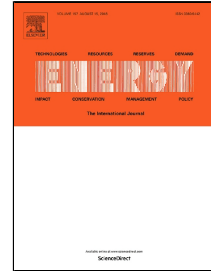


# Accepted Manuscript

Experimental performance of 300 kW<sub>th</sub> prototype of parabolic trough collector with rotatable axis and irreversibility analysis



Ruilin Wang, Wanjun Qu, Hui Hong, Jie Sun, Hongguang Jin

PII: S0360-5442(18)31433-6

DOI: 10.1016/j.energy.2018.07.136

Reference: EGY 13401

To appear in: *Energy*

Received Date: 31 March 2018

Accepted Date: 20 July 2018

Please cite this article as: Ruilin Wang, Wanjun Qu, Hui Hong, Jie Sun, Hongguang Jin, Experimental performance of 300 kW<sub>th</sub> prototype of parabolic trough collector with rotatable axis and irreversibility analysis, *Energy* (2018), doi: 10.1016/j.energy.2018.07.136

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

1     **Experimental performance of 300 kW<sub>th</sub> prototype of parabolic trough collector with**  
2                     **rotatable axis and irreversibility analysis**

3                     **Ruilin Wang<sup>a,b,1</sup>, Wanjun Qu<sup>a,b,1</sup>, Hui Hong<sup>a,b,\*</sup>, Jie Sun<sup>a,c,\*</sup> and Hongguang Jin<sup>a,b</sup>**

4                     <sup>a</sup>University of Chinese Academy of Sciences, Beijing 100049, China

5                     <sup>b</sup>Institute of Engineering Thermophysics, Chinese Academy of Sciences, Beijing 100190, China

6                     <sup>c</sup>School of Chemical Engineering and Technology, Xi'an Jiaotong University, Xi'an, Shaanxi 710049, China

7     **Abstract**

8             Parabolic trough collector (PTC) is the most mature concentrating solar thermal technology. Limited by  
9     the cosine effect, annual thermal efficiency of PTC is only 50 %. To show the limitations of performance of  
10    PTC and find corresponding solutions, an irreversibility analysis of PTC is experimentally conducted. Global  
11    exergy destruction is divided into exergy destructions in concentrator and receiver according to process  
12    analysis. Experimental results shows that the exergy destruction in concentrator accounts for the largest share.  
13    It indicates the process that sunlight being concentrated onto receiver is the key limitation of the performance  
14    of PTC. Experiments of the PTC with rotatable axis tracking show that rotatable axis tracking could decrease  
15    the exergy destruction in concentrator obviously. The annual exergy efficiency would be expected to be  
16    improved by 3 percent points according to the experimental results. This indicates that rotatable axis tracking  
17    is a practical method to improve the performance of PTCs. The influences of azimuth angle of PTC and heat  
18    transfer fluid temperature on exergy destruction are also analysed based on experimental data. In this study,  
19    the key limitation of the performance of the PTC is revealed and practical methods to decrease the exergy  
20    destruction of the PTC are provided.

21  
22    **Keywords:** Parabolic trough collector; Experimental test; Rotatable axis tracking; Irreversibility analysis

25    \* Corresponding authors. E-mail addresses: [honghui@iet.cn](mailto:honghui@iet.cn) (H. Hong) [sunjie@xjtu.edu.cn](mailto:sunjie@xjtu.edu.cn) (J. Sun)

26    <sup>1</sup> These authors contributed equally to this study and share first authorship.  
27

Download English Version:

<https://daneshyari.com/en/article/8070875>

Download Persian Version:

<https://daneshyari.com/article/8070875>

[Daneshyari.com](https://daneshyari.com)