

Quasi-static crush behaviour of environmentally friendly kenaf/wool epoxy composites elliptical tube

ABSTRACT

This current study is to investigate the behaviour of the kenaf/wool natural fibre. Reinforced composite elliptical cones with different content of fibre for each of the two types separately in absorbing energy and the load capacity, the lack studies about the composite elliptical tube, our focus was on this shape of shells of effect content of fibre for each of the two types separately. Various fibre contents were considered, including 30 wt%, 35 wt% and 40 wt%. The composite elliptical tubes were subjected to an axial quasi-static crushing test to achieve the study objectives; the methodology has been divided into three main sections concerning the problem statement, the first section is the mandrels preparation; the second section is specimen's fabrication process and finally is the crushing test. This study concerns the usage of the composite elliptical tube as a collapsible energy absorbing device within an automobile structure, which is supported at the distal end (i.e. the point of attachment) by a stronger structure and is designed to behave in a manner more similar to the quasi-static axial regular progressive mode. Therefore, quasi-static axial compression tests were performed on the tubes using INSTRON universal servohydraulic testing machine. The materials used in this study are polymer resin and kenaf/wool fibres. Environmentally friendly kenaf and wool fibre were used in this study due to several advantages such as environmentally benign, lightweight, low cost, no health risk, and availability. Results showed that including 30 wt% has a higher value of load-carrying capacity and energy-absorption capability than including 35wt% and including 40 wt%. The results also show that the wool fibre has a higher value of load-carrying capacity and energy-absorption capability than kenaf fibre.

Keyword: Environmentally friendly materials; Elliptical cones; Energy absorption; Kenaf composites; Wool composites