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The application of Strain Energy Density criterion to fatigue crack growth behavior of cracked components

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Abstract

The aim of this paper is to study the effects of specimen geometry on fatigue crack growth rate and fatigue life in cracked components by using a modified form of averaged strain energy density criterion. The modified criterion takes into account the first non-singular term of the Williams series expansion in addition to the classical stress intensity factors. Different samples are used to conduct high cycle fatigue experiments on Al 7075-T6. The fatigue behavior of cracked Al 7075-T6 samples is investigated experimentally and theoretically for the compact tension (CT), double cantilever beam (DCB) and Brazilian disc (BD) specimens. It is shown that the fatigue crack growth in these specimens is significantly geometry-dependent. The modified criterion can predict the fatigue crack growth rate and the fatigue life of the pre-cracked specimens well.

Keywords: Strain energy density; Fatigue crack growth; Geometry effects

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