عنوان مقاله:

Numerical Analysis of the Microstructural and Geometrical Effects on the Flexural Behavior of Sandwich Structures with Skin/Core Delamination

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خلاصه مقاله:

The effects of critical microstructural features on the mechanical behavior of sandwich structures under bending loading are investigated using the finite element method (FEM). The sandwich structures are made of a thick foam core and two thin skins consisting of laminated composites. The numerical results are extracted in the presence of the skin/core delamination which is one of the major failure modes of sandwich structures. The microstructural features include different types of woven fabric (E-glass, Kevlar and carbon), fiber volume fraction, number and arrangement type of layers in the composite skins, thickness and material properties of core, fracture toughness of adhesive face and the debonding length. Also, the effect of addition of carbon nanotubes (CNTs) into the foam core on the flexural properties of sandwich panels is studied. Comparisons are made between the predictions of the FEM and experimental measurements for the sandwich beams involving the skin/core delamination. A reasonable agreement is observed between two sets of results. It is found that the increase of fiber volume fraction and number of layers leads to an enhancement in flexural stiffness and increase in the delamination threshold load. The flexural properties of sandwich structures can be improved by increasing the thickness and elastic modulus of core. The results indicate that using carbon fibers into the composite skin is an efficient way to postpone the delamination of the skin from the .core. Adding the CNTs can significantly enhance the delamination threshold load

کلمات کلیدی:

Sandwich Structure, Bending, Delamination, Microstructural Effect, Finite Element method