# Optimal Design of Multi-Layered Stress Wave Attenuators

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ABSTRACT:

The goal of this study is to examine the efficiency and accuracy of several non-derivative based minimization algorithms for the design of stress wave attenuators. The model under consideration is a one-dimensional composite, composed of elastic or viscoelastic layers, subject to a suddenly applied stress. The performance of each composite is measured by the peak of the stress experienced at a point in the composite that is distant from the applied load. We seek to minimize the magnitude of this distant stress as a function of the material properties of each layer. Analytical solutions exist for a two-layered Goupillaud material, and the optimal designs from that case will be used as a test for our purely computational methods. We also base our choice of non-derivative based search algorithms upon the Goupillaud solution, which displays cusp-like behavior.

KEYWORDS: Elastic, Viscoelastic, Waves, Optimization

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