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The fatigue damage mechanics of a carbon fibre composite laminate: Iâ€”development of the model

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Abstract

The mechanics of fatigue damage of a carbon fibre composite laminate is developed. In this system, damage consists of a delamination front, with associated matrix cracking, which propagates inwards from the sample edges. The elastic stiffness of the laminate is related to the current level of damage, and is used to measure it. The damage growth rate is a power function of the stress amplitude and of the mean stress, and is independent of damage when cycling is at constant stress amplitude. Failure occurs when the damage reaches a critical level which depends on the maximum stress seen in the loading cycle. The results are applied to life prediction in Part II of this work.

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