

CFD Analysis of Solar Floor Radiant Heating System with PCM

Authors : Mohammad Nazififard, Reihane Faghihi

Abstract : This paper is aimed at understanding convective heat transfer of enclosed phase change material (PCM) in the solar and low-temperature hot water radiant floor heating geometry. In order to obtain the best performance of PCM, a radiant heating structure of the energy storage floor is designed which places heat pipes in the enclosed phase change material (PCM) layer, without concrete in it. The governing equations are numerically solved. The PCM thermal storage time is considered in relation to the floor surface temperature under different hot water temperatures. Moreover the PCM thermal storage time is numerically estimated under different supply water temperatures and flow rate. Results show the PCM floor heating system has a potential of making use of the daytime solar energy for heating at night efficiently.

Keywords : solar floor, heating system, phase change material, computational fluid dynamics

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