

Experimental assessment of collapse behavior and energy absorption of composite and hybrid composite square tube subjected to oblique loads

ABSTRACT

Composite tubes have been effectively employed as energy absorber devices mainly in automobile as well as airplane in this era. This research paper compared the energy absorption and crushing behavior of composite materials and hybrid composite square tube subjected to quasi-static oblique loads with various angles. Overall the study highlights the advantages of using hybrid composite material as best energy absorbers. The oblique load was realized experimentally by applying a load via the inclined modified compression plates to the specimens. When the structures are subjected to the axial and oblique quasi-static loading, the deformation modes, such as progressive collapse, axi-symmetrical or diamond deformation mode were observed at 0 degree to 5 degree. As the angle increase beyond 10 degree bending force was identified and became significant. Results show that the axially compressed tubes give better energy absorption against the tubes that subjected to high oblique loading under quasi-static conditions. Hybrid composite square tube from C-glass fiber and Kevlar exhibited good energy absorption capability.

Keyword: Energy absorption capabilities; Hybrid composite; Oblique loading; Quasi-static; Square tube