

Experimental and numerical study of the crushing behavior of pultruded composite

tube structure

ABSTRACT

Pultrusion is considered to be a cost efficient method for developing composite structures. It facilitates the fabrication of uniform cross-section products with improved fiber alignment, mechanical properties, good surface characteristics, etc. In order to ascertain the crashworthiness, the pultruded composites shall be able to resist impact loads, and in this concern, the energy absorption capacity of the pultruded composites must be explored. This article presents the experimental and numerical investigation of the crushing behavior of polyester based pultruded composite with rectangular cross section. Pultruded rectangular tubes with e-glass/polyester composites have been developed for this study. The cross-section of the tubes was developed into two triggering profiles, the uniform edge around the section and the tulip pattern. The tubes were subjected to impact loads, and the effect of these triggering profiles on the energy absorption capacity of the tubes has been investigated. The testing of all composites has been carried out at three different impact velocities (10, 20 and 45 mm/min). The results have revealed the dependence of crushing behavior of the tubes on the loading velocity and the triggered profiles. Lower peak load and high specific energy absorption (SEA) was observed in the tube with tulip pattern profile. The results obtained from the simulation have also shown consistency with the real-time experiments.