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# Calibration of a fatigue model with a combined heuristic-local optimization approach

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## ABSTRACT

A parameter estimation approach is proposed to calibrate the Ottosen high cycle fatigue model using a combination of global and local optimization algorithms. The damage evolution is predicted by a continuum approach based on a moving endurance stress surface, so the stress states defined outside the endurance surface may lead to damage evolution. A simplified system of ordinary differential equations (ODE) was used in the parameter estimation process to simulate the damage evolution in a sinusoidal loading regime. A linear damage growth rate with the number of cycles was observed, thus the fatigue life was calculated by extrapolation of the simulated damage evolution during a reduced amount of cycles. The numerical Wöhler curves were calculated and compared to the experimental data at every iteration of the calibration process. A genetic optimization algorithm was used to determine the initial search point for a local method which provided the final set of parameters. The calibrated model predictions are in good agreement with the experimental data for steel.

**Keywords:** Fatigue modeling, damage, parameter estimation, hybrid optimization.