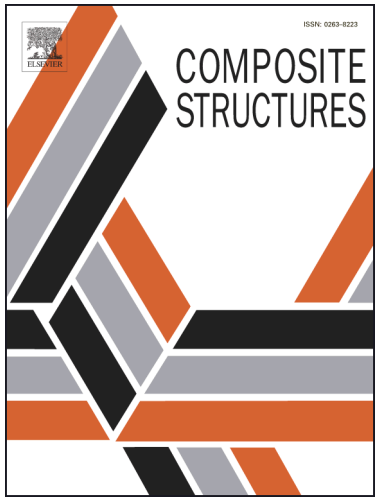

A study on the energy absorption capacity of braided rod composites

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A study on the energy absorption capacity of braided rod composites

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Abstract

Composite materials are becoming popular among automobile manufacturers because of their high strength, light weight, and controlled crushing mechanisms. Many composite structures have been designed and developed as energy absorption components in automobiles until now. Following the trend, in this study UD and braided UD glass fiber rods were manufactured as an energy absorption component for the automotive industry and their energy absorption capability was measured by quasi-static compression testing. In order to fully understand the crushing mechanisms, the effect of braiding layers, braiding technique, taper angle, single and multiple rods and their separation on the energy absorption capability was investigated. Braided UD rods absorbed more energy compared to the MFW (multifilament wounded) rods, while tapering one side of the rod greatly influenced the crushing distance, yield point, and load bearing capabilities. Additionally, the mean load of three BR-1L rods was almost three times higher than that of a single rod however, it was influenced by varying the distance among them. The aim of this research was to collect more data about the crashworthiness of composite rods under different parameters and to gain a better understanding for future research work.

Keywords

Crashworthiness; Failure mechanism; Braided composites; Braided Pultrusion Process (BPP); Side impact