J-Integral Evaluation of Cracked Shell Structures Employing Effective Reproducing Kernel Meshfree Modeling

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Abstract: The J-integral evaluation are analyzed employing effective reproducing kernel method. Several numerical examples of cracked shell structure are carried out to investigate the mixed-mode stress resultant intensity factors (SRIFs). It is formulated by the first order shear deformation plate theory. Reproducing kernel (RK) is used to the meshfree interpolant. A diffraction method, visibility criterion and enriched basis are introduced to model the through crack. *J*-integral is evaluated based on the stress resultants and is decomposed into the symmetric and asymmetric parts for extracting the mixed-mode SRIFs. The stabilized conforming nodal integration (SCNI) and sub-domain stabilized conforming nodal integration (SSCI) are applied to not only the stiffness matrix but also the *J*-integral. The path-independency of SRIFs are examined. The results of SRIF are compared with reference solutions and commercial FEM software. The comparison reveals that high accuracy on SRIFs from meshfree modeling are obtained.