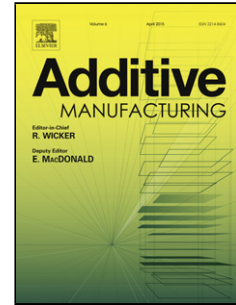


Accepted Manuscript

Title: Parametric Studies on Bending Stiffness and Damping Ratio of Sandwich Structures

Authors: Rohit Rajpal, Lijesh K.P, K.V. Gangadharan

PII: S2214-8604(17)30538-9
DOI: <https://doi.org/10.1016/j.addma.2018.05.039>
Reference: ADDMA 405



To appear in:

Received date: 18-11-2017
Revised date: 6-4-2018
Accepted date: 25-5-2018

Please cite this article as: Rajpal R, K.P L, Gangadharan KV, Parametric Studies on Bending Stiffness and Damping Ratio of Sandwich Structures, *Additive Manufacturing* (2018), <https://doi.org/10.1016/j.addma.2018.05.039>

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.

Parametric Studies on Bending Stiffness and Damping Ratio of Sandwich Structures

Rohit Rajpal^a, Lijesh K.P^a, K V Gangadharan^a

^aSOLVE Lab, Centre for System Design, National Institute of Technology, Karnataka, Surathkal, Mangalore, India-575025

Abstract

Sandwich structures are extensively used in aviation industries to reduce the overall weight of the system. Although the mechanical behavior of these structures has been widely studied, the performance of core shape in vibration response has been minimally explored. This study focuses on understanding the various influences of sandwich structures considering the following parameters: (i) nature of core shape, (ii) number of infill shapes, and (iii) orientation of cores, which affect the dynamic behavior namely of sandwich structures. Nine sandwich structures comprising three different core shapes, hexagon, triangle, and square shapes, in three different orientations, namely 0° , 45° , and 90° , were considered for the present study. These structures in the beginning were put by modal analysis using finite element method (FEM). All the nine structures were printed using the fused deposition method to validate the FEM findings, while the DEWE soft data acquisition system was used to estimate the modal parameters (i) natural frequency and (ii) damping ratio. Natural frequency and damping ratio were estimated using FRF and Nyquist circle plot, respectively. This study demonstrates that although the square core orientated at 0° exhibited superior stiffness in bending loads, the hexagonal core orientated at 0° displayed an admirable combination of both stiffness and damping properties.

Keywords: Sandwich beam, additive manufacturing, sandwich cores, vibration, modal analysis

1. Introduction

The demand for new materials and structures results from the vigorous efforts made by the automobile and aviation industries for saving the natural resources (fuel) and

Download English Version:

<https://daneshyari.com/en/article/7205790>

Download Persian Version:

<https://daneshyari.com/article/7205790>

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