



THERMAL CAPACITANCE OF THE BUILDING ENVELOPE

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ABSTRACT

The aim of the research was to determine the effective thermal capacitance of the envelope of a building in order to evaluate the thermal time constant of the envelope. The effective capacitance of the envelope is determined by calculations of all layers of enclosures of envelope or of effective thickness of active internal layer of enclosure. The research is done by analyzing the different cases of dynamic thermal transmission. The dynamic thermal transmission is based on finite-difference simulation calculation method. The value of Fourier number is determined in order to acquire the reliable calculation results with optimal accuracy. The research analyses three different cases of wall construction. In all the cases the thicknesses of wall are the same, the difference is only in location of insulation layer. This layer is placed in first case – on interior of wall, in second case – on the exterior of wall, in third case – in the middle of wall construction. In all three cases the calculation has been done and the real time delay of wall and effective thermal capacitance of it has been determined. The real time delay was determined by employing of the harmonic dynamics of meteorological conditions.

Keywords: building envelope, enclosure, effective thermal capacitance, Fourier number, time delay