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EXPERIMENTAL AND NUMERICAL INVESTIGATION OF ADHESIVELY BONDED SINGLE LAP AND THICK ADHERENTS JOINTS BETWEEN PULTRUDED GFRP COMPOSITE PROFILES

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Abstract

This paper presents the outcomes of an experimental and numerical study performed on epoxy bonded single lap joints (SLJs) and thick adherents' joints (TAJs) between glass fiber reinforced polymer (GFRP) composite flat profiles. For the experimental program, 30 specimens were prepared by varying the type of connection (SLJ, TAJ), the bond length (70, 100, 150 mm), the type of adhesives and their thicknesses (1, 2, 3 mm); they were then loaded in axial tension up to failure. The main issues that were investigated based on the experimental results are the specific failure modes, load-displacement behavior, stress-strain variation, bond-slip relations and the strain distribution along the bond length at different loading stages. The numerical simulations, based on 3D FEM analysis, provided results in good agreement with the experimental ones for both stress-strain behavior and strain distributions along the bond length.

Keywords: A. Polymer-matrix composites (PMCs), B. Adhesion, C. Finite element analysis (FEA), D. Mechanical testing.