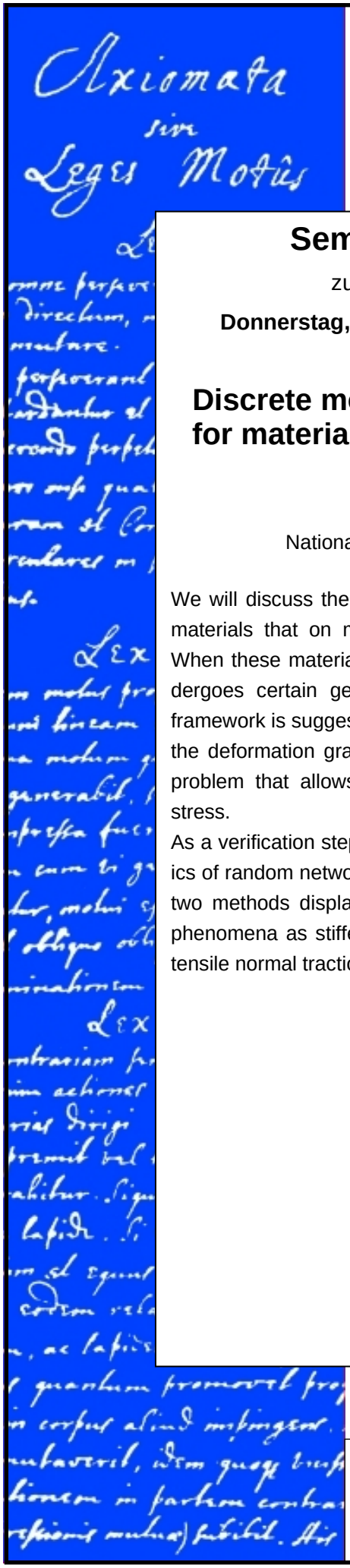

Seminar über Fragen der Mechanik

zu folgendem Vortrag wird herzlich eingeladen

Donnerstag, 13.02.2014, 13:15 Uhr, Egerlandstr. 5, Raum 0.044

Discrete modeling and homogenization techniques for materials with random network microstructures

Dr. Mykola Tkachuk

National Technical University ”Kharkiv Polytechnical Institute”

We will discuss the approaches that can be taken to predict mechanical behavior of materials that on microstructural level present a network of interconnected fibers. When these materials are subject to a finite three-dimensional strain the network undergoes certain generally non-affine microdeformation. To predict it a variational framework is suggested. We derive a relation between fiber stretch and orientation and the deformation gradient. It serves as a kinematic constraint in energy minimization problem that allows to determine the axial forces and ultimately the macroscopic stress.

As a verification step for the simplifying assumptions about the geometry and kinematics of random networks a series of discrete element models have been evaluated. The two methods display similar non-affine microdeformation patterns that explain such phenomena as stiffening of elastomers in uniaxial and equibiaxial loading as well as tensile normal tractions in sheared semiflexible gels.

Prof. Dr.-Ing. P. Steinmann
Prof. Dr.-Ing. K. Willner
Lehrstuhl für Technische Mechanik
Egerlandstraße 5, 91058 Erlangen

Prof. Dr.-Ing. S. Leyendecker
Lehrstuhl für Technische Dynamik
Haberstraße 1, 91058 Erlangen