Relationship Between Intrinsic Threshold Stress Intensity And Near-Tip Residual Stress: A Reference Material Property

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Abstract

The relationship between intrinsic, closure-free threshold stress intensity and near-tip residual stress, characterizes the effect of load magnitude as well as load history on near-threshold fatigue crack growth rates. It serves as a reference against which precise closure data can be extracted from growth rates to calibrate analytical estimates. These possibilities were subjected to rigorous experimental verification involving threshold and near-threshold fatigue response under overloads, underloads with load-shedding on a steel prone to oxide debris formation. The study reveals why conventional load shedding practice to characterize threshold stress intensity is prone to yield unconservative and misleading results.

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