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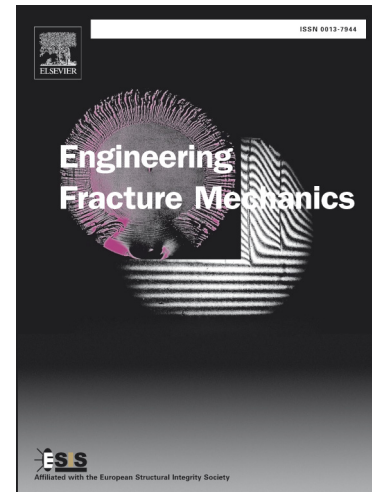
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Analysis of cracked shear deformable plates by an effective meshfree plate formulation

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Abstract

A novel technique to evaluate the path-independent integral using nodal integration is developed for cracked plate problems. The formulation is based on the Mindlin-Reissner plate theory, and the reproducing kernel is used as a meshfree interpolant. A visibility criterion, diffraction method, and enriched basis are included. To integrate the stiffness matrix, the stabilized conforming nodal integration and the sub-domain conforming integration are adopted. A moment intensity factor is also evaluated employing the J -integral based on the nodal integration. Convergence and numerical results derived from regular and irregular discretizations, node density, and other aspect ratios are analyzed.

Keywords: Fracture; Meshfree methods; Mindlin-Reissner plates;
 J -integral; Stabilized conforming nodal integration.

1. Introduction

Hull structures of ships and offshore structures are composed of plates. To ensure structural safety and reliability in practical design of the plate structures, durability assessments against cracking is important. Fracture mechanics is one of the techniques in this assessment. Researchers have performed fracture mechanics and failure analyses for marine structures [1-4].

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