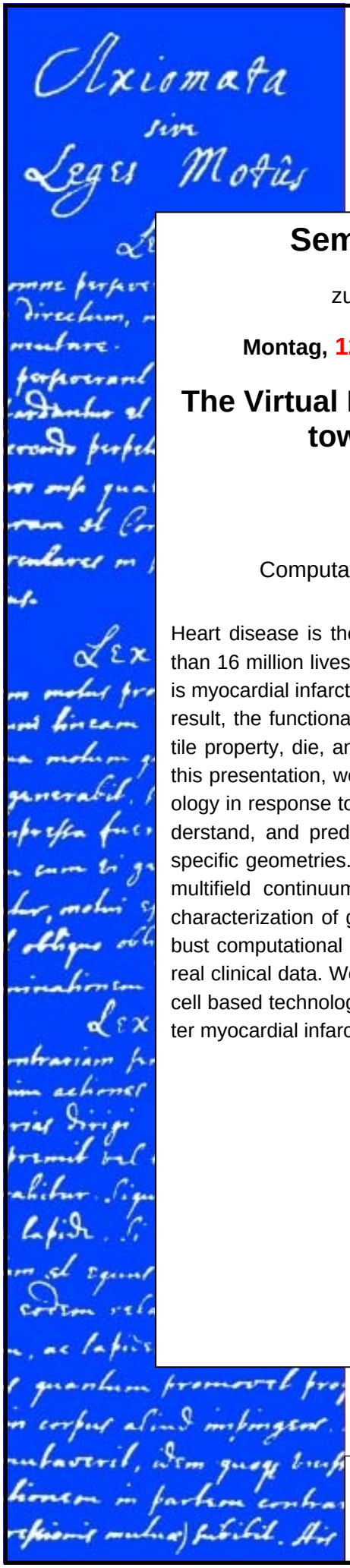

Friedrich-Alexander-Universität Erlangen-Nürnberg

Seminar über Fragen der Mechanik

zu folgendem Vortrag wird herzlich eingeladen

Montag, 12.10.2009, 13:00 Uhr, Egerlandstr. 5, Raum 0.044

The Virtual Heart: A Multiscale Continuum Approach towards Computational Cardiology

Prof. Ellen Kuhl

Computational Biomechanics Laboratory, Stanford University

Heart disease is the primary cause of death in industrialized nations, claiming more than 16 million lives world wide each year. A leading cause of congestive heart failure is myocardial infarction, caused by the loss of blood supply in the myocardial wall. As a result, the functional units of the myocardium, the cardiomyocytes, lose their contractile property, die, and induce changes in form and function of the entire heart. Within this presentation, we explore both short term and long term changes of cardiac physiology in response to myocardial infarction. We present our first attempts to model, understand, and predict the mechanical behavior of the heart based on real patient-specific geometries. The underlying challenges are **(i)** the formulation of a multiscale, multifield continuum theory for excitation-contraction coupling, **(ii)** the constitutive characterization of growth and remodeling, **(iii)** the design of efficient, stable, and robust computational solution schemes, and **(iv)** the validation of our model in terms of real clinical data. We conclude by discussing novel passive support devices and stem-cell based technologies as potential treatment strategies to restore cardiac function after myocardial infarction.

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

Prof. Dr.-Ing. K. Willner
Dipl.-Math. techn. G. Possart
Tel. +49 9131 8528506
possart@ltm.uni-erlangen.de