

Accepted Manuscript

Study of the electrical and thermal performances of photovoltaic thermal Collector-Compound parabolic concentrated

Ahed Hameed Jaaz, Kamaruzzaman Sopian, Tayser Sumer Gaaz

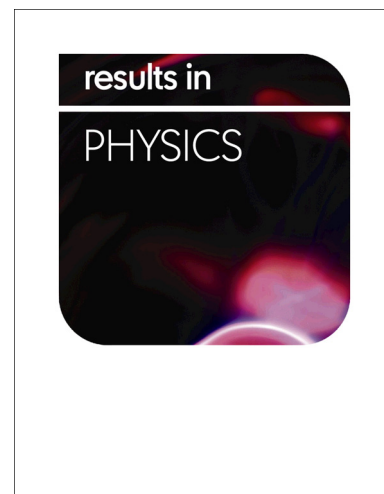
PII: S2211-3797(18)30290-0
DOI: <https://doi.org/10.1016/j.rinp.2018.03.004>
Reference: RINP 1315

To appear in: *Results in Physics*

Received Date: 6 February 2018
Revised Date: 4 March 2018
Accepted Date: 4 March 2018

Please cite this article as: Jaaz, A.H., Sopian, K., Gaaz, T.S., Study of the electrical and thermal performances of photovoltaic thermal Collector-Compound parabolic concentrated, *Results in Physics* (2018), doi: <https://doi.org/10.1016/j.rinp.2018.03.004>

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.



STUDY OF THE ELECTRICAL AND THERMAL PERFORMANCES OF PHOTOVOLTAIC THERMAL COLLECTOR-COMPOUND PARABOLIC CONCENTRATED

Ahed Hameed Jaaz¹, Kamaruzzaman Sopian^{1,*}, Tayser Sumer Gaaz^{2,*}

¹Solar Energy Research Institute (SERI), Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia

²Department of Machinery Equipment Engineering Techniques, Technical College Al-Musaib, Al-Furat Al Awsat Technical University, Al-Musaib, Babil 51009, Iraq

*Correspondence Author: ksopian@ukm.edu.my (K.S.) and taysersumer@gmail.com (T.S.G.)

Abstract

The importance of utilizing the solar energy as a very suitable source among multi-source approaches to replace the conventional energy is on the rise in the last four decades. The invention of the photovoltaic module (PV) could be the corner stone in this process. However, the limited amount of energy obtained from PV was and still the main challenge of full utilization of the solar energy. In this paper, the use of the compound parabolic concentrator (CPC) along with the thermal photovoltaic module (PVT) where the cooling process of the CPC is conducted using a novel technique of water jet impingement has applied experimentally and physically tested. The test includes the effect of water jet impingement on the total power, electrical efficiency, thermal efficiency, and total efficiency on CPC-PVT system. The cooling process at the maximum irradiation by water jet impingement resulted in improving the electrical efficiency by 7%, total output power by 31% and the thermal efficiency by 81%. These results outperform the recent highest results recorded by the most recent work.

Keywords: Photovoltaic thermal collectors; electrical performance; thermal performance; compound parabolic concentrator; jet impingement

Nomenclature

| | |
|-------|--|
| A_c | Frontal area solar collector (m^2) |
| b | Collector width (m) |
| C_p | Specific heat of working fluid (J/kg °C) |
| d | Diameter of nozzle (m) |
| D_h | Hydraulic diameter (m) |
| F' | Collector efficiency factor |

Download English Version:

<https://daneshyari.com/en/article/8208229>

Download Persian Version:

<https://daneshyari.com/article/8208229>

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