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Parameters Optimization of the Laminated Composite Plate for Sound Transmission Problem

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Abstract : In this paper, the specific sound transmission loss (TL) of the laminated composite plate (LCP) with different material properties in each layer is investigated. The numerical method to obtain the TL of the LCP is proposed by using elastic plate theory. The transfer matrix approach is novelty presented for computational efficiency in solving the numerous layers of dynamic stiffness matrix (D-matrix) of the LCP. Besides the numerical simulations for calculating the TL of the LCP, the material properties inverse method is presented for the design of a laminated composite plate analogous to a metallic plate with a specified TL. As a result, it demonstrates that the proposed computational algorithm exhibits high efficiency with a small number of iterations for achieving the goal. This method can be effectively employed to design and develop tailor-made materials for various applications.

Keywords : sound transmission loss, laminated composite plate, transfer matrix approach, inverse problem, elastic plate theory, material properties
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