

Influence of a Refurbishing on an Old Residential Building's Wall in Paris in Summer: Mass and Heat Transfer Approach

K. Azos-Diaz¹, B. Tremeac², F. Simon², D. Corgier², C. Marvillet¹

¹Laboratoire de Chimie Moléculaire, Génie des Procédés Chimique et Energétique, Paris, France

²MANASLU Ing., Savoie Technolac, Le Bourget du Lac, France

Abstract

Old buildings, like in Paris, were built with not insulated thick walls made of materials with high thermal inertia, giving to these buildings a thermal potential in the quality of indoor conditions during summer period, that must be assess. French thermal regulation and the Factor 4 approach have resulted in the implementation of thermal insulation to reduce energy consumption during the winter. Properties of old building are affected by the installation of thermal insulation devices (mainly when they are placed inside). However, what are the consequences on heat and mass transfer in the summer? Indeed, temperature in a city like Paris is higher than suburbs because of the urban heat island. A bad management of theses insulations could have serious consequences on health during hot period: overheat, accumulation of moisture... Also, some materials used in the renovation could have a negative impact on the structure which can compromise the solidity of the building. The aim of this study is to evaluate through hydrothermal modeling under dynamic conditions, the behavior of a 2D-multilayer and renovated wall (for different configurations) subject to real external conditions (for a building located in Paris). COMSOL Multiphysics® is the modeling tool adopted, with the PDE interfaces which allow the coupling of mass and heat equations. Results are compared to literature and discussed.