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Friedrich-Alexander-Universität  
Erlangen-Nürnberg



## Seminar über Fragen der Mechanik

zu folgendem Vortrag wird herzlich eingeladen

Montag, **27.05.2013, 14:15 Uhr**, Egerlandstr. 5, Raum 0.044

### From Systems of Discrete Dislocations to a Continuous Field Representations: The Continuum Dislocation Dynamics Theory (CDD)

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Metal plasticity is governed by the collective behaviour of dislocations – line-like defects in the crystal lattice. The prediction of the motion and interaction of dislocations is one of the big tasks in understanding and modelling materials deformation. This task is, despite all efforts and advances in the last decades, not yet fully solved. The reason is that models with high spatial resolution, which yield complete information about the dislocation microstructure, are computationally feasible only for small systems/small strains. On the other hand, models applicable to larger scales and/or macroscopic systems generally lag sufficiently detailed information about the dislocation microstructure.

In this talk the steps needed for averaging systems of discrete dislocations to obtain a continuum representation of dislocation microstructure are represented. We introduce Hochrainer's Continuum Dislocation Dynamics (CDD) theory which describes the kinematic evolution of dislocation density in a given velocity field (kinematic closure) and study in particular the respective boundary conditions. We then ask how stresses (and the dislocation velocities) can be obtained based on the continuous dislocation microstructure (dynamical closure) and compare to discrete dislocation dynamics simulations.

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