Ultrasonics—An Effective Non-invasive Tool to Characterize Nanofluids

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Abstract Nanofluids are smart colloidal suspensions of fine nanomaterials in the size range of 1–100 nm in base fluids. For the last few years, nanofluids have been an important focus of research, due to their superior thermo physical properties and promising heat transfer applications. Regardless of various experimental studies, it is still unclear whether the thermal conductivity enhancement in nanofluids is anomalous, or lies within the predictions of theoretical models. Moreover, most of the reported values on their thermo physical properties are inconsistent, due to the complexity associated with the surface chemistry of nanofluids. In this chapter, the versatility of ultrasonics, as an effective non-invasive tool in characterizing nanofluids, is discussed. The chapter encompasses the significance and measurement methods of various ultrasonic parameters. The ultrasonic investigations, being non-invasive in nature, highly efficient and relatively cheap, can provide a powerful means to explore complex colloidal systems, like nanofluids and ferrofluids.

1 Introduction

Technological advances led to the miniaturization of gadgets and increased operating speeds, which in turn, augmented heat dissipation that demands a novel and innovative perception for cooling with improved performance. Heat transfer becomes a crucial issue to sustain and maintain an enhanced, reliable performance of a wide variety of products like the ultrahigh heat flux optical devices, car engines, exhaust gas regulators, high powered lasers, X-rays, computers, power electronics etc. Thus, the challenge of attaining a good cooling technology is faced

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