Finite Element Analyses of Double-wall Sandwich Structures with Viscoelastic Core

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ABSTRACT

This paper presents a reduced order finite element model for sound transmission analysis through a double-wall sandwich structures with viscoelastic core inserted in an infinite baffle. The proposed model is derived from a multi-field variational principle involving structural displacement and acoustic pressure inside the fluid cavity. To solve the vibro-acoustic problem, the plate displacements are expanded as a modal summation of the plate's eigenfunctions in vacuo. Similarly, the cavity pressure is expanded as a summation over the modes of the cavity with rigid boundaries. Then, an appropriate reduced-order model is introduced. The structure is excited by a plane wave at the source side. An example of the normal sound transmission loss of a double glazed window with laminated glass is shown. This example illustrates the accuracy and the versatility of the proposed reduced order model, especially in terms of prediction of sound transmission.