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# FINITE ELEMENT ANALYSIS OF LAMINATED SANDWICH STRUCTURE

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**ABSTRACT**

*In modern civil engineering structures, laminated composites are widely used in various applications including roof of buildings, bridge decks, structural panels and beams. Using the laminated composite material in construction introduces many advantages such as high strength/stiffness to weight ratio, survivability in extreme weather conditions, durability, fatigue resistance, and design flexibility, easy to install in structure replacement. The behavior of laminated composites under free vibration, bending and buckling mode is very complex phenomenon because many modes of failure like delamination, large oscillations etc. are observed. Laminated composite structures are weak in shear due to their low shear modulus compared to extensional rigidity.*

*The effect of shear deformation is quite significant and it becomes more complex in the case of sandwich construction, as the material property variation is very large between the core and face layers. Various available theories shows discontinuity in the shear stress distribution at the layer interfaces with continuous variation of transverse shear strain across the thickness. But the actual behavior of composite laminate is opposite, i.e., the transverse shear stress must be continuous at the layer interface and the corresponding strain may be discontinuous.*

*In this study, Finite Element 3-D ABAQUS (v. 6.14) model is used to analyze the behavior of laminated sandwich beams under free vibration, bending and buckling mode. The influence of material properties, loadings (uniformly distributed load, sinusoidal loading), aspect ratio (length to thickness ratio), number of material layers, boundary conditions (simply supported, fixed, free, hinged ends) are studied in detail. The applicability of present FE model is evaluated by comparing the present results with those available from literature calculated using application of specific theory.*

**Key words**: *ABAQUS, 3D, FE model, Laminated sandwich*