

The Effect Of Stress Ratio And Frequency On Fatigue Crack Growth

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Abstract:

Fatigue crack growth tests were performed on compact tension specimens (CTS) made in two thicknesses 12 and 24 mm. Tests were conducted at two frequencies of 0.25 and 30 Hz, applying a stress ratio R varying from -0.7 to 0.7 . The results were analysed using the linear elastic fracture mechanics approach. They showed that the increase in both positive and negative R caused increased fatigue crack growth rates. Also an empirical effective stress intensity factor range, ΔK_{eff} , was found more appropriate to correlate the fatigue crack growth data than the ΔK factor frequently used in crack growth studies. The loading frequency had only a little influence on crack growth rates at low R . However, at high R , growth rates were significantly higher at lower frequencies. It is suggested that this frequency influence may be associated with environmental effects, due to the embrittlement caused by hydrogen from the moist air, while the crack was fully open.