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A homogenised vibratory model for predicting the acoustic properties of hollow brick walls
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Abstract

The prediction and the physical understanding of sound transmission through masonry walls made of hollow bricks remain an open question. To solve this problem a semi-analytical approach is proposed. The inhomogeneous structures of the brick wall are homogenised and a simplified analytical model is established to calculate the transmission loss of an equivalent finite and multilayered anisotropic plate. An efficient numerical homogenisation technique is derived to define the equivalent anisotropic brick. This process only needs the knowledge of the elastic tensor of the brick material that has been determined using ultrasonic measurements. The features of the simplified brick wall have been then investigated through Lamb waves dispersion curves. Finally, the model has been used to explain the transmission loss curve of a wall and a good agreement between predictions and test data is obtained. © 2011 Elsevier Ltd. All rights reserved.

Index Keywords

Analytical model, Anisotropic plates, Brick wall, Dispersion curves, Elastic tensors, Hollow bricks, Homogenisation, Inhomogeneous structure, Lamb Wave, Masonry walls, Multi-layered, Semi-analytical, Sound transmission, Test data, Transmission loss; Acoustic properties, Acoustic wave transmission, Anisotropy, Architectural acoustics, Mathematical models, Ultrasonic applications; Brick

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