



Experimental investigation of a hybrid setup for distilled water and power production

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ABSTRACT

This work majorly concentrates on the effect of mass flow rate of water (m_{fw}) and phase change material (PCM) in an inclined panel basin solar still (IPBSS). To assess the performance of the proposed technique experiments were carried out using the constant mass of PCM beneath the basin of the IPBSS and m_{fw} is varied on the panel surface. Results show that there is a decrease in freshwater production with an increase in m_{fw} at the time of sunshine hours where as, the production increases at the time of offshine hours with continuous discharge of heat while using PCM material. Comparative analysis shows that the freshwater yield is higher for IPBSS without PCM at the time of sunshine hours, the yield and water temperature (T_w) is higher for IPBSS with PCM at the time of offshine hours. The production from the IPBSS with PCM is enhanced by 50% at minimum water flow in the panel surface while the yield from IPBSS without PCM is found as 5.8 kg/m² day. Similarly, the production of electrical power from the panel is lower in addition of PCM material, which increases the panel temperature (T_{pv}). From the results, it is found that the melting temperature and latent heat of fusion plays a significant role in Photovoltaic (PV) power production. The power production of PV panel during the sunshine hours with and without PCM at minimum mass flow is found as 78 and 68 W respectively.

Keywords: Solar energy; PV panel; PCM material; Solar desalination

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