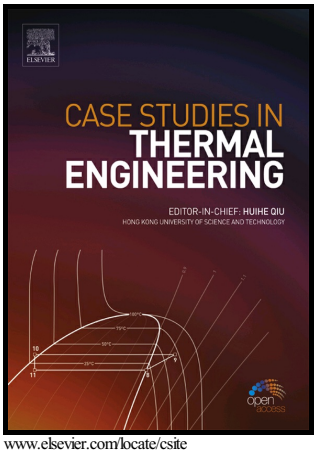
New design of Solar Chimney (Case study)

Omer Khalil Ahmed, Abdullah Sabah Hussein



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PII: S2214-157X(17)30274-5
DOI: https://doi.org/10.1016/j.csite.2017.12.008
Reference: CSITE247

To appear in: *Case Studies in Thermal Engineering*

Received date: 24 October 2017
Revised date: 21 November 2017
Accepted date: 29 December 2017

Cite this article as: Omer Khalil Ahmed and Abdullah Sabah Hussein, New design of Solar Chimney (Case study), *Case Studies in Thermal Engineering,* https://doi.org/10.1016/j.csite.2017.12.008

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Dr Omer Khalil Ahmed
Technical Institute / Hawija
Northern Technical University
omerkalil@yahoo.com

Abdullah Sabah Hussein
Technical College / Kirkuk
Northern Technical University
engabdullah852014@gmail.com

Abstract:

The solar chimney power plant has a promising future in the world. A new design of solar chimney is offered including both PV panels with solar chimney plant for electricity generation. Two experimental models of a hybrid solar chimney were built and designed (systems A&B). System (A) had a collector glass roof cover and a PV panel as an absorber with a chimney of 2 m height while system (B) is similar to system (A) but with PV panel as collector roof cover and plywood as an absorber in the base of the chimney.

Two similar experimental models were built to achieve the performance of these new designs. Practical tests were conducted in Kirkuk (35° 28' latitude and 44° 24' longitude), northern Iraq. The results showed that system (A) had higher thermal gain than system B while the daily average of electrical power in system (B) was (75.6 W) higher than system (A) (79 W). This is because the high thermal gain raised the operating temperature of the PV panel which led to a decrease in its power output. The results also presented that system (A) converted thermal power to kinetic power with daily average (0.008 W) because of the great thermal gain which made air less dense in turn increased its velocity more than system (B) (0.006 W) which had lower kinetic power. The total useful power produced by the system (B) is greater than the useful power produced from the system (A).

Keywords: Solar chimney, New design, Solar cell.