

Modelling Crack Closure and Damage In Variable Amplitude Fatigue Using Smooth Specimen Fatigue Test Data

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Abstract

During overloads in variable amplitude fatigue, local stresses at small cracks growing from notches reach yield stress magnitude. Such high stress levels result in a large decrease in crack opening stress and a subsequent increase in the fatigue damage of subsequent smaller stress cycles. This paper presents a methodology for modelling changes in crack opening stress level and fatigue damage using data derived from periodic overload fatigue tests of smooth specimens. Predicted crack closure stress levels agree well with those obtained from crack growth observations made with a high magnification microscope. Predicted fatigue lives also agree well with experimental data.