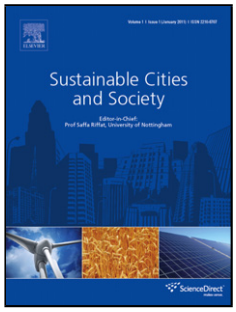

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Thermal Inertia and Thermal properties of the composite material Clay-wool

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HIGHLIGHTS

- A Thermal characterization of the composites clay-wool was done;
- The Asymmetrical hot plate and Flash methods were used to characterize the composite ;
- A comparison of thermal properties between the materials: clay-wool and clay alone were conducted;
- A verification of thermal conductivity using theoretical models were conducted ;
- An analysis of thermal transmittance for the materials : clay, clay-3%wool and clay-5%wool were conducted;
- A study of the thermal Inertia by determining: depth of heat flow diffusion, delay of temperature, delay of heat flow density and damping factor were conducted.

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ABSTRACT

Developing ecological insulation of unfired building materials will not only reduce energy consumption of bill houses but will assure also sustainability, especially for Bensmim region which is a poor area, cold and the main activity of its inhabitant is the elevation of sheep, so the wool is a very abundant and affordable material. For this purpose, a series of experimental studies were performed on the composite clay-wool in different percentage of wool. The first step in this work is the physic-chemical characterization of clay using the fluorescence X method. The second step is the thermal characterization of clay alone and the composite clay-wool using the asymmetrical hot plate and Flash methods. The third step in the work is the verification of thermal conductivity using different theoretical models. The fourth step in this work is the study of thermal Inertia of different wall's thickness of the materials: clay, clay-3%wool and clay-5%wool. By asserting all of the depth of heat flow diffusion, the delay of temperatures, the delay of heat flow density and the damping factor for different wall's thickness for the three materials. The obtained results indicate that those developed composites show off interesting characteristics in term of insulation and thermal Inertia. Those results attend above 11h of delay on (temperature, heat flow density), 0.27 of damping factor and 0.19 $w.m^{-1}.k^{-1}$ of thermal conductivity. Also, a comparison of heating energy need was conducted to a whole building model demonstrating that the composite clay-wool presents the best energy efficiency of envelope building.