Abstract

Heat pipe heat exchanger (HPHE) considers one of the most useful devices for the recovery of waste heat energy. In this paper, an Experimental study has been carried out on air to –air HPHE constructed of thermosyphon heat pipes with distilled water as the working fluid and a fill ratio of 75% from the evaporator length. Its model was composed of 4 rows, each row contains 12 copper tubes, each tube have ID= 9.5 mm, OD=10mm and length =950 mm and the rows of tubes were arranged in a staggered manner. Aluminum wavy plate fins of 0.1mm thickness were fixed among the tubes to increase the heat transfer area. Tests were conducted at various flow rates (air flow rate through evaporator and condenser sections) ranged between 0.12 and 0.37 kg/s and at different temperatures of air entering evaporator section (90, 100,110)℃. The results show that the effectiveness of HPHE decreases when the ratio of mass flow rate through the evaporator and condenser ((m_e ) ̇/ (m_c ) ̇) is approaching one and increases when ((m_e ) ̇/ (m_c ) ̇) is greater than one. Minimum value for effectiveness is found when the flow rate ratio between two air streams is equal to one, also, the effectiveness increases with increasing
Experimental Study of Thermal Performance of Heat Pipe Heat Exchanger

temperature difference (T_(e,i)-T_(c,i)) up to about 90 °C.

References


Index Terms

Computer Science                Power Systems

Keywords

Heat pipe heat exchanger, effectiveness, mass flow rate ratio, condenser, and evaporator