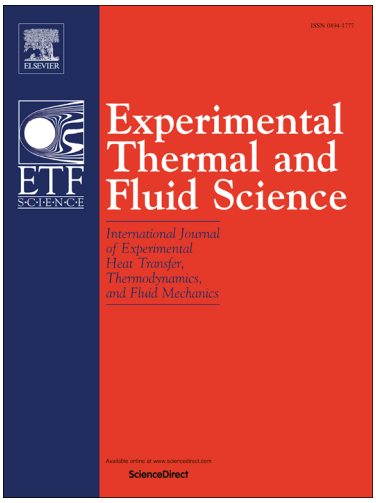

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Experimental and numerical study of parabolic trough solar collector of MicroSol-R tests platform

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Abstract

PROMES-CNRS laboratory has recently inaugurated a small scale parabolic trough power plant, named "MicroSol-R", for research activities. The platform is aimed to test and improve various technologies including thermal energy storage, power conversion cycle, heat transfer fluid and collectors. This article highlights the experimental and numerical investigation of the Parabolic Trough Collector (PTC) of this platform.

The experimental tests, which have been conducted during the period of 2016-2017, to evaluate the optical and thermal performance of the PTCs are reported in the first part of this article. These include the optical and thermal qualifications, the incidence angle modifier, the optical efficiency and the useful thermal heat.

In the second part of the article, three numerical models of different complexity have been developed, validated and then compared. The main goal is to identify the advantages and the limitations of each model with respect to the others and therefore, selecting the most suitable tool for modeling the PTCs.