

Effect of artificial roughness on heat transfer in a solar air heater

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Abstract

The heat transfer of a solar air heater duct can be increased by providing artificial roughness on the heated wall (i.e. the absorber plate). The thermal performance of a single pass solar air heater with five fins attached was investigated experimentally. Longitudinal fins were used inferior the absorber plate to increase the heat exchange and render the flow fluid in the channel uniform. The effect of mass flow rate of air on the outlet temperature, the heat transfer in the thickness of the solar collector was studied. The effect of parameters on the heat transfer is compared with the result of smooth duct under similar flow conditions. Experiments were performed for air mass flow rate $m = 0.016$ kg/s. Moreover, the maximum efficiency values obtained for the 0.016 with and without using fins were 51.50 % and 43.94% respectively.

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