

EXECUTION AND EVALUATION OF THE OPTIMIZATION PROCESS FOR A MULTI-MATERIAL DAMPING TREATMENT

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ABSTRACT –

The automobile industry often aims to reduce any structure-borne noise radiation resulting from external forces placed upon the vehicle during operation in the early stages of the design process, thus reducing the design and development expenses. A cost-efficient mean of testing for and reducing these structure-borne radiation issues is through the use of a finite element method (FEM) for an optimization process, and can be carried out in a numerical calculation program. The optimization procedure allows several different design variables, of which: 1) layer sequence, 2) laminate layer thickness, 3) laminate material properties, 4) viscoelastic material thickness, and 5) fiber orientation are used. The analysis resulting from this FEM can be assumed to have de-coupled the structural and acoustic responses, allowing the results to help in determining the best location and orientation, topology, of multiple-composite damping treatments from the optimization procedure. This paper aims to find the best topology, as well as to evaluate the optimization process used in this procedure.