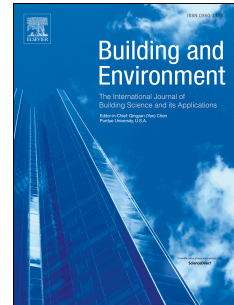


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Study on a tankless solar heating system using phase-change material plaster

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Abstract

This study aims to demonstrate the basic thermal performance, energy-saving effects, and indoor environmental improvements of a solar heating system. This system is a fusion of the phase-change material (PCM) plaster and capillary tubing mats (CTM). First, the experimental results of the basic thermal performance for each PCM mixing ratio and CTM shape are shown. Higher PCM mixing ratios or larger CTM pipe diameters result in increased discharge characteristics. Second, the energy-saving effects are demonstrated when the solar heat collector is installed on an experimental module. The thermal energy-saving effects in Hokkaido, Japan, are approximately 52%. Finally, the effect on room comfort in an experimental residence is determined. The temperature and relative humidity of the residence largely remain within the comfortable range recommended by ISO 7730.

1. Introduction

From the viewpoint of creating a comfortable indoor environment and energy savings, research on indoor thermal benefits afforded by thermal insulation and

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