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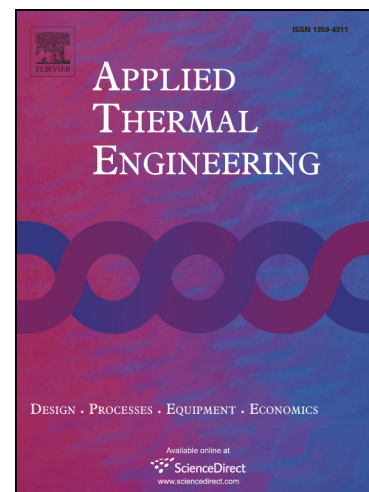
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Solar desalination using solar still enhanced by external solar collector and PCM

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Abstract

In this work, an experimental study on water desalination using a solar still having phase change material (PCM) and connected to a solar collector was carried out. The PCM is used to store solar thermal energy collected by the system at daytime as latent heat, to provide heat during night time thus continuous operation. Water in the basin and the PCM were heated by direct solar radiation and by hot water flowing through a coil heat exchanger, fixed in the basin, heated by a solar collector. The produced water vapor from the basin condensed on the inner side of the water cooled double-glass cover. The condensate was withdrawn as fresh water. The effect of hot water circulation flow rate, cooling water flow rate, and basin water level on the amount of fresh water produced were studied. The production rate of desalinated water was proportional to the increase in ambient temperature and hot water circulation flow rate. There also is an optimum value of cooling water flowrate (about 10 ml/s) at which the unit productivity was the highest. Additionally, as the water level in the basin increased the productivity decreased. The unit was capable of producing 4300 ml/day.m², of which about 40% was produced after sunset. The economic evaluation reveal that such units are feasible mainly in remote areas.

Keywords: Solar still, phase change material, solar collector, productivity

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