

Thermohydraulic Performance of Double Flow Solar Air Heater with Corrugated Absorber

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Abstract : This paper deals with the analytical investigation of thermal and thermohydraulic performance of double flow solar air heaters with corrugated and flat plate absorber. A mathematical model of double flow solar air heater has been presented, and a computer program in C⁺⁺ language is developed to estimate the outlet temperature of air for the evaluation of thermal and thermohydraulic efficiency by solving the governing equations numerically using relevant correlations for heat transfer coefficients. The results obtained from the mathematical model is compared with the available experimental results and it is found to be reasonably good. The results show that the double flow solar air heaters have higher efficiency than conventional solar air heater, although the double flow corrugated absorber is superior to that of flat plate double flow solar air heater. It is also observed that the thermal efficiency increases with increase in mass flow rate; however, thermohydraulic efficiency increases with increase in mass flow rate up to a certain limit, attains the maximum value, then thereafter decreases sharply.

Keywords : corrugated absorber, double flow, solar air heater, thermohydraulic efficiency

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