

INVESTIGATION INTO LOADING ABILITIES IMPROVEMENT OF CFRP SANDWICH SHELLS

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Abstract. The object of interest are GFRP or CFRP composite sandwich shells (reinforced by glass or carbon fabrics) with the foam core inside. Such a type of structure is very common since beginning of composites application in aircraft constructions. The strength-lightness factors of typical sandwich structure are very high in comparison with a laminar structure, however the loading abilities of laminate are not fully consumed in both of them. For example the GFRP sandwich shell in a glider wing spar shear-web is able to consume only about 60% of loading abilities of pure GFRP laminate subjected to tension load along warp direction. It is caused by buckling phenomenon of the shell under shear loads. The big influences on that phenomenon have physical properties of the foam core material and the relation between elastic modules of the foam core and laminate shell. When the same kind of foam core is applied for CFRP sandwich structures – the level of CFRP laminate loading abilities consumption is worse than in GFRP sandwich structures case. This feature of sandwich structures could be improved by application of additional reinforcement inside the foam core. The author describes the successful results of his experimental investigations aimed to improve loading abilities of CFRP sandwich shells without worsening the strength-lightness factors.

Keywords. Polymer composites, sandwich structures, shell.