
MECHANICAL AND THERMAL PROPERTIES OF HEMP CONCRETES

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Abstract.

Hemp concrete is a multifunctional ecological material used in buildings. It is an “atypical” material composed by hemp chips mixed with a binder. It is characterized by a high porosity (about 70% in volume) with three main pore sizes (1 μm , 100 μm and 1 cm).

This paper focuses on the impact of raw materials (hemp particles and binder) on the mechanical and thermal properties of the concrete. It is shown that a physico-chemical interaction at the interface binder / plant particles plays a significant role in the mechanical setting of the material. Moreover, the compressive strength of hemp concrete is correlated with the morphological characteristics of the hemp particles.

Due to the hygrophilous character of plant chips, the phase change effects (water / vapour) result in increasing the global thermal insulating performances of the hemp concrete. Finally, a numerical modeling of hemp concrete hygrothermal behavior is presented.