

A Numerical Investigation of Lamb Wave Damage Diagnosis for Composite Delamination Using Instantaneous Phase

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Abstract : This paper presents a study of Lamb wave damage diagnosis of composite delamination using instantaneous phase data. Numerical experiments are performed using the finite element method. Different sizes of delamination damages are modeled using finite element package ABAQUS. Lamb wave excitation and responses data are obtained using a pitch-catch configuration. Empirical mode decomposition is employed to extract the intrinsic mode functions (IMF). Hilbert–Huang Transform is applied to each of the resulting IMFs to obtain the instantaneous phase information. The baseline data for healthy plates are also generated using the same procedure. The size of delamination is correlated with the instantaneous phase change for damage diagnosis. It is observed that the unwrapped instantaneous phase of shows a consistent behavior with the increasing delamination size.

Keywords : delamination, lamb wave, finite element method, EMD, instantaneous phase

Conference Title : ICSECM 2018 : International Conference on Structural Engineering and Composite Materials

Conference Location : Sydney, Australia

Conference Dates : October 04-05, 2018