EXERGY ANALYSIS OF THE AIR SOLAR COLLECTOR
BASED ON EXPERIMENTAL DATA

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Abstract

An experimental study of solar collectors with a collecting area of 4.2 m² and a variable flow rate of 0.02–0.06 kg/s was developed. During the operation of the solar collector, entropy is generated due to the frictional forces occurring at the flow of the working fluid through the solar heater serpentine as well as due to the heating processes of the working fluid of the solar collector. The generated irreversibility contributes to the decrease of the exergy efficiency and produces unwanted effects upon the ambient environment. The aim of this paper is to establish the optimum flow rate of the working fluid for the collector’s area established by construction. In this way, the exergy efficiency is improved and the negative impact on the ambient environment is minimized.

For a solar collector with an area of 4.2 m², the optimum flow rate of the working fluid is 0.04 kg/s. The exergy transferred by the collector to the working fluid is 6.41% based on the exergy received from the Sun in an average summer day, for a flow rate of 0.04 kg/s.

Key words: entropy, exergy, irreversibility, overall exergy efficiency

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