Active-passive control of flutter using MFC piezoelectric actuators

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ABSTRACT

The purpose of this study is to investigate the Macro Fiber Composite(MFC) piezo fiber composite actuators in vibration and flutter control of structural composite wings applications. The MFC piezofiber composite actuator consists of rectangular piezo ceramic rods sandwiched between layers of adhesive, electrodes and polyimide film. The electrodes are attached to the film in an interdigitated pattern which tranfers the applied voltage directly to and from the ribbon shaped rods.The major advantages of a MFC piezofiber composite actuator are higher performance, flexibility, durability, and directional actuationcompared to a traditional piezoceramic actuator. In this study, MFCpiezofiber composite actuatorsbonded in anti-symmetric configuration with three types of control techniques are utilized to simultaneously suppress the first bending and torsional vibrations of plates of a plate-wing structure. The control techniques utilized in this study are active control, passive control and hybrid control. With anti-symmetric configuration of MFCpiezofiber composite actuators, the controlled modes can be individually targeted without spillover. The velocity feedback control and R-shunt, RL-shunt are used in active vibration and passive vibration, respectively.

Keywords : Macro Fiber Composite piezofiber composite actuators

Table of Contents

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