Institut für Hydromechanik (IfH)
Prof. Dr.-Ing. Markus Uhlmann

Institut für Mechanik (IFM)
Prof. Dr.-Ing. Peter Betsch
Prof. Dr.-Ing. Thomas Seelig

Institut für Strömungsmechanik (ISTM)
Prof. Dr.-Ing. Bettina Frohnapfel

Institut für Technische Mechanik (ITM)
Prof. Dr.-Ing. Thomas Böhlke
Prof. Dr.-Ing. Alexander Fidlin
Prof. Dr.-Ing. Carsten Proppe
Prof. Dr.-Ing. Wolfgang Seemann

Kolloquium für Mechanik

Referent: **PhD Habib Pouriayevali**
Mechanics of Functional Materials, TU Darmstadt

Datum: Mo., 02.05.2016
Uhrzeit: 14:00-15:30 Uhr
Ort: KM-Seminarraum, Geb. 10.23, 3. OG

Titel: **A Study of Hardening Behavior Based on a Finite-Deformation Gradient Crystal-Plasticity Model**

Abstract

A systematic numerical study on the different roles of the governing components of a well-defined finite-deformation gradient crystal-plasticity model proposed by Gurtin (Int. J. Plasticity 24, pp. 702-725, 2008) is carried out, in order to visualize the capability of the model in the prediction of a wide range of hardening behaviors as well as rate-dependent, scale-variation and Bauschinger-like responses in a single crystal. A function of accumulation rates of dislocations is employed and viewed as a measure of formation of short-range interactions which impede dislocation movements within a crystal. The model is first represented in the reference configuration for the purpose of numerical implementation, and then implemented in the FEM software ABAQUS via a user-defined subroutine (UEL). Our simulation results reveal that the dissipative gradient-strengthening is also identified as a source of isotropic-hardening behavior, which represents the effect of cold work introduced by Gurtin and Ohno (J. Mech. Phys. Solids 59, pp.320-343, 2011). Moreover, plastic flows in predefined slip systems and expansion of accumulation of GNDs are distinctly observed in varying scales and under different loading conditions. This constitutive model is further developed for multicrystals. Penetration of dislocations through soft boundaries and accumulation of GNDs at hard boundaries are also investigated.

Alle Interessenten sind herzlich eingeladen.

Prof. Dr.-Ing. Thomas Böhlke