

EXPERIMENTAL AND THEORETICAL STUDIES INTO THE STRESS-STRAIN STATE OF THE PURLIN SUPPORTED BY SANDWICH PANELS

In the article, the co-authors analyze the findings of the experimental and theoretical studies into the real behaviour of a thin-walled cold-formed purlin as part of the roof structure made of sandwich panels. The roof structure fragment was tested; displacements and stresses, that the purlin was exposed to, were identified in respect of each loading increment. NASTRAN software was employed to perform the numerical analysis of the roof structure, pre-exposed to experimental tests, in the geometrically and physically non-linear setting. The finite element model, generated as a result (the numerical analysis pattern), is sufficiently well-set, given the proposed grid of elements, and it ensures reasonably trustworthy results. The diagrams describing the stress/displacement to the load ratio and obtained numerically are consistent with those generated experimentally. The gap between the critical loading values reaches 4%. Analytical and experimental findings demonstrate their close conformity, and this fact may justify the application of the numerical model, generated within the framework of this research project, in the course of any further research actions. The co-authors have identified that the exhaustion of the bearing capacity occurs due to the loss of the buckling resistance as a result of the lateral torsional buckling.

Key words: thin-walled structures, cold-formed profiles, purlin, sandwich panel, experiment, numerical analysis.

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