

Thesis Title	Improving Thermal Performance of Coil-Loop Heat Pipe for Air Conditioning System by using Nanofluid as a Working Fluid
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Abstract

The objective of this research is to study thermal performance improvement of coil-loop heat pipe with nanofluid as a working fluid in the air conditioning system. This nanofluid is made of refrigerant R22 filling with titanium dioxide (TiO_2) particles of 21 nm mean diameter. The concentrations of nanofluid used in the experiments are 5 ppm, 10 ppm, 30 ppm and 60 ppm. The evaporator section of the heat pipe is placed in front of the evaporator of air conditioning system. The condenser section of the heat pipe is placed in back of the evaporator of air conditioning system. The experiments measure the thermal resistance of the heat pipe (R_{th}), the coefficient of performance of air conditioning systems (COP) and the energy saving by cooling process of air conditioning system (E_{s1}). The experiment results showed that when the heat pipe with pure refrigerant R22 as working fluid is used, the thermal resistance of the heat pipe is 3.859°C/kW . The COP_R and COP_H of the air conditioning system can be improved by 9.28% and 8.87%, respectively. The energy consumption of the air conditioning system can be reduced by 10.55%. When the nanoparticles of TiO_2 are added into refrigerant R22 of the heat pipe at the concentration of 10 ppm, the COP_R and COP_H can be improved by 2.79% and 2.66%, respectively, as compared with the heat pipe using pure refrigerant R22. The energy consumption of the air conditioning system can be reduced by 16.49%. When the nanoparticles of TiO_2 are added into refrigerant R22 of the heat pipe at the concentrations of 5 ppm and 10 ppm, the thermal resistance of the coil-loop heat pipe can be reduced by 12.31% and 32.97% as compared with pure refrigerant R22.

Keywords : Heat Pipe / Air Conditioning System / Nanofluid / Titanium Dioxide