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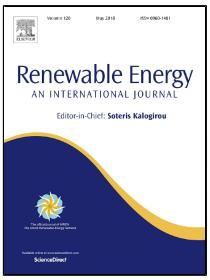

Integration of a solar pond with a latent heat storage system

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Integration of a solar pond with a latent heat storage system

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Abstract

Various studies have been conducted to increase the thermal efficiency and improve the performance of solar ponds. These works are based on increasing the temperature of the storage zone, decreasing the losses, and making the system stable. However, because of the relatively low efficiency of solar ponds, more studies are needed for developing novel methods. In this study, the integration of a solar pond with latent heat storage is studied for performance stability. For this case, the energy balance is written for each device; then the governing equations are solved, using the finite difference method. Comparing the results of the models with the experimental data indicates the accuracy of the analysis. Three different general configurations, including two parallel and a series layout, are studied. The results are presented based on the temperature changes, thermal energy, and efficiency of the processes. By comparison with the pond without phase change material (PCM), the average efficiency of discharging time for the series layout shows 6.1% increase. Also, this increase is about 5.4% for the parallel layout.

Keywords: Solar pond; latent heat storage; stability; efficiency.