# Fatigue crack growth modelling considering a hybrid propagation strategy

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October 17, 2022

**Abstract**

Fatigue results from the occurrence of several damage mechanisms and their interactions. The cyclic plastic strain and damage accumulation at the crack tip are widely pointed as the main agents behind FCG. In this work, the authors propose the prediction of FCG through a node release numerical model that offers several possibilities regarding the modelling of the mechanisms behind fatigue. A hybrid propagation method is presented where both cumulative plastic strain and porous damage represent parallel propagation criteria. Accordingly, the node is released once either a critical plastic strain or a critical porosity, at the crack tip, is reached. The Gurson-Tvergaard-Needleman (GTN) damage model is employed to predict porous damage evolution through the processes of nucleation and growth of microvoids. The model is validated through comparison with experimental data. Finally, the interactions between plastic strain, porous damage, crack closure and stress triaxiality are accessed.

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