Experimental Study of Heat Transfer and an Effect the Tilt Angle with Variation of the Mass Flow Rates on the Solar Air Heater

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Abstract

in this study we have been indicated an effect of tiltangle and the mass flow rates onto the thermal performance of a single pass solar air heater will be investigatedexperimentally. The effects of mass flow rate of air on theoutlet temperature, the heat transfer in a solar collector andthermal efficiency were studied. Experiments were performedfor range of air mass flow rates from 0.0078 to 0.0166 kg/s.,Moreover; the maximum efficiency was obtained at the difference's mass flow rates. The maximum efficiency obtained for the 0.0078, 0.0093, 0.0125 and 0.0166 kg/s were47.82%, 37.50%, 31% and 26% respectively. Comparison of the results as an effect the mass flow rates by solar collectorsand the tilt angle a substantial enhancement in the thermalefficiency. The optimal tilt angles for the outlet temperaturewere between 20 and 30°.

Keywords: mass flow rate; tilt angle; thermal efficiency;outlet temperature; inlet temeprature.