

A Study on the Behaviors of Cracks under Mixed-Mode Loading Using Stereo Vision

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Abstract

A stereo vision is used to study the applicability of the Shih' s plane strain solution to the mixed mode crack tip fields.

The fracture specimen used in the paper is a compact tension shear (CTS) specimen made of 2024-0 aluminum.

The in-plane strain and stress fields near the mixed mode crack tip of the CTS specimen are determined using the

deformation field measured by the stereo vision. Then the J integral values along rectangular contours surrounding

the mixed mode crack tip are evaluated. The computed J integral values approach a constant after $r/h > 0.5$.

Observing the measured strains at several specified points near the crack tip ($r/h > 0.5$), it is found that the

measured values follow the trends of the Shih' s plane strain solution.

The elastic mixity evaluated using the

measured crack tip stress fields are close to those obtained from

analytical solution. However the evaluated plastic

mixity deviates from the analytical solution.

Keyword :