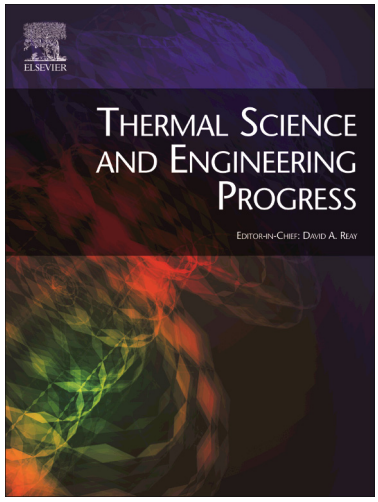

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Solar Energy Latent Thermal Storage by Phase Change Materials (PCMs) in a Honeycomb System

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Abstract: A computational investigation of a honeycomb system with Phase Change Materials (PCM) for solar energy applications is accomplished. The system is a solid honeycomb structure made in checkerboard matrix using parallel squared channels, half of them are filled with PCM and in the other the Heat Transfer Fluid (HTF) passes through. Transient regime numerical simulations are created for different channels per unit of length (CPL). The Solid-liquid PCM is paraffin wax. A comparison between the direct honeycomb model (Model A) and a porous medium model (Model B) is carried out. The model B is modelled with the extended Darcy-Brinkman law using the Local Thermal Equilibrium (LTE) assumption for heat exchange between solid and liquid zones. By the results of the direct honeycomb model, the characteristics such as permeability, effective thermal conductivity and interfacial heat transfer are evaluated and then compared with the porous medium model. Numerical simulations were carried out using the Ansys-Fluent code. Results in terms of melting time and temperature fields as function of time are presented.

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Keywords: Thermal storage; PCM; Phase Change material; Porous media; Honeycomb; Darcy-Brinkman law.