

Moisture Risks in Multi-layered Walls - Comparison of COMSOL Multiphysics® and WUFI®PLUS Models with Experimental Results

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Abstract

Introduction

Five test stands of houses have been built for the first time in Riga, Latvia (see Figure 1). The goal of these test stands is to verify the energy efficiency and sustainability of the solutions developed for the constructions of external walls. Moisture risks at the wall can negatively influence building sustainability and human health as well as the energy efficiency of the house and environment. The influence of the humidity on buildings' sustainability in two different test stands has been appraised. Moisture risks in multi-layer wall, mainly consisted of wooden materials and mineral wool, are analyzed in Latvian climatic conditions. Some experimental results are obtained about moisture in the multi-layered wall. Numerical simulations are also used to verify moisture risks in a building components in a long term as well as to compare numerical results with experimental obtained.

Use of COMSOL Multiphysics®

Software packages WUFI® plus and COMSOL Multiphysics® are used for numerical simulations. WUFI® plus is 3D room climate model which takes into account whole building and transient indoor conditions. COMSOL Multiphysics® is used to solve coupled heat and moisture transfer in building structures in a 1D case. These two numerical approaches show good fitting with the experimental results, despite the fact that a simple 1D model is used in COMSOL Multiphysics®.

Reference

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