

Experimental Set-up for the Thermo-Hydric Study of a Wood Chips Bed Crossed by an Air Flow

Authors : Dimitri Bigot, Bruno Malet-Damour, Jérôme Vigneron

Abstract : Many studies have been made about using bio-based materials in buildings. The goal is to reduce its environmental footprint by analyzing its life cycle. This can lead to minimize the carbon emissions or energy consumption. A previous work proposed to numerically study the feasibility of using wood chips to regulate relative humidity inside a building. This has shown the capability of a wood chips bed to regulate humidity inside the building, to improve thermal comfort, and so potentially reduce building energy consumption. However, it also shown that some physical parameters of the wood chips must be identified to validate the proposed model and the associated results. This paper presents an experimental setup able to study such a wood chips bed with different solicitations. It consists of a simple duct filled with wood chips and crossed by an air flow with variable temperature and relative humidity. Its main objective is to study the thermal behavior of the wood chips bed by controlling temperature and relative humidity of the air that enters into it and by observing the same parameters at the output. First, the experimental set up is described according to previous results. A focus is made on the particular properties that have to be characterized. Then some case studies are presented in relation to the previous results in order to identify the key physical properties. Finally, the feasibility of the proposed technology is discussed, and some model validation paths are given.

Keywords : wood chips bed, experimental set-up, bio-based material, desiccant, relative humidity, water content, thermal behaviour, air treatment

Conference Title : ICBPCM 2022 : International Conference on Buildings and Phase Change Materials

Conference Location : Tokyo, Japan

Conference Dates : August 16-17, 2022