Heat Transfer in Nanofluids 2012

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Editorial

Heat Transfer in Nanofluids 2012

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Heat transfer enhancement determines the need for new and innovative coolants with improved performance. The novel concept of "nanofluids" has been proposed as a route to surpassing the performance of heat transfer fluids currently available. These heat exchange fluids present interesting heat transfer features compared to more conventional coolants. There is considerable research on the superior heat transfer properties of nanofluids especially on thermal conductivity and convective heat transfer. Nowadays, a fast growth of research activity in this heat transfer area has arisen. In fact, applications of nanofluids in industries such as heat exchanging devices appear promising with these characteristics. Several reviews, surveys, [1, 2] and benchmarks [3–5] and critical synthesis [5] on nanofluids with respect to thermal and rheological properties, different modes of heat transfer including boiling and on their development and applications [6–8] have been reported. However, it should be underlined that nanofluids present several factors such as long-term stability, higher pumping power and pressure drop, their thermal performance in turbulent flow and fully developed region, lower specific heat of nanofluids, and higher production cost. Moreover, the study in nanofluids involves different scales from the molecular scale to the system-scale.

The fast growth of research activity in this heat transfer area is significantly increasing. In fact, the exponential increase in the number of research articles dedicated to this subject thus far shows a noticeable growth and the importance of heat transfer enhancement technology in general. Just to give some recent data, the number of papers from 1993 to 2012 (up to January) found in SCOPUS under "Nanofluids," "Nanofluids AND Heat Transfer" and "Nanofluids AND Properties" is reported in Figure 1. Moreover, in SCOPUS under "Nanofluids and Review" about 87 papers were given as result. The data confirms the intensive interest and activity in research and engineering applications of nanofluids.

The aim of this special issue is to collect basic, applied and review articles on the most recent developments and research efforts in this field, with the purpose of providing guidelines for future research directions. The issue includes with experimental investigations on thermophysical properties measurements and numerical studies on convective heat transfer. A robust experimental methodology for measuring the heat capacity of nanofluids is presented and employed to measure the property of two nanofluids by H. O'Hanley et al. An experimental measurement of thermal conductivity and dynamic viscosity of water-based nanofluids containing iron oxide is presented by L. Colla et al. The freezing point measurements to study the supercooling point made of alumina is performed by T. Maré et al. A constitutive modeling of the stress tensor for nanofluids containing multiwalled carbon nanotubes is proposed by M. Massoudi and T. Phuoc. A molecular dynamics method for simulating pressure-driven flows in channels is discussed by Q. Y. To et al. A numerical investigation is made based on the lattice Boltzmann method to solve natural convection from a protruding heater located at the bottom of a square cavity by J. Guiet et al. The heat transfer in a confined impinging slot jet and the effect of buoyancy in forced convection in a duct with triangular cross section in water/alumina nanofluids are

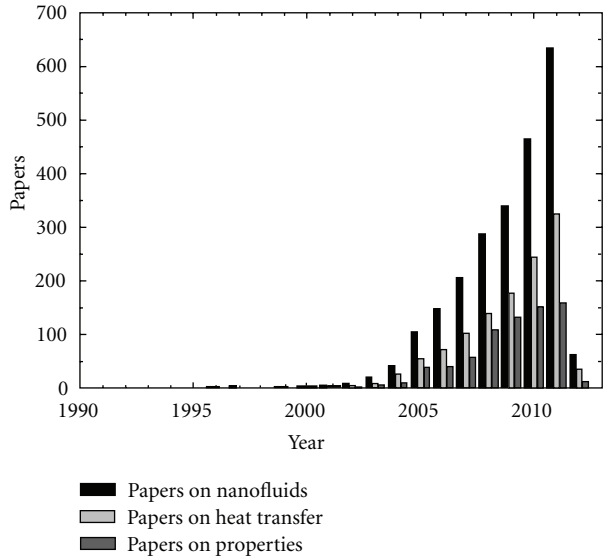

Figure 1: Number of papers published on nanofluids, heat transfer in nanofluids, and nanofluids properties.

studied numerically employing a single-phase model by G. Di Lorenzo et al. and O. Manca et al.

The present volume is the second special issue on heat transfer in nanofluids and we hope that it may be the beginning of a series that will periodically stimulate researchers to publish the highlights and original articles reporting how nanofluids bring new advances to heat transfer engineering.

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