Vibro-acoustic behaviour of laminated glazing including ultra-thin films

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Abstract

In this work, the vibro-acoutic behaviour of a laminated panel composed of two glazing skins and a viscoelastic core (PVB: butyral polyvinyl) joined with two adhesive ultra-thin films is investigated. Therefore, the developed dynamic model is underlined by mixing the classical plate's theories with a specific behaviour rule for the adhesive ultra-thin films and an integral equation formulation of the outside fluid. Then, the finite element method is used to discretize the coupled energy functional. Hence, a modal analysis is carried out in order to calculate and characterize the modal damping of the complex structure. Also, numerical results are validated by an experimental study. Besides, the modal recombination method is used to calculate the vibro-acoustic responses. Consequently, the influence of some parameters such as the thickness of the core and the ultra-thin films material on the modal damping and the vibro-acoustic behaviour of the laminate can be investigated. Then, numerical results show the importance of the adhesive ultra-thin films shear effects on both modal damping and transmission loss of the designed structure.