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Effect of Single Overload Ratio and Stress Ratio on Fatigue Crack Growth

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Abstract : In this investigation, variation of cyclic loading effect on fatigue crack growth is studied. This study is performed on 2024 T351 and 7050-T74 aluminum alloys, used in aeronautical structures. The propagation model used in this study is NASGRO model. In constant amplitude loading (CA), the effect of stress ratio has been investigated. Fatigue life and fatigue crack growth rate were affected by this factor. Results showed an increasing in fatigue crack growth rates (FCGRs) with increasing stress ratio. Variable amplitude loading (VAL) can take many forms i.e with a single overload, overload band etc. The shape of these loads affects strongly the fracture life and FCGRs. The application of a single overload (ORL) decrease the FCGR and increase the delay crack length caused by the formation of a larger plastic zone compared to the plastic zone due without VAL. The fatigue behavior of the both material under single overload has been compared.

Keywords : fatigue crack growth, overload ratio, stress ratio, generalized willenborg model, retardation, al-alloys
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