

Accepted Manuscript

Identification of disbond and high density core region in a honeycomb composite sandwich structure using ultrasonic guided waves

Shirsendu Sikdar, Sauvik Banerjee

PII: S0263-8223(16)30644-4

DOI: <http://dx.doi.org/10.1016/j.compstruct.2016.05.064>

Reference: COST 7477

To appear in: *Composite Structures*

Received Date: 26 January 2016

Revised Date: 1 March 2016

Accepted Date: 18 May 2016



Please cite this article as: Sikdar, S., Banerjee, S., Identification of disbond and high density core region in a honeycomb composite sandwich structure using ultrasonic guided waves, *Composite Structures* (2016), doi: <http://dx.doi.org/10.1016/j.compstruct.2016.05.064>

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.

Identification of disbond and high density core region in a honeycomb composite sandwich structure using ultrasonic guided waves

Shirsendu Sikdar^{*}, Sauvik Banerjee

Department of Civil Engineering, Indian Institute of Technology Bombay, Powai, Mumbai-400046, India;

Email: shisu.iitkgp@gmail.com^{*}, sauvik@civil.iitb.ac.in

Abstract

The aim of this study is to identify disbond and high-density (HD) core region in a honeycomb composite sandwich structure (HCSS) using ultrasonic guided waves (GWs) and surface-bonded piezoelectric wafer transducers (PWTs). Towards this, an organized theoretical, numerical and experimental study has been carried out in order to understand the characteristics of GW propagation in a HCSS. A global matrix method based efficient and fast two dimensional (2D) semi-analytical model is used to study transient response and dispersion characteristics of the healthy HCSS under PWT excitations. Numerical simulation of GW propagation in HCSS with disbond and HD-core is then carried out using finite element package, ABAQUS. Laboratory experiments are then carried out to validate the theoretical and numerical results. A good agreement is observed between the theoretical, numerical and experimental results in all cases studied. It is found that the presence of HD-core region leads to decrease in amplitude of the propagating GW modes and the presence of disbond leads to substantial amplification of the primary anti-symmetric mode. Finally, based on these changes in modal behaviors, the location and size of unknown disbond and HD-core region within the PWT array are experimentally determined using a probability based damage detection algorithm.

Keywords

Honeycomb composite sandwich structure; Guided wave; Piezoelectric wafer transducers; High-density core; Disbond; Group velocity

Download English Version:

<https://daneshyari.com/en/article/6705385>

Download Persian Version:

<https://daneshyari.com/article/6705385>

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