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Seminar Title	: Dynamic stability and control of composite MRE sandwich panels
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Venue	: SEMINAR ROOM (ME)
Date and Time	: 31 Jul 2024 (11.00 am)
Abstract	: Sandwich structures are widely used in aerospace and marine applications. Improving the dynamic performance of composite sandwich structures is a key task in their design. Smart materials like magnetorheological elastomers (MRE), shape memory alloys and piezoelectric materials are employed in automatic control of unstable vibrations. Present work focuses on the vibro-aeroelastic analysis and control of composite sandwich structures with MRE cores. A dynamic model is developed for the MRE core composite sandwich structure using the classical beam theory and the finite element formulation. Aerodynamic pressure over the sandwich structure is modelled using the linear first-order piston theory. The aeroelastic characteristics and the stability of the MRE composite sandwich beam are studied and parametric study is performed. Various core layer configurations like partially treated core, tapered core and hexagonal honeycomb core are considered. Furthermore, neural network-based RBF surrogate model is developed and genetic algorithms is used for optimizing the parameters. The vibration and aeroelastic characteristics of the composite MRE sandwich plate under hygrothermal loads is investigated and the parametric study is carried out. The back propagation neural network (BPNN) model and modified teaching learning-based optimization algorithm (MTLBO) is implemented to know the optimized values that can increase the stability region. Sound absorption characteristics of MRE composite sandwich plate are also investigated. The transient response of MRE sandwich beam subjected to various loads such as sinusoidal, triangular, step and blast loads are obtained when the simultaneous aerodynamic pressure is acting over it. A smart hybrid piezoelectric active control scheme is proposed for effective vibration reduction in composite MRE sandwich under aerodynamic loading. Experimental and numerical study is carried out for the MRE composite sandwich box beam.