

## Experimental and Theoretical Study on Hygrothermal Aging Effect on Mechanical Behavior of Fiber Reinforced Plastic Laminates

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**Abstract :** The manufacture of composite parts is a major issue in many industrial domains. Polymer composite materials are ideal for structural applications where high strength-to-weight and stiffness-to-weight ratios are required. However, exposition to extreme environment conditions (temperature, humidity) affects mechanical properties of organic composite materials and lead to an undesirable degradation. Aging mechanisms in organic matrix are very diverse and vary according to the polymer and the aging conditions such as temperature, humidity etc. This paper studies the hygrothermal aging effect on the mechanical properties of fiber reinforced plastics laminates at 40 °C in different environment exposure. Two composite materials are used to conduct the study (carbon fiber/epoxy and glass fiber/vinyl ester with two stratifications for both the materials [904/04] and [454/04]). The experimental procedure includes a mechanical characterization of the materials in a virgin state and exposition of specimens to two environments (seawater and demineralized water). Absorption kinetics for the two materials and both the stratifications are determined. Three-point bending test is performed on the aged materials in order to determine the hygrothermal effect on the mechanical properties of the materials.

**Keywords :** FRP laminates, hygrothermal aging, mechanical properties, theory of laminates

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