

Accepted Manuscript

Maximization of fundamental frequency of layered composites using differential evolution optimization.

C.M.C. Roque, P.A.L.S. Martins

PII: S0263-8223(17)30090-9

DOI: <http://dx.doi.org/10.1016/j.compstruct.2017.01.037>

Reference: COST 8171

To appear in: *Composite Structures*



Please cite this article as: Roque, C.M.C., Martins, P.A.L.S., Maximization of fundamental frequency of layered composites using differential evolution optimization., *Composite Structures* (2017), doi: <http://dx.doi.org/10.1016/j.compstruct.2017.01.037>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Maximization of fundamental frequency of layered composites using differential evolution optimization.

Roque, C. M. C., Martins, P. A. L. S.

*INEGI, Faculdade de Engenharia da Universidade do Porto
Universidade do Porto
Rua Dr. Roberto Frias 404, 4200-465 Porto, Portugal.*

Abstract

Differential evolution optimization is used to find stacking sequences for maximization of the natural frequency of symmetric and asymmetric laminates. Clamped and simply supported boundary condition are considered. A meshless numerical method is used to compute free vibrations of square and rectangular plates. Obtained stacking sequences for symmetric laminates are in accordance with the literature. Optimized stacking sequences for 8 ply asymmetric laminates are also presented. Asymmetric stacking sequences produced higher first natural frequencies. Posterior analysis shows that optimized asymmetric stacking sequences are hygrothermally stable.

Keywords: Differential evolution, composite plate, free vibration, optimization, HTCC laminate, RBF method

1. Introduction

To take full advantage of the mechanical properties of fibrous composite materials, fiber orientation within the material can be tailored for custom purposes. Fiber orientation and geometry can influence the mechanical behavior of composite parts, including its behavior under dynamic loading. The stacking sequence of a laminate can then be optimized in order to meet stiffness and strength criteria [1].

For example, the maximization of the natural vibration of a structure is a recurrent problem in mechanical or civil engineering in the context of anti-resonance performance. An historical perspective on optimization of general mechanical structures can be found in [2], from Galileo with a beam design

Download English Version:

<https://daneshyari.com/en/article/6704956>

Download Persian Version:

<https://daneshyari.com/article/6704956>

[Daneshyari.com](https://daneshyari.com)