

FEM Analysis of Fatigue Crack Growth in Low Carbon Steel Using Single Edge Notched Tension Specimen



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Abstract Continuing improvement in the field of virtual crack closure technique of metals provides the opportunity for reliable probabilistic fatigue crack growth. The paper presents an analysis of mode I fatigue crack growth in low carbon steel. Experiment was carried out with Single Edge Notched Tension (SENT) specimens to determine its fatigue crack growth parameters on the specimens under constant amplitude loading. Linear elastic fracture mechanic crack path was modelled with the finite element method according to its experimental observation using the virtual crack closure technique (VCCT) in MSC Marc/Mentat. The simulation predicts the fatigue crack growth rate in high cycle fatigue. The simulated fatigue crack growth rate (FCGR) produced using SENT model represents good similar feature with the experimental process at stress ratio $R = 0$. Based on the remeshing model, it is also found that the results of crack growth rate and cycle count show good agreement within acceptable discrepancy compared to the experiment from Paris law diagram.

Keywords Finite element method · Crack propagation · SENT · VCCT · LEFM

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