USE OF NANOFLUIDS TO IMPROVE THE PERFORMANCE OF HEAT PIPES

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Heat pipes are an alternative technology for making compact and high effectiveness heat exchangers. However, the heat pipes are subject to operating limits, which are a series of physical phenomena that stop heat transfer. The capillary is the main at low temperature heat transfer. Nanofluids are suspensions of nanoparticles in common fluids and it has been shown that nanofluids modify some properties of the base fluid, such as thermal conductivity, viscosity, wetting angle and the amount of heat that can be transferred by boiling. In this work, nanofluids of nanostructured CuO particles on water have been characterized by SEM and DLS and an evaluation of the effect of nanoparticles concentration on the performance of heat pipes was achieved. Three nanofluids were prepared with concentrations 0.1\%, 0.5\% and 1.0\% w/w. These three nanofluids and a control fluid which was only DI water were tested in four cylindrical screen mesh wick heat pipes. In every test, the thermal resistance and the capillary were calculated based on the evolution of the temperature profiles. After each test, the screen mesh wick was analyzed by SEM to verify the deposition of nanoparticles. Results show that thermal resistance of the heat pipes can be reduced with the addition of nanoparticles but there is a concentration beyond which the reduction is not feasible. Also, the capillary of the heat pipes could be increased when the nanostructured particles were added.

Keywords: Nanofluid, Heat pipes, Capillary limit

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