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Study on Energy Absorption Characteristics of Corrugated Sandwich Panels

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Abstract

Sandwich panels are important lightweight structural components, and have gained wide popularity in a range of engineering applications. As a type of sandwich structure, the energy absorption characteristic of a corrugated sandwich panel is found largely related to core shapes and dimensional parameters, such as cell width, wall thickness, structural angle and core height. In this study, single-layered and multi-layered corrugated sandwich panels with trapezoidal or triangular core were explored by means of experiments and simulations. Two kinds of loading conditions were considered in the numerical analysis, which are of Low-velocity local impact and planar impact. Experiments were also conducted to validate FE models prior to the design optimization.

For the single-layered corrugated sandwich panels, the corrugated sandwich panels with triangular cores show better energy-absorption characteristics than that with the trapezoidal cores. For the multi-layered corrugated sandwich panels, the experimental study was carried out to analyze the energy-absorption characteristics of three different configurations. After analysis and comparison of the experimental results, it was found that the configuration and the number of layers core played an important role in the failure mechanism and energy absorption for multi-layered corrugated sandwich structures.