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Heat characteristics of alumina-deionized water nanofluid in horizontal heat pipe

Hajar Alias

Universiti Teknologi Malaysia, Malaysia

This research studied the characteristics of nanofluid in a horizontal heat pipe. Nanofluid is a new technology for heat transfer in cooling systems and suspension stability of nanofluid is a major issue since it will affect the performance of nanofluid in heat pipe. The addition of surfactant will increase the dispersion of nanoparticles in base fluid and increase the stability of nanofluid. The objectives of this research are to prepare the stable nanofluid with addition of surfactant and to investigate the stability, properties, and heat characteristics of nanofluid in horizontal heat pipe. Aluminum oxide (Al₂O₃) was added to deionized water, the base fluid, with addition of polyvinylpyrrolidone (PVP) as surfactant by two-step method. First, the optimum stability ratio of nanofluid to surfactant PVP was determined. The properties and heat characteristics of nanofluid were analyzed at different concentration of nanofluid and at 5 different temperatures. From the observation, the alumina nanofluid was stable with the addition of surfactant at ratio 1:2. The thermal conductivity of nanofluids was higher than base fluid and increased as the temperature and concentration increased. Viscosity of nanofluid was also increased with increasing nanoparticle concentration but decreased with temperature. The heat transfer performance of nanofluid was investigated using horizontal heat pipe for continuous fluid flow. The study showed the capability of nanofluids acting as a heat transfer fluids. It showed that nanofluid could absorb more heat than base fluid when hot and cold streams flow in counter current flow.

Biography

Hajar Alias has completed her PhD from Leeds University, United Kingdom. Her Doctoral research was on nanomaterials and synthesis of nanofluids for heat transfer application. Her current research work includes nanomaterials synthesis and characterization, nanofluids application and catalysis. She has published numerous articles in international refereed journals and conference proceedings. She is currently a Senior Lecturer at Universiti Teknologi Malaysia and also an Associate Member of IChemE UK.

hajar@cheme.utm.my

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