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# A fatigue damage and residual strength model for unidirectional carbon/epoxy composites under on-axis tension-tension loadings

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**Abstract**

Fibre-reinforced composites experience a degradation of stiffness and strength during fatigue life. Understanding the reduction of these properties is fundamental to establish a reliable fatigue life prediction methodology. This work investigates the loss of stiffness and strength in advanced unidirectional carbon/epoxy laminates under on-axis tension-tension loads. A phenomenological stiffness-based fatigue model is formulated within the framework of continuum damage mechanics, where damage is described by the reduction of the in-plane longitudinal stiffness. The particularity of the model is to assume that the ultimate strain remains constant after fatigue damage. Thus, the residual strength model and the S-N curves are deduced from the residual stiffness model. This assumption reduces the experimental characterization of phenomenological-based approaches. The experimental challenges found in the fatigue experiments are also discussed. The accuracy of the model is

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