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NUMERICAL MODELLING OF FATIGUE CRACK PROPAGATION IN THIN WALLED STRUCTURES

Numerical models for fatigue crack propagation simulation in thin-walled structures under cyclic loading are presented. A simulation procedure based on numerical integration of the differential equation of a crack growth model will be explained and implemented to assess the fatigue life of considered specimens. The Mode I stress intensity factor values, K_I, are calculated by a FEM program (ANSYS) using extrapolation method of singular elements nodal displacement. In FEM modelling eight node quadratic isoparametric elements assuming plane stress conditions are used, where the region surrounding a crack tip is meshed by singular elements. By using the Paris law, fatigue life is simulated for plate specimens damaged with a central crack and subjected to cyclic loading with a constant tensile stress range. The obtained simulation results are compared with the experimentally determined fatigue crack propagation lives.