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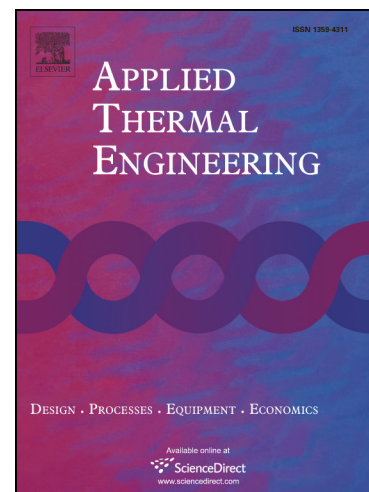
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On the performance of a baffled glazed-bladed entrance solar air heater

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Abstract

The performance of a baffled glazed-bladed entrance air heater (BGBSAH) was experimentally investigated and compared with a conventional one at the same operating conditions. The solar air heater was modified at the entrance region. This region was covered with a glass cover instead of a steel one to increase the heating area exposed to solar radiation (I_R). In addition, the entrance region was boosted by guide blades to affirm a good air distribution inside the heater. Baffles attached to nineteen longitudinal fins were fixed inside the heater. These baffles were used to increase the heat transfer area, the length of air flow path, and the heat capacity of SAH via increasing the mass of the material. Three various numbers of baffles (170, 410 and 800) were used. Moreover, four values of air flow rates ranged from 0.013 to 0.04 kg/s were investigated. The results showed that, at the same mass flow rate, the performance of SAH was directly proportional to the baffles number. In addition, the results revealed that the maximum daily temperature difference obtained from the BGBSAH with 800 baffles was 51.9 °C compared to 22.7 °C for the conventional one at 0.013 kg/s. Besides, the daily efficiency was improved by 29.91 to 51.69 % in case of BGBSAH with 800 baffles compared to the conventional one. For conventional SAH the average cost per kW is 0.0146 \$ while for BGBSAH are 0.00733, 0.00787 and 0.0084 \$ for 800, 410 and 170 baffles, respectively.

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