

Accepted Manuscript

Performance Analysis of Proposed Solar HDH Water Desalination Systems for Hot and Humid Climate Cities

A. Fouda, S.A. Nada, H.F. Elattar, Saeed Rubaiee, A. Al-Zahrani

PII: S1359-4311(18)30593-3

DOI: <https://doi.org/10.1016/j.applthermaleng.2018.08.037>

Reference: ATE 12540

To appear in: *Applied Thermal Engineering*

Received Date: 26 January 2018

Revised Date: 30 July 2018

Accepted Date: 12 August 2018

Please cite this article as: A. Fouda, S.A. Nada, H.F. Elattar, S. Rubaiee, A. Al-Zahrani, Performance Analysis of Proposed Solar HDH Water Desalination Systems for Hot and Humid Climate Cities, *Applied Thermal Engineering* (2018), doi: <https://doi.org/10.1016/j.applthermaleng.2018.08.037>

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.



Performance Analysis of Proposed Solar HDH Water Desalination Systems for Hot and Humid Climate Cities

A. Fouda^{a,*}, S. A. Nada^{b,c}, H. F. Elattar^b, Saeed Rubaiee^{d,e}, A. Al-Zahrani^c

^aDepartment of Mechanical Power Engineering, Faculty of Engineering, Mansoura University, 35516 El-Mansoura, Egypt

^bDepartment of Mechanical Engineering, Benha Faculty of Engineering, Benha University, Benha, 13511 Qalyubia, Egypt

^cEgypt-Japan University of Science and Technology, Borg El-Arab, Alexandria, Egypt

^dDepartment of Industrial Engineering, Faculty of Engineering, University of Jeddah, 21589 Jeddah, KSA

^eDepartment of Mechanical Engineering, Faculty of Engineering, University of Jeddah, 21589 Jeddah, KSA

*Corresponding author Email: eng_alifouda@mans.edu.eg, Mob: +966530541920

Abstract

Transient performance analysis and investigation of three proposed solar powered humidification–dehumidification (HDH) water desalination systems: single stage (SS), double stages (DS) and modified double stages (MDS) systems are presented for hot and humid cities. Open/closed modes of operations of the systems are also investigated. A parametric study of the hourly and daily systems performance is presented at various operating parameters. The results reveal that: (i) inserting solar collectors in HDH systems for air and water heating substantially enhances the system's performance; (ii) the fresh water productivity of all systems at open mode of operation increases with increasing the outdoor air temperature and humidity; (iv) at low outdoor humidity, the system's performance at closed mode of operation is higher than those at open mode of operation and the opposite is true at high outdoor humidity; (v) comparing between the three systems, MDS system (open mode) can produce fresh water of 350 kg/day with GOR_{day} of 1.63 and its fresh water productivity enhances with 86.7% and 34% than SS and DS systems, respectively; and (vi) using control system, the performance of the proposed systems can be maximized by changing between the open/closed mode of operations according to the outdoor conditions.

Download English Version:

<https://daneshyari.com/en/article/8941918>

Download Persian Version:

<https://daneshyari.com/article/8941918>

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