

Hanno Gottschalk
Bergische Universität Wuppertal

Abstract

Title: A local, probabilistic model for Low Cycle Fatigue - from Statistical Modeling to Shape Optimization

Mechanical components fail under cyclic loading due to fatigue of the materials. This process is highly stochastic as the time to the formation of mesoscopic cracks is subject to a statistical scatter of one order of magnitude in lab experiments. In this talk, the probabilistic crack formation is modeled by spatio-temporal point processes with intensity depending locally on the mechanical load situation. This allows to compute failure probabilities at a given number of load cycles. A survey is given about experimental calibration and validation of these models, numerical implementation and their applications to gas turbine design including the consequences that statistical modeling has for shape optimization.