

PROCEEDINGS

Analytical Modeling for Asymmetric Four-Point Bend End-Notched Flexure Delamination Testing of Composite Laminates Considering Friction

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ABSTRACT

The crack tip of the asymmetric four-point bend end-notched flexure (4AENF) delamination testing under shear loading often exhibits a proportion of mode I component, making it a typical mixed-mode I/II problem. Characterizing the total fracture toughness in 4AENF laminates is crucial for understanding the delamination phenomenon in composites. In this study, 4AENF tests were conducted on carbon fiber-reinforced epoxy asymmetric laminates to evaluate the total interlaminar fracture toughness under shear loading conditions. Additionally, the variation of interlaminar fracture toughness in asymmetric laminates with different fiber orientation angles was considered. Theoretical modelling was performed using an analytical model that accounts for interlaminar friction, and the solutions based on different crack tip deformation assumptions were analyzed and compared. Finally, experiment results and theoretical fracture toughness were compared and discussed.

KEYWORDS

Composite; 4AENF; delamination; fracture toughness; interlaminar friction

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