Solar Energy and Building Physics Laboratory
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LESO LUNCHTIME* LECTURES

renewable energy - building science - urban physics

Friday 9 January 2015, 12h15-13h15
EPFL – GC C 330

DYNAMIC THERMAL SIMULATION OF PASSIVE HOUSING FOR SOUTHERN EUROPEAN CLIMATE: THERMAL REGULATION WITH PCM SOLUTIONS

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Summary

Pursuing the best solutions for the challenge imposed by the European Energy Performance Buildings Directive (EPBD: recast 2010) is a stimulating goal. Exploring and tackling this task leads to a broad number of possible combinations of energy saving strategies that can be bridged by a Passive House concept.
Acknowledging that this concept is well established and implemented mainly in cold climate countries of Northern and central Europe, the present research investigates on how the construction technology and energy demand levels can be adapted to Southern Europe, in particular to the Portugal mainland climate. For South Western Europe in addition to meeting the heating requirements in a fairly easy manner, it is crucial to provide comfortable conditions in summer, due to a high risk of overheating. A sensibility analysis using dynamic simulation was carried out, identifying the best solutions for a binomial criteria: energy demand – comfort analysis (using EN15251).
The use of Phase Change Materials (PCM) can be considered as a passive solution for thermal regulation of indoor air temperature. In the scope of this work, building solutions with the incorporation of PCM panels were investigated for their potential to reduce overheating. The PCM panels were incorporated into a gypsum board partition wall and into a suspended ceiling. To deepen the knowledge, a hygrothermal monitoring campaign to evaluate the indoor thermal comfort in two rooms of a department building of the University Campus was carried out for a whole year. The results achieved until present are presented and discussed. They reveal a promising potential, still to be further explored in terms of optimization algorithms.

Author

António José Figueiredo obtained a Master´s diploma in Civil Engineering from the University of Aveiro in 2009 for his work on “Characterization of a Seismic Reinforcing Solution of Adobe Walls”. Later he started his research career at the University of Aveiro and a consultant engineer of the Construction Institute from the Faculty of Engineering of the University of Porto. In 2012 he started his PhD on the subject “Dynamic Thermal Simulation of Passive Housing for Southern European Climate” supervised by Associate Professor Romeu Vicente and Pro-Rector Claudino Cardoso. He is author of over 10 scientific papers and a member of the Passive House Zero Energy Association.

*Presentations are followed by drinks & snacks, to give the opportunity to guests and speaker to further discuss the topic.