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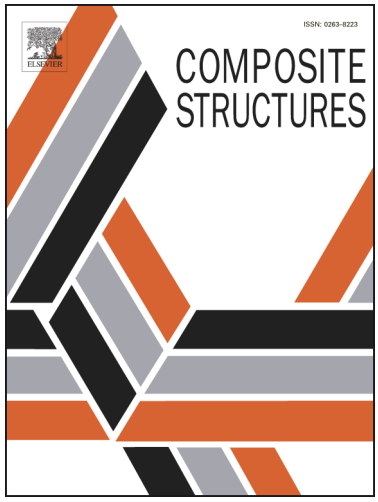

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Effect of Variable Core Stiffness on the Impact Response of Curved Sandwich Plates

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Abstract.

An extensive analytical model to determine behaviour of curved sandwich plates with variable stiffness cores and face-sheets under low velocity impact with foam core is presented in this paper. A developed method is introduced to determine effective dynamic stiffness of the face-sheets and core with variable stiffness. A modified spring-mass-dashpot model was used to obtain the contact force function related to effective dynamic stiffness and effective dynamic frequency to determine the contact force histories by impact of a hemispherical-nose impactor. A parametric study was also performed to understand the effects of several factors such as impactor velocity, face-sheet thickness, core thickness (constant and variable stiffness), layup orientation and curvature on the contact force histories of curved sandwich plates. Different geometries of curved sandwich plates are analysed to study their performance under impact loading. Numerical analysis was performed in LS-DYNA to further validate with the developed analytical models.

Keywords: Analytical; Impact; Variable Stiffness; Sandwich, LSDYNA

Nomenclature

E	Young's Modulus (GPa)
G_{12}	Shear Modulus (GPa)
γ	Poisson's ratio of plate/impactor
ρ	Density of plate/impactor
b	Width of plate

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