Mathematical Model for Prediction of Transmission Loss for Clay Brick Walls

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Abstract

Standardized acoustic measurements are both expensive and time consuming, therefore a mathematical model that can predict transmission loss for different construction types is necessary for the optimization to be carried out with computer and one final test to be made for validation. In this work clay brick constructions are tested as a porous material and as an isotropic, homogenous material. For porous materials the rigid matrix properties as well as porosity and pore properties contribute to sound reduction index of the material. Dissipation occur as a relative flow between fluid and solid. For isotropic, homogenous material there is structural damping that is an empirical assumption. Calculations are made by using different boundary conditions, calculations of trasmission loss are calculated using two methods and results are discussed. The noise is simulated as a superposition of several monofrequencies with an interval of 1 Hz.
The model use test environment that fit ISO EN 10140 -1 to 10140-5 is used to predict a sound reduction index value for several composite structures. The results achieved are validated with standardized measurements carried out in a certified laboratory[1].