IMPROVING THE MECHANICAL PERFORMANCE OF CFRP BY METAL-HYBRIDIZATION

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ABSTRACT

The aerospace and spacecraft industry’s increasing requirement for weight reductions demands the development of advanced materials which allow for a better mechanical performance, a higher structural efficiency, high reliability and better long-term behavior. In view of the wide range of the material’s performance requirements, special efforts have to be made to perform an intelligent use of the diversity of engineering materials available in the present time according to their specific potentials and shortcomings.

The advances in composite material technology have opened new perspectives in view of the increasing demand for superior structural performance and efficiency. Nevertheless, the notch and impact sensitivity, the brittleness, the limited damage tolerance, the difficult mechanical joining, the low wear resistance and the inherent degradation effects are limiting properties of composite materials in terms of their acceptance and use for primary aircraft structures. Recognizing these limitations of pure composite materials, new developments entail the hybridization with metal taking advantage of the metal’s material properties to optimize the exploitation of the mechanical capacity of the composite constituent.

The present paper is intended to provide an overview about the mechanical performance, manufacturing and application of hybrid CFRP/Ti and CFRP/St, developed as a construction material for specific aircraft, spacecraft and automotive structures aiming the improvement of the operational capabilities of composite materials.