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DAMPING CHARACTERISTICS AND MECHANICAL PROPERTIES OF CARBON FIBER-REINFORCED COMPOSITES INTERLEAVED WITH CO-CURED VISCOELASTIC LAYERS

Abstract

Vibration damping characteristics of carbon fiber-reinforced composites interleaved with co-cured viscoelastic layers have been studied using cantilever beam test, an impulse technique and dynamic mechanical analysis (DMA). The Natural Frequency and Loss Factor of bending vibration obtained indicated that the damping properties of composites were effectively improved by the addition of viscoelastic damping layer, and in the frequency range of 0-1600Hz, the Loss Factor of the 1st and 2nd vibration mode increases with the increasing of frequency. The effect of the number and location of the damping layer on the mechanical properties of unidirectional composite plate have also been investigated. The test results show that the number and location of the damping layer is closely related to the mechanical properties of composites. With increasing number of damping layer, the bending strength and modulus of the composite were correspondingly decreased. With one damping layer interleaved, the bending strength and modulus of the composite decreased dramatically as the location of damping layer near the center of the laminates as a result of the shear stress is the largest in the middle of laminate. The desired damping properties of composites with a certain strength and modulus can be achieved by controlling the number and location of the interleaved damping layers which could be applied in the vibration damping of structural composites for spacecraft and launch vehicle.