

Nanofluids: Applications and Challenges

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Abstract

Nanofluids are relatively stable suspensions produced by the distribution of nanoparticles (<100 nm) in ordinary fluids. Nanofluids are a new generation of fluids with great potential in industrial applications. One of their important applications is to improve the performance of common heat transfer fluids. Conventional fluids used for heat transfer have poor thermal performance. Solid particles, due to their high thermal conductivity, are dispersed in the base fluid to improve the thermal performance of the fluid. The idea came up more than a hundred years ago. But the particles that were used before had micro or millimeter dimensions. The use of these particles caused some problems such as rapid settling, blockage of ducts, impossibility of use in small ducts, severe erosion and excessive pressure drop. The use of nanoparticle particles seems to minimize these problems. Experimental results show that the addition of nanoparticles to the base fluid significantly increases the heat transfer coefficient. Therefore, nanofluids can be a major breakthrough in heat transfer applications. In this lecture I will briefly talk about nanofluids, methods of preparing them, the most important applications of nanofluids by focusing on the works done by our research team members, the most important challenges in the research and applications of nanofluids and some suggestions for possible future works.