Accepted Manuscript

Title: Analyses of Entropy Generation and Pressure Drop for a Conventional Flat Plate Solar Collector Using Different Types of Metal Oxide Nanofluids

Author: M.A. Alim Z. Abdin R. Saidur A. Hepbasli M.A.

Khairul N.A. Rahim

PII: \$0378-7788(13)00415-5

DOI: http://dx.doi.org/doi:10.1016/j.enbuild.2013.07.027

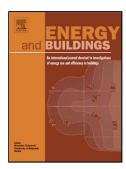
Reference: ENB 4382

To appear in: *ENB*

Received date: 17-4-2013 Revised date: 14-6-2013 Accepted date: 8-7-2013

Please cite this article as: M.A. Alim, Z. Abdin, R. Saidur, A. Hepbasli, M.A. Khairul, N.A. Rahim, Analyses of Entropy Generation and Pressure Drop for a Conventional Flat Plate Solar Collector Using Different Types of Metal Oxide Nanofluids, *Energy and Buildings* (2013), http://dx.doi.org/10.1016/j.enbuild.2013.07.027

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.



Analyses of Entropy Generation and Pressure Drop for a Conventional Flat Plate Solar

Collector Using Different Types of Metal Oxide Nanofluids

M.A. Alim^{a,*}, Z. Abdin^b, R. Saidur^{a,c}, A. Hepbasli^d, M.A. Khairul^a, N.A. Rahim^c.

^aDepartment of Mechanical Engineering, Faculty of Engineering, University of Malaya

50603 Kuala Lumpur, Malaysia

 b Department of Electrical Engineering, Faculty of Engineering, University of Malaya

50603 Kuala Lumpur, Malaysia

^cUM Power Energy Dedicated Advanced Centre (UMPEDAC), Level 4, Wisma R & D,

University of Malaya, 50603 Kuala Lumpur, Malaysia

^dDepartment of Energy Systems Engineering, Faculty of Engineering, Yasar University,

35100 Bornova, Izmir, Turkey

ABSTRACT

This paper theoretically analyzes entropy generation, heat transfer enhancement capabilities and

pressure drop of an absorbing medium with suspended nanoparticles (Al₂O₃, CuO, SiO₂, TiO₂

dispersed in water) inside a flat plate solar collector. Steady, laminar axial flow of a nanofluid is

considered. These nanofluids considered have different nanoparticles volume fractions and

volume flow rates in the range of 1% to 4% and 1 to 4 *L/min*, respectively. Based on the

analytical results, the CuO nanofluid could reduce the entropy generation by 4.34% and enhance

the heat transfer coefficient by 22.15% theoretically compared to water as an absorbing fluid. It

also has a small penalty in the pumping power by 1.58%.

Keyword: Solar collector; Nanofluid; Entropy generation; Pressure drop; Pumping power.

* Corresponding author. Tel: +60-3-79677611; fax: +60-3-79675317

Email address: jonduet@gmail.com (M.A. Alim).

1

Download English Version:

https://daneshyari.com/en/article/6734645

Download Persian Version:

https://daneshyari.com/article/6734645

<u>Daneshyari.com</u>