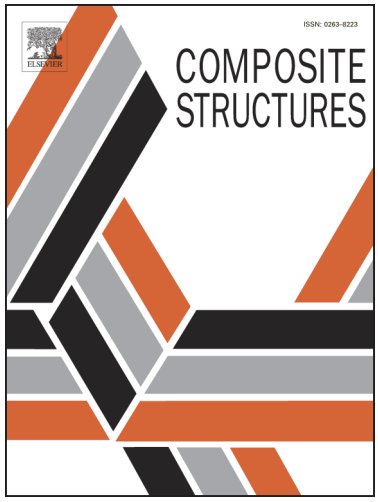

Low velocity impact analysis of functionally graded carbon nanotubes reinforced composite skew plates

Parviz Malekzadeh, Mojtaba Dehbozorgi

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Low velocity impact analysis of functionally graded carbon nanotubes reinforced composite skew plates

Parviz Malekzadeh[1], Mojtaba Dehbozorgi

Department of Mechanical Engineering, School of Engineering, Persian Gulf University, Bushehr 7516913798, Iran

Abstract

As a first endeavor, the low velocity impact analysis of functionally graded carbon nanotubes reinforced composite (FG-CNTRC) skew plates including the specifications of contact force, plate deflection and impactor displacement is presented. The plate deformation is formulated based on the first-order shear deformation theory (FSDT) and the contact force between the plate and projectile is estimated using the Hertzian nonlinear contact law. The effective mechanical properties of the carbon nanotubes-polymer composite plates is obtained using Mori-Tanaka micro-mechanical model. The finite element method (FEM) in conjunction with Newmark's time integration scheme and Newton-Raphson algorithm is employed to solve the governing equations. After studying the convergence behavior of the method, its accuracy is verified by comparing the obtained results with those available in the open literature in the limit cases and also by comparing the obtained contact force with those of ABAQUS commercial software for isotropic plate. Finally, the effects of various profiles of the carbon nanotubes (CNTs) distribution, which includes symmetric and asymmetric distributions, the geometrical parameters and the velocity of impactor on the low velocity impact behavior of the FG-CNTRC skew plates are studied.

[1] Corresponding author, Tel.: +98-77-31222150; fax: +98-77-33440376.

E-mail address: p_malekz@yahoo.com, malekzadeh@pgu.ac.ir (Parviz Malekzadeh)