Modeling Materials Short Course

ModelingMaterials.org

At a Glance

WHAT	Five-day short course on the fundamentals of continuum, atomistic and multiscale modeling of materials.
WHO	**Prof. Ellad B. Tadmor** (U. Minnesota, USA) and **Prof. Ronald E. Miller** (Carleton University, Canada).
WHERE	Technische Universität Hamburg-Harburg (TUHH), Hamburg, Germany
WHEN	March 17-21, 2014

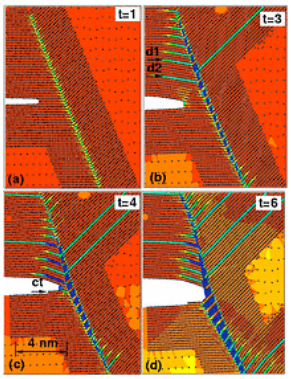
SFB 986 M³ | Maßgeschneiderte | Multiskalige | Materialsysteme

TUHH Technische Universität Hamburg-Harburg

Helmholtz-Zentrum Geesthacht
Zentrum für Material- und Küstenforschung

About the Course

Material properties emerge from phenomena on scales ranging from angstroms to millimeters, and only a multiscale treatment can provide a complete understanding. Materials researchers must therefore understand fundamental concepts and techniques from vastly different fields.



Quasicontinuum simulation of interaction of crack and grain boundary.

This course is an intensive 5-day introduction to the fundamentals required to understand state-of-the-art modeling and computer simulation of material behavior. The course includes a mix of theoretical lectures, exercises and hands-on practical computer calculations. The following topics will be covered (a complete outline is available on request):

- **Continuum mechanics:** tensors, nonlinear deformation, balance laws, thermodynamics, constitutive relations, energy principles.
- **Finite Element Method (FEM):** nonlinear FEM, basic theory, practical simulations.
- **Materials Science:** crystals and defects.
- **Quantum mechanics:** basic theory and density functional theory (DFT).
- **Classical atomistic modeling:** interatomic potentials, statistical mechanics, molecular dynamics (MD), stress in MD, and OpenKIM.
- **Spatial multiscale methods:** Cauchy-Born rule, atomistic/continuum coupling strategies, static and dynamic methods, the quasi-continuum method.

Included with the course fees, all participants will receive copies of the textbooks “Modeling Materials” (Tadmor and Miller) and “Continuum Mechanics and Thermodynamics (Tadmor, Miller and Elliott) published by Cambridge University Press, 2012. (This is a 125 euro value.)

About the Instructors

Professors Tadmor and Miller have both been teaching and researching the science of multiscale materials modeling for over 15 years. Between them, they have published nearly 100 scientific articles and two books. They have received numerous awards for both their research and teaching abilities.

Who Should Attend

This course is suitable for all graduate and post-graduate researchers from engineering, materials science, physics, chemistry and mathematics with an interest in materials modeling. No prior knowledge is assumed beyond an undergraduate education in one of the fields listed above.

Cost

Early registration (ends February 15, 2014)	675 euro
Regular registration (begins February 16, 2014):	800 euro

The course fee covers tuition, course material (including textbooks), and early electronic access to the books to allow students to prepare. Accommodations are extra.

Inquiries

For more information and to register, visit
http://ModelingMaterials.org/short-courses