



Technische
Universität
Braunschweig



Vortrag im Gästeprogramm des GRK 2075 -
Modelle für die Beschreibung der Zustandsänderung bei Alterung von Baustoffen

Prof. Dr.-Ing. Manfred Staat

FH Aachen - Deutschland

Direct plastic finite element limit and shakedown analysis in structural design and fracture mechanics

Dienstag, 11.09.2018, 15.00 Uhr
Institut für Wissenschaftliches Rechnen
Mühlenpfordtstrasse 23, 8. OG, Raum 812

The design according to code standards is based on critical limit states. In steel construction and apparatus engineering, significant load increases are achieved for ductile materials by exploiting the plastic range. The static calculation is often carried out according to the limit load theory and protects against plastic collapse if it is not caused by instability. In the case of time-variant loading, the shakedown analysis is used as a generalization.

In the lecture the theoretical basics of the limit and shakedown analysis (LISA) and their FEM discretization will be presented. Kinematic and static theorems form upper and lower load-bearing capacity limits. The resulting primal-dual optimization method shows rapid convergence to the exact solution of the discretized problem. Applications in apparatus engineering are discussed up to ductile fracture mechanics.

Due to the restriction of the design code guidelines to perfect plastic material, the impression prevails that LISA is also limited. Therefore, the extension to kinematic hardening with a two-surface model of plasticity is presented and numerical analyses are critically discussed. Finally, probabilistic LISA is integrated into structural reliability methods. The presentation gives an overview of the results of the EU project LISA and of some subsequent doctoral theses.

Kontakt

Institut für Statik
Technische Universität Braunschweig
Beethovenstraße 51
38106 Braunschweig
0531 - 391-3668
grk-2075@tu-bs.de
www.tu-braunschweig.de/grk-2075