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Dynamic stability of wings for drone aircraft subjected to parametric excitation

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Vibration control of machines and structures incorporating viscoelastic materials in suitable arrangement is an important aspect of investigation. The use of viscoelastic layers constrained between elastic layers is known to be effective for damping of flexural vibrations of structures over a wide range of frequencies. The energy dissipated in these arrangements is due to shear deformation in the viscoelastic layers, which occurs due to flexural vibration of the structures. Multilayered cantilever sandwich beam like structures can be used in aircrafts and other applications such as robot arms for effective vibration control. These members may experience parametric instability when subjected to time dependant forces. The theory of dynamic stability of elastic systems deals with the study of vibrations induced by pulsating loads that are parametric with respect to certain forms of deformation. The purpose of the present work is to investigate the dynamic stability of a three layered symmetric sandwich beam (Drone Aircraft wings) subjected to an end periodic axial force. Equations of motion are derived using finite element method (Matlab software). It is observed that with increase in core thickness parameter fundamental buckling load increases. The fundamental resonant frequency and second mode frequency parameter also increase with increase in core thickness parameter. Fundamental loss factor and second mode loss factor also increase with increase in core thickness parameter. Increase in core thickness parameter enhances the stability of the beam. With increase in core loss factor also the stability of the beam enhances. There is a very good agreement of the experimental results with the theoretical findings.

Biography

Iyd Eqaab Maree has completed his PhD at the age of 45 years from TU-Freiberg University in Germany and Master studies from University of Technology in Baghdad. He is Assistant Professor in Erbil Technical College, a premier Bio-Soft service organization. He has published more than 10 papers in reputed journals and serving as an editorial board member of repute.

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