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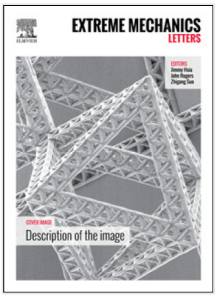

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Compression behavior and energy absorption of carbon fiber reinforced composite sandwich panels made of three -dimensional honeycomb grid cores

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Abstract:

Carbon fiber reinforced three dimensional egg and pyramidal honeycomb grids cores with interconnected void spaces were fabricated using an interlocking method. The out-of- plane compression properties, failure modes, and energy absorption capacity of all-composite sandwich panels made of the new 3D grid cores were investigated. The analytical models for predicting the compressive stiffness and strength of both egg and pyramidal honeycomb grids cores were derived. The results showed that the fabricated sandwich panels have higher specific energy absorbing abilities compared to lightweight square honeycombs of same density (10-100 Kg/m^3). The new core design promises novel applications for lightweight multifunctional structures due to increased flow in the inner spaces of the core construction, embedding of electrical lines, enhanced heat transfer, fuel storage and higher energy absorption compared to traditional cores.

Keywords: Carbon fiber sandwich; Three dimensional grid; Interlocking; Multifunctional.

1. Introduction

Sandwich panels have found wide structural applications due to their light weight, high bending stiffness and high energy absorption ability. Traditional sandwich panels are made from foam and honeycomb cores with close-cells thereby impeding their deployment as functional structures [1-3]. In contrast, sandwich panels with open cell cores, in addition to high specific strength and high specific stiffness also exhibit multifunctional benefits, such as fluid circulation [4-6], lines embedding [7], active cooling [8], energy absorption characteristics [9] and

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