

ENERGY EFFICIENCY ASSESSMENT OF HEAT INSULATION BUILDING PRODUCTS: FUZZY-PROBABILISTIC APPROACH

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Abstract

The expediency of using heat-insulating construction products from a straw at the erecting of energy-efficient envelope constructions is considered in the paper. The hierarchical model in the form of an inference tree of the factors influencing the target function – reliability of energy efficiency of heat-insulating building products made of straw has resulted. A fuzzy matrix of knowledge is proposed which reflects the influence of thermophysical, physic-mechanical and durability parameters on the target function. The hierarchical connections between classified factors proceeded by apparatus of fuzzy logic and linguistic variables. A system of fuzzy logical equations which describes linguistic expressions of input variables according to the corresponding terms is proposed. In the research the expressions which describe the objective function – reliability of energy efficiency of heat-insulating construction products made of straw were obtained. It was made with the of membership functions following linguistic variables, by taking into account both qualitative as well as quantitative factors of influence. Represented in the paper model can be used as the design and engineering tool for the prediction of thermal performance of any multilayered wall assembly at the design stage of the project to assess complex energy efficiency parameters, which could be applied in practice during the decision-making process.

Keywords: Modelling; Reliability; Energy efficiency; Thermal insulation; Linguistic variable; Fuzzy logic; Construction product.