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A. El Moumen, M. Tarfaoui, K. Lafdi, H. Benyahia



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Dynamic properties of carbon nanotubes reinforced carbon fibers/ epoxy textile composites under low velocity impact

A. El Moumen (a,*), M. Tarfaoui (a), K. Lafdi (b) and H. Benyahia (a)

(a) ENSTA Bretagne, FRE CNRS 3744, IRDL, F-29200 Brest, France.

(b) University of Dayton, Dayton, OH 45469-0168, United States.

*Corresponding author. E-mail address: ahmed.el_moumen@ensta-bretagne.fr

Abstract:

In this study, the impact response of polymer composites containing a random distribution of carbon nanotubes (CNTs) has been investigated by considering energy profile diagrams and associated force-time curves. The composite consists of CNTs initially filled Epon 862 Epoxy resin and implanted between plies of T300 6k Carbon fiber with 5HS (satin) weave. Different mass fractions of CNTs were used: 0% as reference, 0.5%, 1%, 2% and 4%. Taylor impact test was used to obtain the impact response of specimens. Projectile manufactured from a high strength and hardened steel with a diameter of 20 mm and 1.5 kg of mass was launched by a compressed gas gun within the velocity of 7 m/s. Deformation histories and damage modes of specimens were recorded during impact using high-speed camera. The effect of CNTs amount on dynamic properties and damage process was discussed.

Keywords: A. Fabrics/Textiles, A. Polymer (textile) fibre, B. Impact behaviour, C. Damage, Carbon nanotubes, Dynamic response.

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