



COMMAS Course C2 – WS 2009/2010 Computational Mechanics of Materials

Participants: COMMAS students, further interested listeners

Dates: Lecture: thursdays 09:45 - 11:15 h V 7.12

 Exercise: fridays 09:45 - 11:15 h V 7.12

Beginning: Thursday, October 22, 2009

Course Contents:

Core course C2 focuses on the theory and numerics of material models. Important classes of material models are investigated both for the one-dimensional and the three-dimensional context.

- Introduction: Discrete and Continuous Modelling of Materials (Microstructures, Homogenization Techniques and Multi-Scale Approaches).
- Fundamental Theoretical Concepts (Basic Rheology, Classification of the Phenomenological Material Response, Elements of Continuum Thermodynamics).
- Fundamental Numerical Concepts (Discretization Techniques for Evolution Systems, Linearization Techniques and Iterative Solution of Nonlinear Systems).
- Linear and Nonlinear Elasticity (Isotropic Spectral Forms, Anisotropic Models based on Structural Tensors).
- Damage Mechanics (Isotropic and Anisotropic Models, Stress Update Algorithms).
- Viscoelasticity (Linear and Nonlinear Models, Stress Update Algorithms and Consistent Linearization).
- Rate-Independent Plasticity (Theoretical Formulations, Return Mapping Schemes, Incremental Variational Formulations, Consistent Elastic-Plastic Tangent Moduli).
- Viscoplasticity (Classical Approaches and Overstress Models).
- Material Stability and Failure Analysis (Nonlocal Modes, Discrete Failure Mechanisms).

Stuttgart, October 15, 2009

(Prof. Dr.-Ing. C. Miehe)