Free Vibrational Responses of GRP Composite Plates: Experimental and Numerical Studies

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Abstract

In the recent years the composite materials aggrandize attention of researchers since metals have been replaced with these composites. The properties such as high strength to weight ratio, high modulus, excellent resistance to fatigue, creep, corrosion and wear as well as economical. Most of the studies done so for related to composite materials analytical, numerical or experimental focused on the strength evaluation. In the present study the vibro-acoustic analysis of the composite specimen has been carried out, since in case of structural application it plays a significant role. The vibro-acoustic analysis of the fabricated composite specimens is carried out numerically employing different boundary conditions. The glass fiber reinforced epoxy matrix composite specimens are manufactured by the vacuum-bag moulding technique. The elastic properties of the fabricated specimens are determined experimentally. The properties such as modal density and damping loss factor which deals with the vibration response of the system investigated. The numerical results validated with the experimental results. The experimental analysis is carried out using modal analysis technique with Fast-Fourier-Transform (FFT) analyzer, data acquisition system, impact hammer and accelerometer to obtain the frequency response functions. The effects of different geometrical parameters such as fiber orientation and different boundary conditions are studied in detail. It is observed that numerical predictions and experimental tests have a good correlation.

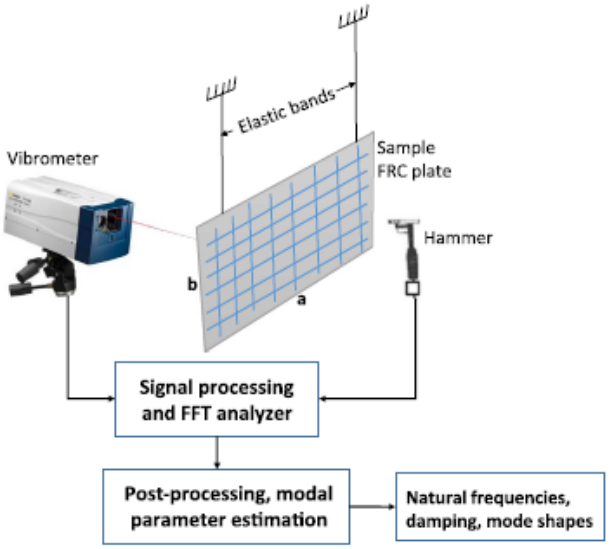


Fig.1 Experiment setup for modal analysis of GRF composite plates

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