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Roughness-induced stress shielding effect in fatigue crack propagation under Mode II loading

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Abstract:

Roughness-induced stress shielding effect under cyclic Mode II loading caused by fracture surface roughness, i.e., the effect of decreasing loading stress intensity factor *K*, is investigated. A fatigue crack propagation test by applying cyclic Mode II loading on a small textured material is performed. The decrease in *K* is a few percent quantitatively, and the decrease is sufficiently small to ignore. Using the failure surface observation results, we discuss the mechanism of the fatigue crack propagation during cyclic Mode II loading on the textured material and validate the repeated crack propagation mechanism of damage accumulation, void formation, and coalescence.

Keywords:

Mode II fatigue; Rolling contact fatigue; Roughness-induced stress shielding effect; Fractography; Fracture mechanics