

Coupled Reliability and S-version Finite-Element Model for Probabilistic

Distribution of Surface Crack Growth under Constant Amplitude Loading

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This research work focused on probabilistic finite-element analysis of surface crack growth. Implementation of S-version Finite Element Model (s-FEM) performs an improvement in the finite-element analysis. The application of s-FEM is by superposed the local dense finite-element mesh on the global coarse finite-element mesh. An adaptive mesh refinement method implemented to provide local mesh refinement without introducing a transition region. The Monte Carlo method embeds with s-FEM for reliability analysis of the structural system with a combination of random and interval parameters. The generated random parameters by Monte-Carlo method activate as an input in the s-FEM analysis. Probabilistic research conducted based on s-FEM results and presented the uncertainty in the model. Numerical example showed that probabilistic analysis based on s-FEM simulation provides accurate estimates of crack growth distribution. The comparison shows that the association between s-FEM analysis and probabilistic analysis provide an effortless and faithful of quantify the failure probability.

Keywords: Surface crack, S-version Finite Element, Probabilistic, Monte Carlo, Reliability