

**STATIC STABILITY OF SANDWICH PANELS WITH HONEYCOMB CORES MADE BY ADDITIVE TECHNOLOGIES**

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This paper presents approaches to and the results of finite-element analysis of static buckling in cylindrical sandwich panels. The core layer of the panels is a polylactide honeycomb core 3D printed using the Fused Deposition Modeling (FDM) additive technology. The two thin face layers are made of carbon fiber reinforced polymer. Such structures are promising for use as structural elements of rockets and drones. For them, the determination of stability under longitudinal and radial loads is an important issue. The global buckling of a cylindrical panel under longitudinal loads and the local buckling of a honeycomb core as a plate structure under radial loads are studied. The geometrically nonlinear deformation of a cylindrical panel under a combination of transverse and radial loads is studied. Seven cylindrical sandwich panels with the radius-to-thickness ratio in the range  $5 < R/h < 50$  and a sandwich plate are considered. The effect of the radius of curvature on the characteristics of local and global buckling is investigated.

The problem is solved by the finite element method using the ANSYS software system. The convergence of the finite element model was investigated. For this purpose, a strained state under the action of a longitudinal load was studied. The finite-element mesh parameters were selected to ensure the convergence of the results. Two finite element models, an "exact" one and an "approximate" one, were constructed to investigate global buckling under longitudinal loads. The «exact» model includes a honeycomb core represented by its geometry. In the «approximate» model of the sandwich panel, the honeycomb core is replaced with an equivalent homogenized layer.

It was found that for longitudinal loads the modes of the global buckling of the cylindrical sandwich panels and the sandwich plate under study are almost the same. It was shown that the critical loads obtained by the «exact» and the «approximate» model are close. It was found that when a cylindrical panel is deformed under the action of a combination of longitudinal and radial subcritical loads, the calculated results for the «exact» and the «approximate» model are close. Therefore, longitudinal buckling can be considered using the homogenized model, which is much simpler in terms of computations.

**Keywords:** *cylindrical sandwich panel, honeycomb core, additive technologies, finite element method (FEM), buckling.*

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