

Abstract:

Fatigue testing of fiber-reinforced polymer matrix composites

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Depending on their area of application, composite structures are subjected to dynamic loading when in use. Carbon fiber-reinforced plastics (CFRPs) in particular show a more favorable fatigue behavior compared to metallic alloys and are often considered fatigue-resistant up to a relatively high stress level. Consequently a simplification of the structural design is possible with CFRP materials. However, this does not apply for fiber-reinforced polymer matrix composites in general and in particular when a composite laminate is damaged. The consideration of the fatigue behavior of composite materials used, for example, in aerospace structures or in rotor blades for wind turbines is therefore of great importance. This presentation gives an overview of frequently performed composite fatigue tests on coupon-level and introduces the required testing machines for this purpose, either with electro-dynamic or servo-hydraulic drive systems. Different methods of strain measurement for fatigue testing will be presented and limitations for the frequency range when testing polymer matrix composites will be discussed.