Seminar im Rahmen des GRK 2078

Referent: PD Dr.-Ing. Philipp Junker
Ruhr-Universität Bochum, Lehrstuhl für Mechanik - Materialtheorie

Datum: Di., 28.11.2017
Uhrzeit: 14:00 Uhr

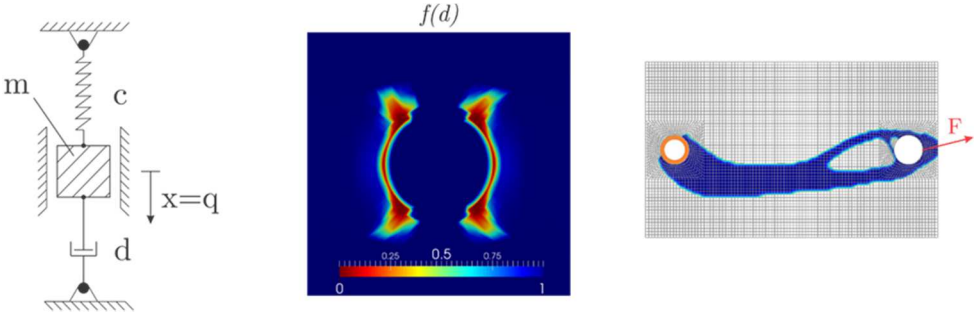
Ort: Geb. 10.23, 3. OG (R 308.1 – KM-Seminarraum)

Titel: **The Hamilton Principle in Material Modeling: Foundations, Damage, and Optimized Growth**

Abstract

The aim of modern material modeling is the realistic prediction of the behavior of materials and construction parts by numerical simulation. Experimental investigations prove that the microstructure and thus the mechanical properties may vary under loads. It is thus essential to describe the load-dependent microstructure in these cases by material models to close the system of fundamental physical equations. One elegant way for the derivation of such material models is given by the Hamilton principle which belongs to the class of variational, energy-based modeling strategies.

The talk starts with fundamental investigations for modeling the simple harmonic oscillator. Afterwards, the presented modeling concept is generalized to the Hamilton principle which is also applicable to deformable solids with evolving microstructure. As first example for such materials, damage processes in solids are modeled for which non-convex energy potentials are needed. The drawback of the non-convexity are numerical results that depend on the specific finite element mesh. Thus, several strategies for regularization and hence correction of this issue are discussed. In the last part of the talk, the universal character of the Hamilton principle is demonstrated by inverting the damage modeling which results in a model for optimized material growth. The growth approach behaves similarly as observed in biological processes and computes component structures with minimal weight at maximum stiffness.



Alle Interessenten sind herzlich eingeladen.
Prof. Dr.-Ing. Thomas Böhlke