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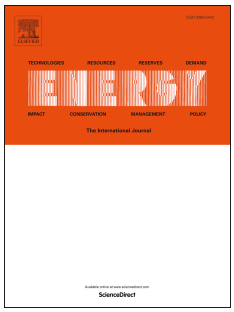

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PII: S0360-5442(18)30910-1

DOI: 10.1016/j.energy.2018.05.090

Reference: EGY 12925

To appear in: *Energy*

Received Date: 20 January 2018

Revised Date: 10 May 2018

Accepted Date: 12 May 2018

Please cite this article as: Ma L, Xu E, Li J, Xu L, Li X, Analysis and validation of a thermal hydraulic dynamic model for the parabolic trough solar field, *Energy* (2018), doi: 10.1016/j.energy.2018.05.090.

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Highlights

A thermal hydraulic dynamic model for a parabolic trough solar field is developed.

The model is validated with experimental data obtained from a pilot plant.

Thermal hydraulic behavior of the solar field is analyzed in detail.

A method for balancing the flow distribution is improved upon and verified.

Abstract

In this paper, a thermal hydraulic dynamic model (THDM) is developed to improve the efficiency and controllability of a parabolic trough solar field (SF). The THDM is divided into a hydraulic submodel and a thermal submodel; these two submodels interact via flowrate and temperature of the heat transfer fluid. Three experimental