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RESPONSE OF PULTRUDED GLASS COMPOSITE BOX BEAMS UNDER BENDING AND SHEAR

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ABSTRACT

Existing failure load prediction models for pultruded FRP box beams are inaccurate when compared to experimental evaluations provided herein by the authors. This inaccuracy is attributed to improper identification of failure modes based on beam span-to-depth ratios and principal strain resulting in premature failure compared to elastic bending stress-based failures. Inclusion of stress intensity factors and computation of stress concentrations aids in consistently accurate results compared with experimental data. The proposed equations are predicting critical flexural load capacities within $\pm 22\%$ of experimental data for all cases. The failure model in tension is the most accurate one, while local buckling predictions in compression need further refinement.

Keywords: fiber-reinforced polymer (FRP); glass fibers; mechanical testing; pultrusion; stress concentrations

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