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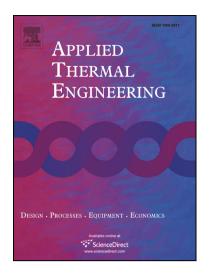
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ACCEPTED MANUSCRIPT

Performance analysis of a thermal energy storage system based on

paired metal hydrides for concentrating solar power plants

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Abstract

Concentrating solar power (CSP) plants require suitable thermal energy storage (TES) systems

to enable power generation during the night and cloudy days. Metal hydrides (MH) are attractive

options for such TES system and a novel design of an MH-TES system is proposed for CSP plants.

A 2D mathematical model is developed to study heat and mass transfer inside this system in which

a heat storage medium of high-temperature MH bed (Mg₂FeH₆) is coupled with a low-temperature

MH bed (Na₃AlH₆). To simulate this model a numerical code in Fortran-90 is made. The main

objective of this work is (i) to demonstrate the technical feasibility of the novel MH-TES system

through the simulation of operating cycles, and (ii) to discuss the performance assessment of the

proposed system. The process simulation demonstrated a consistent thermal and dynamic coupling

between the paired MH beds. The performance analysis showed that the present MH-TES system

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