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A study on exergetic performance of using porous media in the salt gradient solar pond

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Abstract: The transient exergetic performance of the salt gradient solar ponds with porous media added in Lower Convective Zone (LCZ) is investigated. One dimensional transient temperature, energy and exergy models have been developed. Three different porous media materials have been used in the simulation. Findings show that solar pond with cinders gains the highest LCZ temperature and gets the maximum energy and exergy efficiency which are 32.62 % and 20.70 % respectively, and the lowest one is the case with marbles which are 29.72% and 16.62%. The results indicate that adding porous media with low volume heat capacity and low heat diffusivity to LCZ is beneficial to reach a higher temperature, and high temperature, high volume heat capacity and low thermal diffusivity of the porous media are both positive effect to the solar pond's energy and exergy storage. Experimental study shows that the numerical energy and exergetic efficiency are both a little higher than experimental ones, and the same temperature difference leads to a bigger exergy difference than energy.

Key words: solar pond; porous media; exergy; energy; simulation

1. Introduction

China government has set the target of increasing the share of renewable energy

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