

Low-velocity impact performance of glass fiber, kenaf fiber, and hybrid glass/kenaf fiber reinforced epoxy composite laminates

ABSTRACT

The goal to decrease global dependency on petroleum-based materials has created a demand for bio-based composites. Composites that are reinforced with natural fibers often display reduced strength compared with those using synthetic reinforcement, and hybridizing both types of reinforcement within a common matrix system offers a possibly useful compromise. This research investigated the low-velocity impact performance of glass, kenaf, and hybrid glass/kenaf reinforced epoxy composite plates. The aim of the study was to determine the low-velocity impact behavior of biocomposite material in assessing its potential for application in the radome structures of aircraft. Natural fibers possess low dielectric constants, which is a primary requirement for radome. However, the structural integrity of the material to impact damage is also a concern. Composite samples were prepared via a vacuum infusion method. A drop weight impact test was performed at energy levels of 3 J, 6 J, and 9 J. The Impact tests showed that the impact peak force and displacement increased with the energy level. Hybrid glass/kenaf composites displayed damage modes of circular and biaxial cracking. The former is analogous to the damage observed in glass-reinforced composite, while the latter is unique to woven kenaf reinforced composites. The severity of the damage increased with impact energy and was found to be significant at 3 J.

Keyword: Low velocity impact; Hybrid; Kenaf fiber; Glass fiber; Composite laminates