

The effect of residual stress on mixed-mode crack propagation behavior in friction stir welded 7075-T6 aluminum alloy panel under biaxial loading

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Abstract

The bi-axial 7075-T6 Al alloy samples were designed and manufactured by Friction Stir Welding (FSW). The residual stress profiles were measured. Crack propagation behavior were simulated with five different biaxial loading ratios. ABAQUS software was used to calculate the stress intensity factors (SIFs) and to study the effects of residual stress on crack behaviors. It is found that residual stress can affect the effect of biaxial loading ratio on crack growing. Mode I and mode II SIFs are susceptible to residual stress when $\lambda = 0.5 \sim 2$. Cracks at the retreating side are much more affected by the residual stress. At given biaxial loading ratio, the distribution characteristics of SIF components have similarity on the advancing side and the retreating side.

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