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Experimental and numerical investigations of thermal performance of a Hemp Lime external building insulation

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1 **Experimental and Numerical Investigations of Thermal Performance of a** 2 **Hemp Lime External Building Insulation**

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12 **Abstract:** Hemp-concrete is a green material which has become nowadays highly recommended in the
13 construction field. It finds applications as internal or external thermal insulator in wooden frame walls. At wall
14 scale, studies proved that using Hemp-concrete in building envelope can improve indoor hygrothermal comfort.
15 However, at building scale, hemp-concrete is scarcely studied. In that context, a French building in Grand-Est
16 region, Champagne-Ardennes, employing hemp-concrete as external insulator is selected and studied. An
17 apartment is monitored for several months. Indoor temperatures, relative humidities, thermal heat flux as well as
18 external weather conditions are measured using sensors installed inside the apartment and a weather station at
19 the building roof. Measurements underline the hemp-concrete ability to dampen external weather conditions by
20 showing good results for both indoor temperature and relative humidity. Experimental approach is then coupled
21 with a numerical validation at the wall and room scales using SPARK simulation tool. Investigations are
22 conducted on thermal heat flux through the wall, indoor office air temperature, and relative humidity. Results
23 show a good agreement between numerical values and experimental measurements.

24

25 **Keywords:** Hemp-concrete, monitoring, experimental measurements, numerical validation, SPARK.

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