

## Performance evaluation of a solar still in the Eastern Province of Saudi Arabia— An improved analysis

Mohamed A. Antar<sup>a\*</sup>, Syed M. Zubair<sup>b</sup>

<sup>a</sup>*Mechanical Engineering Department, King Fahd University of Petroleum and Minerals, P.O. Box 535, Dhahran 31261, Saudi Arabia  
Tel. +966 (3) 8602964; Fax +966 (3) 8602949; email: antar@kfupm.edu.sa, http://faculty.kfupm.edu.sa/me/antar*

<sup>b</sup>*Mechanical Engineering Department, King Fahd University of Petroleum and Minerals, P.O. Box 1474, Dhahran 31261, Saudi Arabia*

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### ABSTRACT

The performance of a solar still is predicted through an improved and updated mathematical model. The model is based on classical energy balance equations; however, variable properties were considered in addition to a more reliable correlation for convection heat transfer from the seawater surface and the still glass cover. The effect of density variation within the solar still due to water vapor concentration difference is taken into consideration through a modified expression of the temperature difference ( $\Delta T$ ) and a more reliable expression for the heat transfer coefficient within the still that was developed for tilted covers. The performance of the still is validated against the published experimental values. In addition, the (distillate) productivity was reported for two days that represent both summer and winter conditions in Dhahran, Saudi Arabia. A parametric study was performed to identify the effect of the most influential parameters on the still performance. In addition, a sensitivity analysis was carried out to identify the most influential parameters on the solar still productivity.

*Keywords:* Solar still; Performance evaluation; Mathematical model

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\* Corresponding author.