

Compression behaviour and performance of novel carbon-fiber aluminum-honeycomb sandwich reinforced by aluminum grid

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Abstract

The performance and application of honeycomb sandwich structures were limited by the low-stiffness honeycomb core. In this study, a novel sandwich panel, which employed an aluminum honeycomb filled orthogrid as a core and two carbon-fiber/epoxy composite sheets as the faces, were designed and investigated under in-plane compression condition. In-plane compression tests were conducted to compare carbon fiber sandwiches with different types of core: (1) aluminum honeycomb core, (2) aluminum-plate orthogrid core, and (3) aluminum honeycomb filled orthogrid core. As measured in the experiments, about 100% enhancement in peak load were observed for the honeycomb filled orthogrid core sandwich. Moreover, the energy absorption were increased by up to 280 % by filling honeycomb blocks into orthogrid core. The results indicated that the honeycomb filled orthogrid core sandwich with carbon fiber face sheet could provide improved structural properties for engineering applications.

Keywords: Carbon fibers; Honeycomb filled orthogrid; Sandwich structures; In-plane compression