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THERMODYNAMIC PERFORMANCE FOR THE SOLAR COLLECTOR OF A MICRO-COMBINED COOLING, HEATING AND POWER SYSTEM

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Abstract

The paper presents a computer modelling and experimental validation for the thermodynamic performance of parabolic trough solar collectors (PTSC) used in a micro-combined cooling,e heating and power (mCCHP) system. The thermal efficiency, fluid outlet temperature, heat gain and heat and optical losses of the collector are calculated depending on the collector geometry, optical properties, fluid properties, fluid inlet temperature and flow rate, solar insolation, wind speed and ambient temperature. The experiments consisted of thermal measurements and image recordings which allowed the exploring of the heat transfer phenomenon that determines thermal and optical losses and therefore the collector's thermodynamic performance/. These results are useful in the design of mCCHP system. Knowing the heat supplied by the Stirling engine and the PTSC allows us to size the auxiliary heating boiler.

Key words: heating and power system, micro-combined cooling, optical loss, parabolic trough solar collector, radiation, thermodynamic performance

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