
Registration Seminar

Seminar Title	: Non-destructive testing of Composite material with local defect resonance based wideband sweep vibrothermography
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Venue	: Seminar Hall, ME-001
Date and Time	: 01 Apr 2025 (11:00 AM)
Abstract	: This work focuses on quick detection of impact damage in composite structure using local defect resonance (LDR) assisted vibrothermography. Carbon and glass fiber composite samples are fabricated using Vacuum Assisted Resin Transfer Molding (VARTM) process. Then a portable impact testing machine has been fabricated for creation of different energy and angle impact on coupon and structure. The variation of energy, displacement, force and velocity has been observed for different energy levels and angles. Barely visible impact damage (BVID) has been created to inspect it using a newly developed non-destructive testing method. In case of LDR based Non-destructive testing (NDT) method, the sample is excited using narrow and wideband sweep excitation using contact type PZT element and reception using Laser Doppler Vibrometer or, microphone (acoustic testing) or thermal camera (vibro-thermography). All the types of testing have been presented on sample containing defects like flat bottom hole (FBH), delamination (made by pouch), low velocity impact damage of variable energies. Vibro-thermography is found to be the fastest method among method inspected. Nonlinearity plays a vital role in the LDR based NDT. It is found that different sweep direction (forward/backward) produces other two nonlinear LDR frequencies other than the traditional linear LDR frequency (f_L) due to the unstable response part in the backbone curve. Backward sweep excitation provides more out of plane vibration/temperature increment over defect at LDR frequency than forward sweep excitation.