Experimental Study of Radiation Influence on Thermophysical Properties of Al_2O_3 and ZrO_2 Nanofluids

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Abstract

Nanofluids are a promising technology for application in nuclear reactor systems for high heat flux transport. As demonstrated by the recent researches, nanofluids have very interesting physical properties with respect to its ability to remove and transport of heat. There is, currently, research groups in the world conducting investigations on the influence of ionizing radiation on nanofluids and the possibility of its use as working fluid or cooling of the core of nuclear reactors core in cases of accidents. *Among the countless applications presently proposed for the nanofluids, the applications in energy have special attention by academic and industrial interest. Studies demonstrate that nanofluids based on metal oxide nanoparticles have physical properties that characterize them as promising working fluids, mainly, in industrial systems in which high heat flux want to be removed. The nuclear reactors for power production are examples of industry where such an application has been proposed. However, there are no concrete results about the ionizing radiation effects on nanofluids properties. This work aims to present the initial results of the current study carried out with the objective to check the effects caused by that ionizing radiation on nanofluids based on Al_2O_3 and ZrO_2 nanoparticles. Results from thermophysical analyses demonstrate that particular behavior on thermal conductivity, and density of such nanofluids can be observed as a function of temperature under no ionizing radiation effect. New investigations will analyze the application potentiality of some nanofluids in nuclear systems for heat transfer enhancement under ionizing radiation influence.*