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## Impact resistance of bio-inspired sandwich beam with side-arched and honeycomb dual-core

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### Abstract

The work explores computationally the impact resistance of the proposed bio-inspired sandwich beam comprising top and bottom carbon fiber reinforced polymer laminate skins sandwiching the side-arched hot melt adhesive and aluminum honeycomb dual-core, as bio-inspired by the beak, skull bone, hyoid, and spongy bone of the woodpecker head. Examined geometrical effects on the impact behaviors include the arched core thickness (3, 4.6, 10 mm) and leg span (10, 25, 35 mm). For impact performance appraisal, contact force, stress transmission, damage area, and absorption energy are assessed. The models with the thickest arched core may depict the highest contact force, damage area, and energy absorption; thinner arched cores with different leg spans are maximally stressed. Nonetheless, it is overall found that the beam with a thin arched core performs optimally due to its high impact resistance efficiency index.

### Introduction