# INVESTIGATION ON THE IMPROVEMENT OF THERMAL PROPERTIES OF TiO2 NANOFLUIDS

| Reference | Presenter | Authors (Institution) | Abstract |
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| 02-005 | Juan Gentile Martins | Rocha, M.d. (Instituto de Pesquisas Energéticas e Nucleares); Andrade, D.A. (Instituto de Pesquisas Energéticas e Nucleares); Moreira, P.G. (Instituto de Pesquisas Energéticas e Nucleares); Stefaniak, I. (Instituto de Pesquisas Energéticas e Nucleares); Martins, J.G. (Instituto de Pesquisas Energéticas e Nucleares); | This work aims to investigate the thermophysical properties of TiO2 nanofluids in the water base experimentally and also comparing results with existing literature data and theoretical models. Studies reveal that nanofluids present increasing in thermal conductivity and other important properties related to the heat transfer capacity compared to the base fluid. In this way, it can be classified as promising fluids for heat transport applications. As the proposal is to use it in high thermal flux systems, the survey of experimental measurements was performed to verify whose of the main parameters have more influence over such properties. Thermal conductivity, viscosity, surface contact angle and some visualization of nanoparticles in SEM were carried out in order to understand the nanofluids properties modifications. The TiO2 nanofluids in water base solutions were prepared for this study using the ultrasonic dispersion technique for three distinct volume concentrations: 0.1%, 0.01%, and 0.001%. Samples were initially prepared using an ultrasonic disrupter to make a homogeneous solution. This is an important step in sample analyses concerning the homogeneity influence on thermal conductivity measurements. With all samples prepared, some steps were followed to ensure the dispersion of nanoparticles and thus obtaining more accurate results Nanofluids samples were visualized in a scanning electron microscope (SEM) JEOL, model JSM 6701F at IPEN. Figure 2 shows the TiO2 nanoparticle's image observed. Preliminary tests for determining the thermophysical properties of nanofluids were: density, thermal conductivity, viscosity and surface contact angle. Concentration and temperature effects were investigated in preliminary tests for measurement of the thermal conductivity of nanofluids: this step consists of measuring the thermal conductivities and viscosities of nanofluids for all concentrations (0.001%, 0.01% and 0.1% vol.) at 15°C, 25oC and 35oC. ASTM D5334-08 (2008) describes the standard procedure for determining thermophysical properties and is based on the classical Linear Probe Method also known as the Transient Hot-Wire Method. |

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