Seminar

21. September 2009 14h HS 42-258

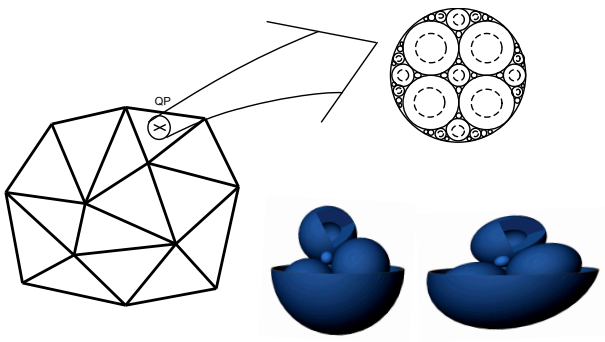
TECHNISCHE UNIVERSITÄT KAISERSLAUTERN

zu folgendem Vortrag wird herzlich eingeladen:

Void growth model for multiscale modeling of ductile failure

Celia Reina and Michael Ortiz
California Institute of Technology

The emerging field of predictive science requires computational models of material failure that reproduce the real physics underlying a process. In particular, in the case of ductile rupture, there is a need to quantitatively model the nucleation of voids, their growth and their coalescence.
Towards the effort of building such a multi-scale model, we present a model for void growth and its numerical analysis. The effective behavior of porous materials is obtained using a finite element formulation. This gives a completely general framework to the problem overcoming the limitations of preceding analytical models such as the GTN model (Gurson, Tvergaard and Needleman, 1977, 1981).
This model employs a hollow sphere as the representative element and the approximation space used is based on spherical harmonics. This allows the fields to be represented using a single element for the entire hollow sphere and exploits the possible symmetries of the problem. An exact quadrature rule has been developed in order to have exact integration of the stiffness matrix.
The resulting model has been verified against several analytic solutions. A close to ideal convergence rate is obtained for linearized kinematics as well as for finite kinematic problems with elastic and plastic materials.



Prof. Dr.–Ing. habil. Sven Klinkel
Fachgebiet
Statik und Dynamik der Tragwerke
TU Kaiserslautern

Dr.–Ing. Sigrid Leyendecker
Emmy Noether Group
Computational Dynamics and Control
TU Kaiserslautern

Prof. Dr.–Ing. habil. Ralf Müller
Lehrstuhl für Technische Mechanik
TU Kaiserslautern