ROTATIONAL STIFFNESS CHARACTERIZATION OF PULTRUDED GFRP CROSS-SECTION JUNCTIONS

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Abstract: In recent decades, pultruded glass-fiber reinforced polymer (pGFRP) use in structural applications has greatly increased, owing to its several advantages over traditional materials, such as its lightweight, corrosion resistance and versatility in section geometries and properties. The researches concerning its structural performance have become increasingly significant to spread the use and allow for safe design of pGFRP members. Among the several relevant topics studied, the behavior of the web-flange junctions (WFJs) has found an important place in literature, especially due to its influence on the buckling response of structural members. This paper aims to present the results of an experimental program intending to characterize the rotational stiffness of junctions between adjacent plates comprising the cross section of pGFRP members having different shapes. To gather experimental displacements and to monitor crack formation and propagation, digital image correlation (DIC) technique will be used. In parallel, fiber architecture of each studied cross section will be recorded and analyzed using an optical microscope. Finally, an equation based on the micromechanics is proposed for the rotational stiffness prediction.

Keywords: GFRP; Rotational stiffness; Web-flange junction; Digital image correlation (DIC); Micromechanics.