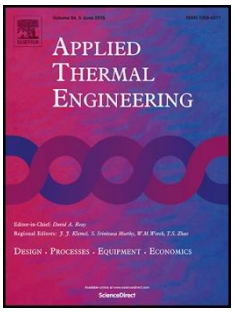
Accepted Manuscript



Title: Multi-parameter optimization design of parabolic trough solar receiver

Author: Jiangfeng Guo, Xiulan Huai

PII: S1359-4311(15)01422-2
DOI: http://dx.doi.org/doi: 10.1016/j.applthermaleng.2015.12.041
Reference: ATE 7455

To appear in: *Applied Thermal Engineering*

Received date: 8-10-2015
Accepted date: 9-12-2015

Please cite this article as: Jiangfeng Guo, Xiulan Huai, Multi-parameter optimization design of parabolic trough solar receiver, *Applied Thermal Engineering* (2015), http://dx.doi.org/doi: 10.1016/j.applthermaleng.2015.12.041.

Multi-parameter optimization design of parabolic trough solar receiver

Jiangfeng Guo*, Xiulan Huai

Institute of Engineering Thermophysics, Chinese Academy of Sciences, Beijing 100190, China

Highlights

- The optimal condition can be obtained by multi-parameter optimization.
- Exergy and thermal efficiencies are employed as objective function.
- Exergy efficiency increases at the expense of heat losses.
- The heat obtained by working fluid increases as thermal efficiency grows.

Abstract:

The design parameters of parabolic trough solar receiver are interrelated and interact with one another, so the optimal performance of solar receiver can not be obtained by the convectional single-parameter optimization. To overcome the shortcoming of single-parameter optimization, a multi-parameter optimization of parabolic trough solar receiver is employed based on genetic algorithm in the present work. When the thermal efficiency is taken as the objective function, the heat obtained by working fluid increases while the average temperature of working fluid and wall temperatures of solar receiver decrease. The average temperature of working fluid and the wall temperatures of solar receiver increase while the heat obtained by working fluid decreases generally by taking the exergy efficiency as an objective function. Assuming that the solar radiation intensity remains constant, the exergy obtained by working fluid increases by taking exergy efficiency as the objective function, which comes at the expense of heat losses of solar

*Corresponding author. Tel: +86 10 82543035; .fax: +86 10 82543033.
E-mail address: gjf1200@126.com (J. Guo)