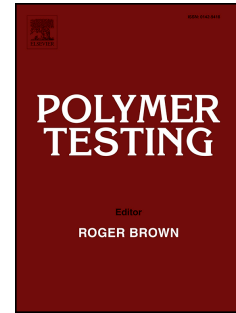


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Property modelling

## Experimental and Numerical Investigation of Progressive Damage in Composite Laminates Based on Continuum Damage Mechanics

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### Abstract

This paper presents experimental and numerical studies of the progressive damage in composite laminates. Firstly, damage initiation or first ply failure (FPF) is predicted by comprehensively investigating several failure criteria. Then, a modified method for the progressive damage modeling of composite laminates by employing a combination of gradual and sudden reduction rules is proposed for predicting the last ply failure (LPF). In the method employed, progressive damage is modeled with various exponential material softening laws and appropriate exponents for exact simulation of the damaged ply derived from experimental tests. Finally, for investigating the performance and capability of the proposed method for predicting progressive damage in composite materials, a series of experimental tests in Glass/Epoxy composite laminates with a variety of stacking sequences are presented. A comparison of the numerical and experimental results shows that the proposed method can accurately simulate the progressive damage in composite laminates.

**Keywords:** Progressive damage, composite laminates, continuum damage mechanics, first ply failure (FPF), last ply failure (LPF)

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