

MATERIALS AND STRUCTURES SYMPOSIUM (C2)
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EFFECTS OF THERMAL CYCLING ON MECHANICAL AND PHYSICAL PROPERTIES OF HIGH
PERFORMANCE CARBON/EPOXY COMPOSITES APPLIED TO SATELLITE ANTENNA

Abstract

The aim of this article was to investigate the effects of thermal cycling on mechanical and physical properties of high performance carbon/epoxy(M40J/BA204)composites applied to satellite antenna. The thermo-cycling(-196 celsius degree to 130 celsius degree,200 cycles)was performed on unidirectional composite and pipe composite. For unidirectional compositethe changes in dynamic mechanical properties and thermal stability were characterized by dynamic mechanical analysis(DMA)and thermo gravimetric analysis(TGA),respectively. The evolution of surface morphology and surface roughness were observed by atomic force microscopy(AFM). Changes in mechanical properties including longitudinal tensile propertyflexural property and interlaminar shear strength(ILSS)were measured. For pipe compositechanges in mechanical properties including tensile property and flexural property were measured. The results of unidirectional composite indicated that the thermal cycling could improve the crosslinking degree and the thermal stability of resin matrix to a certain extentand induce thermal stress, thereby leading to the interfacial debonding. The degradation in longitudinal tensile property was caused by effects of the interfacial debongding. The degradation in flexural property and ILSS were also affected by it. Even so the integrate mechanical property of pipe composite was almost constant after 200 times of thermo-cycling, which indicates than the pipe composites has good thermal stability and good mechanical stability.