EVALUATION OF INTERLAMINAR FRACTURE STRENGTH OF PEI/MWCNT/CARBON FIBERS COMPOSITES SUBJECTED TO HYGROTHERMAL AND UV RADIATION CONDITIONING

Luis Felipe de Paula Santos[1], Alberto Lima Santos[1], Bruno Ribeiro[2], Edson Cocchieri Botelho[1], Michelle Leali Costa[1]

[1]Departamento de Materiais e Tecnologia, Faculdade de Engenharia de Guaratinguetá, UNESP. [2] Instituto de Ciência e Tecnologia, Universidade Federal de São Paulo, UNIFESP.

Abstract: Carbon nanotubes possess excellent mechanical properties, high thermal conductivity, low density and a unique geometry. The aforementioned features make them attractive to produce multifunctional polymer composites, which are composites that do not only have the function of mechanical support, but can also add thermal, electrical, magnetic improvements as well. Additionaly, the final laminate is able to reduce the mass and the volume of the whole system. The understanding of this concept is such important, since there has been a growth in the use of polymeric reinforced composites in the aeronautical field. Considering all the types of failure that a composite can exhibit, interlaminar fracture is a major one, known as delamination. It can generate a significant reduction of structural stiffness without presenting external signals that will result in a catastrophic failure. Therefore the addition of nanofillers is an alternative to increase the hardness of the polymer matrix and consequently improve the resistance to interlaminar fracture as well as the life of the material. Another important factor is the environmental condition that the aircraft is exposed during its service life, such as hot and humid conditions and high or low UV radiation. Such conditions associated with the several types of loads subjected during flight make easy the growth of interlaminar cracks. Finally, the present work intends to evaluate the influence of the interlaminar shear strength of poly (ether-imide) (PEI) / carbon fibers and PEI / carbon nanotubes / carbon fibers composites in samples without conditioning and samples conditioned by temperature, humidity and UV radiation. After the mechanical tests, a fractographic analysis was performed to evaluate the influence of the carbon nanotubes and the conditionings performed on the resistance to interlaminar fracture.

Keywords: Carbon nanotube, thermoplastic, interlaminar fracture, fractographic analysis, hygrothermal, uv radation