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New combination of solar chimney for power generation and seawater desalination

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ABSTRACT

In this article, a new combination of solar chimney and Humidification–Dehumidification desalination process is introduced. In this system, the air is humidified by injection of water drops into the air flow. Then, the partial of vapors contained in the air is condensed on the outer surface of the cold water tubes. Two mathematical models have been developed for a one-dimensional flow in the solo solar chimney and the integrated system. The performance of the integrated system including power and potable water production is estimated and the results are discussed. Furthermore, it has been demonstrated that increasing in the temperature and mass flow rate of humidifier inlet water would improve the performance of the integrated system. It is found that the increase in water production would cause the decrease in power output. Also, to produce more fresh water, the number of dehumidifier tubes should be increased.

Keywords: Solar chimney; Power production; Seawater desalination; Humidifier; Dehumidifier

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