

ARTICLE



Crashworthiness and comparative analysis of polygonal single and bi-tubular structures under axial loading – experiments and FE modelling

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KEYWORDS

crashworthiness • thin-walled structures • single and multi-cell tubular structures • energy absorption • key performance indicators

TOPICS

mechanics of materials • structures mechanics

ABSTRACT

This article aims to present a report of experimental and numerical investigations on crashworthiness characteristics of single and multi-cell/bi-tubular structures. Novel multi-cell/bi-tubular structures are proposed in order to improve the crashworthiness performance, LS-DYNA FE software is applied for the modelling of axial crushing behaviour to validate with experimental results and a good agreement is observed. The KPIs are used to compare various structures and to determine the best performing ones. The investigations reveal that the HMC4 has significantly obvious effects on the structural crashworthiness and improved 515% energy absorption efficiency. Afterward, a parametric study has been carried out for the best energy absorber.

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