This study focuses on the contribution of nano particles in heat transfer enhancement

The role of nanoparticles in enhancement of heat transfer

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In the last few decades, a great development has been achieved in miniaturization of electronics, communication, and computing technologies. Thermal management of components of these devices with larger power and smaller size requires new cooling technologies, hence thermal management is the key technologies in their design. Removing heat from such devices by traditional heat transfer fluids such as water, engine oil or ethylene glycol is limited due to the their low thermal conductivity. In order to overcome this problem, a novel concept is proposed by Choi [1], which is adding solid particles with high termal conductivity into the base fluid since solid particles generally possess far greater thermal conductivity than conventional heat transfer fluids. However, for many years suspensions of millimetre- or micrometre-sized solid particles led to increase pressure drop in the flow channel. With the recent advances in material technology, it is possible to produce metallic or non-metallic nanoparticles or nanofibers with a typical size of less than 100 nm. Suspending ultrafine nano particles in a base fluid, which is defined as nanofluid, has attracted a great attention by researchers as it increases greatly thermal properties even with for low concentration of suspended nanoparticles. For instance, dispersion of a less than 1% volume fraction of Cu nanoparticles or carbon nanotubes in ethylene glycol increases the thermal conductivity of the liquid about 40% and 150%, respectively [2].

This study focuses on the contribution of nano particles in heat transfer enhancement and presents the research progress made in this area including formulation and predicting the physical properties.

1. *Choi S.U.S.* Enhancing Thermal Conductivity of Fluids with Nanoparticles // ASME FED.-1995.-**231**, -P. 99–105.
2. *Keblinski P., Eastman J.A., Cahill D.G.* Nanofluids for thermal transport // Mater. Today. -2005. -**8**, -P. 36-44.