SHAPE AND TOPOLOGY OPTIMIZATION OF MULTI-LAYERED COMPOSITE MATERIALS

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ABSTRACT
This work is devoted to multi-layered composite design in structural optimization. Given a stacking sequence and fiber orientation, we determine the optimal shape of each layer composed by two orthotropic phases. Each layer is modeled as a linearly elastic membrane. The objective function to be minimized is the weight of the composite structure under a rigidity constraint. We propose a numerical algorithm for shape and topology optimization based on the level set method coupled with the shape and topological derivative. Difficulties for elastic low contrast shape derivative and anisotropic topological derivative calculations are addressed. A 2-d airplane fuselage section test case is discussed.

1. REFERENCES