

عنوان مقاله:

Nonlinear Analysis of a Corrugate Composite Panel Actuated by Shape Memory Alloy Wire

محل انتشار:

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خلاصه مقاله:

This paper investigates the application of Shape Memory Alloy (SMA) wire in actuation of a corrugated composite panel by SMA wires. This synthesis is applicable in adaptive skin of morphing wings. Trapezoidal corrugated laminate is proposed as a good candidate to provide a compliant structure. The SMA wire is mounted on the corrugated composite panel as an actuator in the transverse direction. The active structure is considered as a beam which deflects under eccentric axial loading due to tensile force exerted by the SMA wire. The Brinson model is used for the thermomechanical behavior of the SMA wire. A nonlinear finite element analysis is performed to predict the behavior of proposed structure under actuation of SMA wire. Due to complicated hysteric behavior of SMA wires, a user material subroutine (UMAT) has been written, based on the constitutive equation of SMA wires, to model the shape memory effect of these wires. Numerical results show that the selected SMA wire actuator can generate enough force to deform the structure. Also, in reversal movement the structure has enough strain energy to bring the structure back to its initial position. The fabrication of a specimen as well as experimental procedure are described. Finally the active corrugated panel is actuated by the electrical current and the test results are compared with the numerical data. The end point deflection of the structure followed the trends expected from the numerical results

کلمات کلیدی:

Corrugated composite panel, Large deflection, Nonlinear modeling, Shape Memory Alloy

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