NUMERICAL STUDIES ON FLEXURAL BEHAVIOUR OF GRADED MULTI-LAYER PUF CORED SANDWICH PANELS

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Abstract

The present numerical investigation was mainly concerned with the evaluation of flexural properties of graded multi-layered polyurethane foam cored (MLCC) sandwich panels using a novel approach through the medium of general purpose program i.e. FEM/ANSYS. Aiming to the goal, three-point bending analysis was performed on sandwich beam models assumed to be made up of composite face sheets (GFRP) and graded multi-layer polyurethane foam cores of different layer densities. Finite element models of sandwich beams were obtained successfully using nonlinear shell 91 elements for face sheets (orthotropic material) and 8-noded shell 98 elements for core (isotropic material).Various multi-layer core configurations in a stack of three layered core were studied with great care. Prior to actual task, the proposed evaluation technique was verified using bench marks. Series of multi-layered cored beam models of different core configurations and span length were analysed in order to study the influence of different graded (density) layer configuration on flexural properties. The present studies reveals that use of MLCC panels for sandwich construction can provide improved flexural properties and hence these panels could be the better choice for structures under non uniform bending and shear loads due to their higher shear stiffness values compared to soft PUF cored panels. Furthermore the MLCC-2 panels in which layers arranged in order of higher to lower density between compression face and tension face stand better among all the possible core configurations.

Keywords: GFRP Skins, Multi-layer PUF Core, Core Configurations, Sandwich Panels, FEM/ANSYS