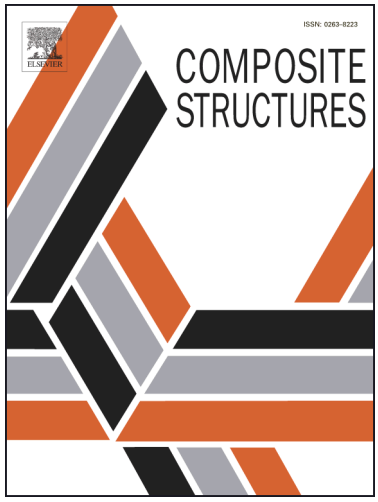

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Low velocity axial collapse behavior of E-glass fibre/epoxy composite conical frusta

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Abstract

The collapse behavior of random, woven [0/90] and angle-ply [±60^o] oriented Glass Fiber Reinforced Composite (GFRP) conical frusta under low velocity axial impact loading is reported in this work. The GFRP conical frusta having uniform wall thickness with semi-apical angle in the range of 15- 24^o were fabricated using chopped random, woven roving and uni-directional ply-oriented E-glass fiber mats through hand layup method. The low velocity drop weight impact test setup was utilized to study the load-deformation and energy-absorption characteristics of conical frusta at different strain rates. The finite element analysis (FEA) were also performed using ABAQUS® software to predict the collapse behavior and energy-absorption characteristics of the same categories of GFRP specimen models similar to the experimental conditions. The results from both the procedures were compared and the crashworthiness characteristics of GFRP conical frusta were studied. The energy-absorption characteristics of conical frusta during impact and quasi-static loading testing were also compared and reported.

***Keywords*:** Conical frusta; Polymer-matrix composites (PMCs); Crashworthiness; Buckling; Finite element analysis (FEA); Low-velocity impact.

1. Introduction

The Fiber Reinforced Plastic (FRP) composite members play a major role in automobile and aerospace applications because of their higher strength, reduction in weight and better shock-absorbing characteristics. The energy-absorbing characteristics of such