
Continuum based fatigue modelling

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Abstract

Ottosen, Stenström and Ristinmaa proposed in 2008 a continuum based high-cycle fatigue (HCF) model which is inherently multiaxial and offers several advantages in comparison to classical multiaxial fatigue models. The key ingredients of such model are construction of a moving endurance function and the evolution equations describing the movement and damage evolution. This format is quite general, inherently multiaxial and is not based on heuristic cycle-counting approaches. In this talk we discuss extensions of the basic isotropic HCF model to anisotropy and low-cycle fatigue. Different forms to construct the endurance function are given, e.g. how to better capture the mean stress behaviour (Haigh-diagram). This is achieved by using the solution of diffusion-reaction equation. Based on the famous Murakami equation, which describes how fatigue strength depends on defect size, we also discuss how the influence of defect size on the endurance function can be taken into account. Coarsening from micromechanical crystal plasticity models is also discussed.

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