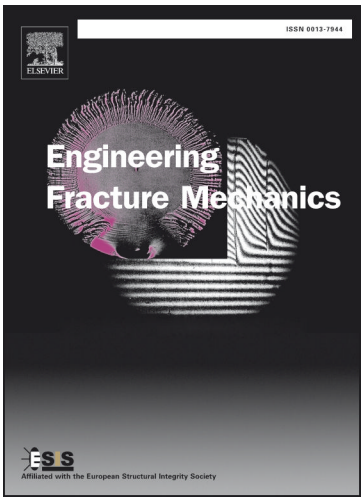

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Fatigue Behavior of Dissimilar Ultrasonic Welds in Lap-Shear Specimens of AZ31 and Steel Sheets

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Abstract

Fatigue behavior of dissimilar ultrasonic welds in lap-shear specimens in magnesium and steel sheets is investigated. The welds were produced using a Sonobond ultrasonic spot welder to join magnesium AZ31B-H24 to two types of steel. The lap-shear specimens have been machined into a dog-bone profile to approximate a linear weld. The lap-shear linear welds were studied based on experimental observations, closed-form stress intensity factor solutions, and a fatigue life estimation model. Optical micrographs of the welds after testing were examined to understand the failure modes of the welds. The micrographs show that the welds tested under cyclic loading failed from kinked fatigue cracks growing through the magnesium sheets. The closed-form stress intensity factor solutions for each side of the weld are used to explain the location of fatigue crack initiation and growth. Two-dimensional finite element analyses of the lap-shear specimens with the welds were carried out to obtain the global and local stress intensity

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