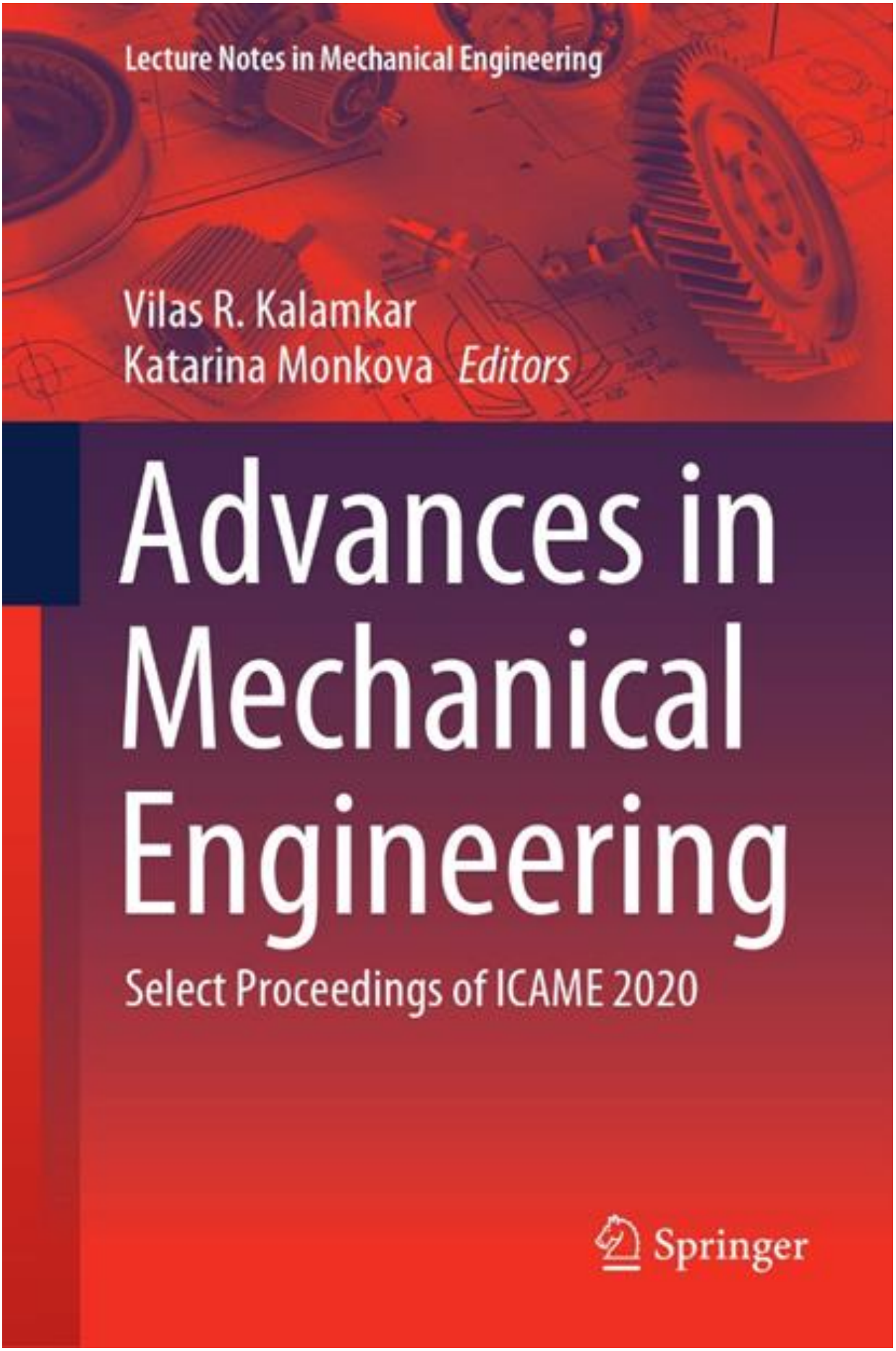
Dr. K.R. Nemade: Experimental Investigation of Effect of Nanoparticle Concentration On Thermo- Physical Properties Of Nanofluids



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Experimental Investigation of Effect of Nanoparticle Concentration on Thermo-physical Properties of Nanofluids

Prashant Maheshwary, C. C. Handa, K. R. Nemade, and N. N. Gyanchandani

Abstract Present comparative study has experimentally investigated the effect of nanoparticle concentration on thermo-physical properties of nanofluids. This study was carried out with five different metal oxide (Al_2O_3, TiO_2, MgO, CuO and ZrO_2) nanoparticles. To analyze concentration effect, the concentration of nanoparticles was altered from 0.5 to 2.5 wt% by an interval of 0.5 wt%. The two-step method without any surfactant was employed for the preparation of nanofluids. All metal oxides were characterized by using X-ray diffraction analysis, scanning electron microscopy and ultraviolet–visible spectroscopy. To examine the stability of nanofluids, different parameters like velocity and Brownian velocity were computed by using dynamic light scattering technique (NanoZS, Malvern). Based on the results, it is concluded that thermal conductivity and viscosity are strongly influenced by concentration of nanoparticles in base fluids. The stability data also shows good dependence on concentration of nanofluids. In this comparative work, Al_2O_3–H_2O nanofluid depicted highest enhancement in thermal conductivity and heat transfer ratio among all nanofluids.

Keywords Heat transfer · Thermal conductivity · Viscosity · Stability · Nanofluid

1 Introduction

The researchers from across globe identified some parameters such as concentration, particle size and shape, which have great influence on heat transfer characteristics of nanofluids. Out of these parameters, concentration has significant effect on thermo-physical properties of nanofluid. Bhuiyan et al. demonstrated the role of nanoparticle

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