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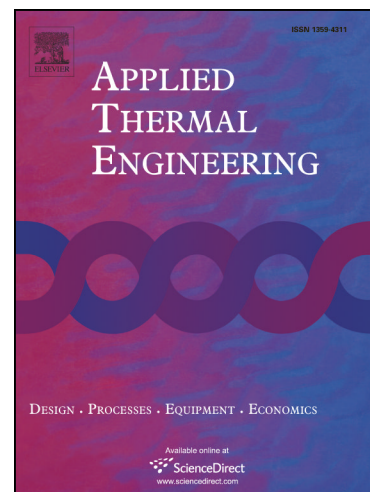
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Effect of Phase Transition Temperature and Thermal Conductivity on the Performance of Latent Heat Storage System

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Abstract: The heat transfer properties of phase change materials (PCMs) are of importance for the efficiency assessment on the heat storage and release in solar thermal systems. Previous research results demonstrate that the increase of thermal conductivity of PCMs can enhance the thermal performance in solar thermal systems; however, the corresponding mechanism is not clear. To this end, this work investigates the influence of PCMs properties on storage performance of solar thermal systems. First, experimental testing was conducted to verify the effectiveness of a thermal simulation model in the heat storage and release process. Then, the proposed simulation model was used to investigate the performance of several commonly used PCMs in the process of melting and solidification. The influence of thermal conductivity and phase transition temperature on the thermal storage properties was analyzed. The analysis results demonstrated that the influence of phase transition temperature on the thermal system performance was greater than that of the thermal conductivity in short time, while the thermal conductivity contributed greater influence on the system performance in long time. The phase transition temperature hardly affected the total system efficiency if given enough heat transfer time. The findings in this work may provide a theoretical reference for the selection of heat storage materials.

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