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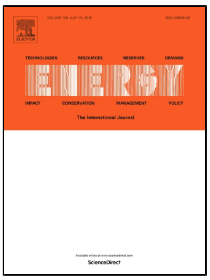

Latent and sensible heat analysis of PCM incorporated in a brick for cold and hot climatic conditions, utilizing computational fluid dynamics

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Latent and sensible heat analysis of PCM incorporated in a brick for cold and hot climatic conditions, utilizing computational fluid dynamics

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Thermal energy storage is a key issue in efficient energy systems applications. In this regard, phase-changing material (PCM) has been of interest as a passive solution for efficient energy management, especially in buildings. This paper presents a thermal analysis of a brick, which includes a particular type of PCM and ten air cavities, so as to be utilized in building envelop system. The objective of current study is to reduce heat transfer from outdoor to indoor space and vice versa by investigating latent and sensible heat storage through the PCM. Eventually, the fluctuations of indoor and outdoor air are analyzed in both the coldest and hottest days of Tehran in 2016. Computational fluid dynamics (CFD) was performed to estimate the behavior of the confined PCM while exposed to the external time-dependent conditions. The results indicated that in the summer heat storage was conducted mostly via latent heat, while in winter the thermal storage was mainly made up of sensible heat. However, in both the summer and winter, PCM could be incorporated in buildings envelop systems in order to operate as a passive indoor thermo-regulator.

Keywords: *Phase Change Material; insulation in greenhouses; Computational Fluids Dynamics; Brick*

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