

COLLABORATIVE RESEARCH CENTER 837

## INTERACTION MODELING IN MECHANIZED TUNNELING

RUB

### Seminar: Large-scale Scientific Computing in FEM Simulations

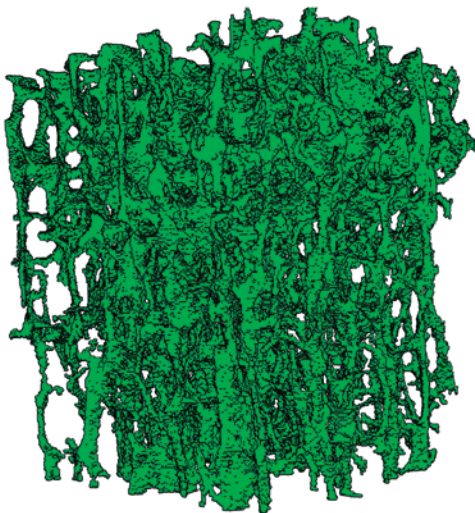
Prof. Svetozar Dimitrov Margenov

*Bulgarian Academy of Sciences*

**13.12.2010 – 13:00 ~ 16:30 h – IA 6/21 (Part I)**

**14.12.2010 – 09:00 ~ 12:30 h – IA 4/56 (Part II)**

The finite element method (FEM) has become an established technique for numerical solution of differential equations. This course begins with a short introduction to large-scale scientific computing in FEM applications. Iterative methods play an important role in FEM simulations. Numerous properties of the problem may affect the efficiency of the solution. A particular focus of the presentation is on algorithms for the solution of large-scale sparse FEM matrices.



AMG algorithms for  $\mu$ FEM analysis of bio and geo-composites. The microstructure of the materials is extracted from high resolution computer tomography images.

Part II provides a short introduction to algebraic multilevel iteration (AMLI) methods. The optimality issues are in the spirit of computational complexity of the related preconditioning (PCG or GCG) algorithms. The robustness of the AMLI methods with respect to mesh and/or coefficient anisotropy, strongly heterogeneous materials, etc. will be discussed. The almost incompressible linear elasticity and the time dependent Navier-Stokes problem are selected as two representative coupled problems. The last lecture will consider some applications of AMLI and

**Guests are sincerely welcome!**