



A REVIEW ON THERMOPHYSICAL PROPERTIES FOR WATER BASED NANOFUIDS AND THEIR HYBRIDS

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ABSTRACT

Nanofluid is a solid–liquid mixture which consists of nanoparticles and a base liquid. Nanoparticles are basically metal (Cu, Ni, Al, etc.), oxides (Al₂O₃, TiO₂, CuO, SiO₂, Fe₂O₃, Fe₃O₄, BaTiO₃, etc.) and some other compounds (SiC, CaCO₃, graphene, etc.) and base fluids usually include water, ethylene glycol, propylene glycol, engine oil, etc. Conventional fluids have poor heat transfer properties but their vast applications in power generation, chemical processes, heating and cooling processes, electronics and other micro-sized applications make the re-processing of those thermo fluids to have better heat transfer properties quite essential. Recently, it has been shown that the addition of solid nanoparticles to various fluids can increase the thermal conductivity and can influence the viscosity of the suspensions by tens of percent. Thermophysical properties of nanofluids were shown dependent on the particle material, shape, size, concentration, the type of the base fluid, and other additives. Therefore, a comprehensive analysis has been performed to evaluate the thermophysical properties of nanofluids due to variations of nanoparticle volume concentration. Actually, it is shown that no model is able to predict the thermophysical properties of nanofluids precisely in a broad range of nanoparticle volume fraction. Also, a review on hybrid nanofluids is inserted, even if the research is at the very beginning. As a conclusion, the results indicated that further work is needed due to a large uncertainty in thermophysical properties method of estimation.

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