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A Review of Thermal Conductivity of Various Nanofluids

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Abstract

In the present paper, several experimental and theoretical studies conducted on the thermal conductivity of nanofluids are represented and investigated. Based on the reviewed studies, various factors affect thermal conductivity of nanofluids such as temperature, the shape of nanoparticles, concentration and etc. Results indicated the increase in temperature and concentration of nanoparticles usually leads to the higher thermal conductivity of nanofluids. In addition, it is concluded that there are some novel approaches in order to obtain nanofluids with more appropriate thermal properties including using binary fluids as the base fluid or utilizing hybrid nanofluids.

Keywords: Thermal Conductivity; Nanofluid; Heat Transfer; Brownian Motion

Introduction

Nanofluids are produced by dispersing nano particles or nano sheets in a fluid which is known as the base fluid [1–4]. Nano particles dispersion in the base fluid can influence thermophysical specifications of the base fluid [5–10]. Among several thermophysical properties of a fluid, dynamic viscosity and thermal conductivity have more significant role on heat transfer behavior [11,12]. Adding nano particles causing increase in thermal conductivity [13–16] and dynamic viscosity of nanofluid [17,18]. Higher thermal conductivity has favorable effect on convective heat transfer of fluids while the increase in dynamic viscosity worsen convective heat transfer.

Since the ratio of surface to the volume of nano particles is much higher in comparison with micro particles, nanofluids thermal conductivity is higher compared with microfluids or pure fluids [1,19,20]. Higher

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