

عنوان مقاله:

Fracture Energy of CFRP Composite Lamina in Fiber Breakage Mode using Digital Image Correlation and Finite Element Methods

محل انتشار:

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خلاصه مقاله:

Carbon fiber-reinforced polymer (CFRP) composite are increasingly used in the design of aerospace structures. Fibers are the load bearing constituent of the composite structures, therefore mechanical characterization of fibers in composite lamina is important for the design of composite structures. Lamina behavior is classified as quasi brittle materials with no plastic deformation, in which many constitutive models have been developed to address its linear-nonlinear behavior to failure. Although, the standard test has been developed and practiced to determine the elastic and strength properties of fibers, many challenges encountered in the characterization of lamina fracture energy in fiber breakage mode. Fracture energy is considered as the dissipated energy through full elastic-softening deformation to final failure at local material point. In this research, an experiment on CFRP composite along with digital image correlation (DIC) and finite element simulation (FES) are developed to obtain and validate the fracture energy of lamina in fiber breakage mode. The experiment is conducted on single-edge-notch 0-deg unidirectional (UD) CFRP composite lamina under tensile loading condition. DIC system is used to record the mechanism of deformation and strain field at the outer surface of the CFRP composite. FES is used to model the specimen behavior and validate the measured value of fracture energy.

کلمات کلیدی:

Carbon fiber-reinforced polymer composite laminate, Fracture energy, Continuum damage Mechanics, Finite element simulation, Digital image correlation

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