Influences of the Indoor Environment on Heat, Air, and Moisture Conditions in the Component: Boundary conditions modeling

Current models to predict heat, air and moisture (HAM) conditions in building components assume uniform boundary conditions, both for the temperature and relative humidity of the air in an indoor space as well as for the heat and moisture surface transfer coefficients. The heat and moisture surface transfer coefficients strongly depend on the local air velocity, local temperature, water-material interactions, water content at the material surface, and the surface texture of the material. Moreover, due to local heat and moisture sources, imperfect mixing and microclimatic effects, temperature and relative humidity in the adjacent air are seldom uniform. In order to obtain a reliable prediction of the HAM conditions in a building component, an accurate description of the indoor (and outdoor) boundary conditions is required. The objective of the present paper is to analyze the influence of the variations of the surface transfer coefficients near the surface of a building component on the HAM conditions in the component. A parameter study has been used to investigate this influence. The research showed that the surface transfer coefficients have a relatively large influence on the predicted HAM conditions in a building component. Building researchers and designers should be aware that the appropriate indoor environmental conditions are applied, when performing a HAM component simulation and analysis.

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