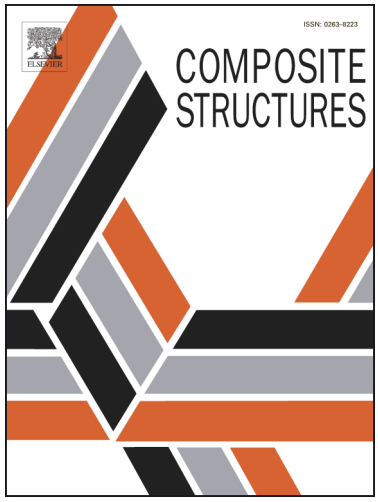

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Simultaneous Optimization of Stacking Sequences and Sizing with Two-Level Approximations and a Genetic Algorithm

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Abstract

Laminated composites have widespread applications in aerospace structures, and optimization of corresponding stacking sequences is indispensable. A genetic algorithm (GA) using a two-level approximation method was proposed previously to determine the optimal stacking sequences with significantly low computational costs. In practical structures, composite laminates are usually assembled with other components, such as honeycomb or metal panels or stiffened beams. Together with stacking sequences, the cross-sectional dimensions of these components need to be considered simultaneously. Thus, in the present study, this proposed method is extended to solve this problem. A new optimization model is firstly established by involving both stacking sequence and sizing variables. Within a single procedure, the genetic algorithm is used to solve a first-level approximate problem which includes both types of variables, while a second-level approximate problem is addressed for the individual fitness calculations. Numerical applications are presented to demonstrate the efficacy of this optimization strategy.

Keywords: 1.Stacking Sequence Optimization; 2. Sizing Variables; 3. Adaptive Genetic Algorithm; 4.Two-Level Approximation

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