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Kolloquium für Mechanik / Graduiertenkolleg 1483

Referent: **Dr.-Ing. Rainer Glüge**
Otto-von-Guericke-Universität, Magdeburg

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Titel: **Numerical aspects of strain gradient elasticity**

Abstract

The use of strain gradients in material models requires additional effort when boundary value problems are solved numerically with the Finite Element Method (FEM), compared to the usual second-order partial differential equations (PDE) that arise in the case of simple materials. In short, one needs to introduce either the first gradient $\mathbf{H} = \mathbf{u} \otimes \nabla_0$ as a new field, and enforce $\mathbf{H} = \mathbf{u} \otimes \nabla_0$ weakly by solving two coupled systems of PDEs with C_0 continuous approximations of $\mathbf{u}$ and $\mathbf{H}$ (implicit strain gradient), or construct C_1 continuous approximations of the displacement field $\mathbf{u}$ (explicit strain gradient). In both cases, additional degrees of freedom are introduced. This requires an extension of standard FE codes, which I shall address in my talk. Specifically, I intend to cover the following points:

- Discussion of the advantages and drawbacks of explicit and implicit strain gradient implementations
- From the PDEs to the weak form in 3D gradient elasticity
- Constructing C_1 continuous elements
- Implementation as user elements into Abaqus

Alle Interessenten sind herzlich eingeladen.

Prof. Dr.-Ing. Thomas Böhlke