and deionized water in circular microchannels was investigated experimentally. SiO₂ nanoparticles with diameter of 15 nm were added to water to prepare nanofluids with 0.2% and 0.4% volume fractions. Heat transfer characteristics were calculated by using temperature, flow and pressure measurements. The thermal conductivity and viscosity values required for the calculations are measured separately. It is observed that the Nusselt number increases at the all volume fraction of particles, by increasing the Reynolds number and the volumetric ratios of the particles. The highest heat transfer enhancement is obtained at Re = 2160 and 0.4 % vol. by 14% under the condition of a constant pumping power.

Keywords : nanofluid, microchannel, heat transfer, SiO₂-water nanofluid

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