

DETECTION OF TRANSVERSE CRACKS IN A COMPOSITE BEAM USING COMBINED FEATURES OF LAMB WAVE AND VIBRATION TECHNIQUES IN ANN ENVIRONMENT

Ramadas C. *, Krishnan Balasubramaniam^{††}, M. Joshi *, and C.V. Krishnamurthy

Centre for Nondestructive Evaluation and Department of Mechanical Engineering,
Indian Institute of Technology Madras, Chennai 600 036, INDIA

*R & D E (E), Dighi, Pune – 411 015, INDIA

^{††} Email: balas@iitm.ac.in

Abstract - The detection, location and sizing of transverse cracks in a composite beam, by combining damage features of Lamb wave and vibration based techniques in artificial neural network (ANN) environment, using numerical finite element model, is discussed. Four damage features, time of flight (TOF) and amplitude ratio, which are Lamb wave based features and first and second natural frequencies, which are vibration based features were used as input to ANN. The output of ANN was crack location and depth. It was demonstrated that through the simultaneous employment of features from the two modalities in an ANN environment, the sizing could be done more effectively.

Index terms: Lamb wave, vibration, ANN, damage detection, crack, SHM, NDE