

Crashworthiness performance of hybrid kenaf/glass fiber reinforced epoxy tube on winding orientation effect under quasi-static compression load

ABSTRACT

This research was aimed to study the effect winding orientation on the crashworthiness performance of hybrid tube. The specimens tested under quasi-static compression load involve of three winding parameters ($\theta = 30^\circ, 45^\circ$ and 70°) of hybrid kenaf/glass fiber reinforced epoxy and glass fiber reinforced epoxy as contrast specimen. The automated filament winding technique has been used in fabrication of hybrid and non-hybrid composite tube and crashworthiness performance was investigated experimentally. The effects of winding orientation on energy absorption capabilities and crashworthiness characteristic were investigated through quasi-static compression load and the result are compared with the glass fiber composite tube to justify the capability of hybrid natural/synthetic as energy absorption application. Hybridized samples proved to enhancing the progressive crushing capability as combination of local buckling, delaminate and brittle fracturing as progressive crushing modes. In the view of winding orientation aspect, the results of high winding orientation of hybrid composite tube elevated the crush load efficiency, specific energy absorption and energy absorption capability compared to glass composite tube (GFRP). The hybrid kenaf/glass composite tube with high winding orientation showed the best winding orientation to enhance the energy absorber characteristics as energy absorption application.