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Study of random fatigue behavior of C/SiC composite thin-wall plates

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Abstract

As an alternative method of acoustic experiment, vibration tests of C/SiC thin-wall plates were conducted to study the random fatigue behavior. The vibration specimen was clamped with cantilever boundary and subjected to limited-bandwidth vibration excitation. The strain history and fundamental frequency of the specimens were monitored during the vibration test. It was found that the measured strain value and strain amplitude value accorded with Gauss and Rayleigh distribution, respectively. The fundamental frequency decreased greatly when the vibration specimen failed, which could be recognized as failure criterion for the specimen under random loading. The microscopic fracture morphologies showed that the majority failure mode of fibers in the longitudinal and transverse directions were fiber pull-out and fiber splitting, respectively. The tensile force induced by reversed bending load is the main driving force for damage in specimen.

Keywords: C/SiC composites; Random fatigue; Fundamental frequency; Fatigue failure