

Performance investigation of single- and double-pass solar air heaters through the use of various fin geometries

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Abstract

This paper presents an experimental comparative study on the thermal performance of the following three single-pass types of solar air heaters (SAHs): (i) without obstacles, (ii) with rectangular obstacles and (iii) with a new form of obstacles in the air flow duct. Thus, we carried out studies to compare the best system with (iiii) a double-pass flat plate collector having the same type of obstacles in order to determine the best-performing model. All collectors were designed, constructed and tested in the University of Biskra (Algeria) in a stand facing South at an inclination angle equal to the local latitude. In comparison with the recent literature, at different air mass flows, the highest efficiencies were obtained from the double-pass SAH with trapezoidal obstacles. In addition, this study has allowed us to show that the use of obstacles, in the air flow duct of the SAHs, is an efficient method to improve their performances.

Keywords : solar energy, flat plate collector, obstacles, efficiency factor, fins optimization.

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