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## Comparative low-velocity impact behavior of bio-inspired and conventional sandwich composite beams

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**Abstract** A novel woodpecker's head-inspired sandwich beam, comprising carbon fiber laminated skins with rubber and aluminum honeycomb cores, was developed for low-velocity impact behavior improvement. A comparative study against conventional sandwich beam was performed employing three impact energy levels (7.28J, 9.74J, 12.63J) by means of experimental and numerical methods. In all cases, bio-inspired beams were consistently superior to those conventional, with low developed stress, deformation, and damage area while carrying higher maximum impact force. Even with a low added mass, the impact resistance efficiencies of the bio-inspired beams were 2.7 – 5.7 times greater than those of conventional configuration, thus exhibiting an improved impact performance of the developed bio-inspired beam useful for future protection strategy.

**Keywords:** A. Sandwich; B. Impact behavior; C. Finite element analysis; Modeling

### 1. Introduction

Impact loadings like bird strike, heavy objects drop, debris, and hailstones projectiles have been associated with the substantial reduction in the tensile, compressive, shear, and bending strength of the sandwich structures [1]. These detrimental effects

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