

ASPECTS REGARDING INTERLAMINAR STRESS DISTRIBUTION ON THE COMPOSITE LAMINATED SKIN OF A TAIL ROTOR BLADE EXPOSED TO AERODYNAMIC FORCES

Andrei - Daniel VOICU*¹, Anton HADĂR², Daniel VLĂSCEANU³

Rezumat. Realizarea unui structurii compozite performante trebuie să țină seamă de o multitudine de factori care influențează răspunsul structurii la solicitările apărute pe timpul exploatarei. Astfel, în cazul învelișului laminat al unei pale compozite anticuplu, proiectată pentru a înlocui pala metalică a elicopterului IAR330, este important să se analizeze distribuția de tensiuni pe fiecare lamină constituantă, astfel încât, soluția constructivă aleasă să fie optimă. Modulul ACP Post din cadrul programului Ansys Workbench oferă posibilitatea vizualizării acestei caracteristici ulterior analizei statice structurale a palei, precum și a valorii coeficienților de siguranță în funcție de criteriul de rupere utilizat.

Abstract. *In realizing a high-performance composite material, it is important to take into consideration all the factors that influence the structural response of the component when exposed to service conditions. Thus, in the case of the laminar skin of a composite tail rotor blade, the study of the stress distribution on each lamina is important, so that the optimal design can be chosen. The ACP Post module of the Ansys Workbench finite element software offers the possibility of visualizing the stress distribution on each lamina of the skin, as well as the value of the safety factor for multiple failure criteria.*

Keywords: helicopter tail rotor blade, laminar composite materials, failure criteria.

1. Introduction

Since their development, composite materials have been viewed as superior materials which have the capability of enhancing the overall performances of the structures that contained them. They have been used for decades in their simpler forms in various industries such as constructions, where concrete has been a significant strengthening composite material.

Advanced composite materials on the other hand are still the subject of various research domains, due to their high strength fibers which exhibit a low density while occupying a large fraction of the volume [1]. Specific advantages such as

¹ P.h.D. Student, University Politehnica of Bucharest, 313 Splaiul Independenței, Sector 6, Bucharest, Romania (email: voicu_andrei2001@yahoo.com / voicu@roaf.ro).

² Prof., P.h.D., Department of Strength of Materials, University Politehnica of Bucharest, 313 Splaiul Independenței, Sector 6, Bucharest, Romania, Member of the Romanian Academy of Scientists (e-mail: anton.hadar@upb.ro).

³ Associate professor, P.h.D., Department of Strength of Materials, University Politehnica of Bucharest, 313 Splaiul Independenței, Sector 6, Bucharest, Romania (e-mail: daniel.vlasceanu@upb.ro).