An experimental study on thermal performance of nano fluids in microchannel heat exchanger

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Abstrak

The enhancement of heat transfer performance in heat exchanger is achieved by reducing the size of the hydraulic diameter or by using a working fluid that has a better thermal conductivity compared to conventional working fluids. The application of a small hydraulic diameter can be found in the microchannel heat exchanger (MCHE). The design and the testing of the MCHE were done in this research. The MCHE was tested with several working fluids, such as the distilled water, the Al2O3-water nanofluids at 1%, 3% and 5% volume concentration, and the SnO2-water nanofluids at 1% volume concentration. The temperature of inlet and outlet were set at 50o C and 25o C, respectively. The variations of flow rate at the inlet were applied from 100 ml/min up to 300 ml/min. The addition of nanoparticle in the base fluid was proven to improve the heat transfer of the MCHE, the 5% Al2O3-water and 1% SnO2-water nanofluids are able to absorb the heat 9% and 12% higher than the base fluid. The overall heat transfer coefficient of MCHE with 5% Al2O3-water and 1% SnO2-water nanofluids were 13% and 14% higher than the base fluid.