



## **EXPERIMENTAL FATIGUE BEHAVIOR OF PULTRUDED GLASS FIBRE REINFORCED POLYMER COMPOSITE MATERIALS**

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**Abstract:** The aim of this research is to investigate the behavior of pultruded Glass-fiber Reinforced Polymer (GFRP) composite materials subjected to fatigue loads. Static tests were performed to estimate the material strength and modulus of elasticity. Constant-amplitude axial tension-tension fatigue tests were conducted with a cyclic stress ratio of  $R=0.1$  and a frequency of 4Hz in order to establish fatigue life characteristics (S-N curve) and identify damage evolution and failure modes for the composite material. Generally, the damages developed in fatigue tests were characterized primarily by cracks in the matrix, followed by possible delamination of the material layers and finally the fiber failure and the specimen rupture. Tomography images were used to better understand the architecture of the composite material. It was observed that the layers of the fibers are not perfectly aligned and uniform and there is a substantial quantity of voids resulting in a very heterogeneous material which can explain the scatter of the experimental results.

**Keywords:** Polymer-matrix composites (PMCs) Fatigue Mechanical testing Pultrusion