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Experiments on Residual Compressive Strength After Fatigue of Carbon Fiber Fabric Composites in Hydrothermal Environment

Authors : Xuan Sun, Mingbo Tong

Abstract : In order to study the effect of hydrothermal environment on the fatigue properties of carbon fiber fabric composites, the experiments on fatigue and residual compressive strength with the center-hole laminates were carried out. For the experiments on fatigue in hydrothermal environment, an environmental chamber used for hydrothermal environment was designed, and the FLUENT was used to simulate the field of temperature in the environmental chamber, it proved that the design met the test requirements. In accordance with ASTM standard, the fatigue test fixture and compression test fixture were designed and produced. Then the tension-compression fatigue tests were carried out in conditions of standard environment (temperature of 23+2℃, relative humidity of 50+/-5%RH) and hydrothermal environment (temperature of 70 +2℃, relative humidity of 85+/-5%RH). After that, the residual compressive strength tests were carried out, respectively. The residual compressive strength after fatigue in condition of standard environment was set as a reference value, compared with the value in condition of hydrothermal environment, calculating the difference between them. According to the result of residual compressive strength tests, it shows that the residual compressive strength after fatigue in condition of hydrothermal environment was decreased by 13.5%,so the hydrothermal environment has little effect on the residual compressive strength of carbon fiber fabric composites laminates after fatigue under load spectrum in this research.

Keywords : carbon fiber, hydrothermal environment, fatigue, residual compressive strength
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