Experimental investigation on heat pipe spanwise spacing for passive cooling of roof top photovoltaic panels

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Research Abstract

The uncertainty regarding photovoltaics to generate adequate renewable power is still a problem due to very high temperatures in countries experiencing extreme climates. This study analyses the potential of heat pipes as a passive cooling mechanism for solar photovoltaic panels in the Ecohouse of the Higher College Technology, Oman using Computational Fluid Dynamics (CFD). A baseline model has been set-up comprising of 20 unit, 20 mm diameter water-filled heat pipes with a length of 992 mm attached to a photovoltaic panel measuring 1,956 mm x 992 mm. Using the source temperature of 64.5 °C (337.65 K), the findings of this work have established that a temperature reduction in the range of 5-10 °C is achievable when integrating heat pipes into photovoltaic panels. An optimum spacing of 50 mm (2.5 times the Diameter of the heat pipe) was determined through this work which is also a proof-of-concept towards the use of heat pipe technology for passive cooling of photovoltaic panels in hot climates.

Supervisors

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Publications

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