Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Mechanics & Materials Laboratory
Prof. Dr. Dennis M. Kochmann
www.mm.ethz.ch

PhD/Postdoc Positions Available in Multiscale Mechanics

The Mechanics & Materials Group within ETH Zürich's Dept. of Mechanical and Process Engineering has openings for PhD students and for a postdoctoral scholar within the broad framework of multiscale mechanics. Positions are to be filled and applications welcome immediately for the two projects below.

Project I (PhD/Postdoc positions available):

Funded by an ERC Consolidator Grant, we develop new techniques of *coarse-grained atomistics* to bridge across scales in crystalline solids. Solely based on atomic potentials, a quasicontinuum framework will be applied to study phenomena at length and time scales typically inaccessible to atomistic techniques, including long-term, finite-temperature processes such as recrystallization and hydrogen embrittlement in metals. By combining methods from atomistics, statistical mechanics, continuum mechanics, and computational physics, a new theoretical framework and associated numerical library will be established to admit unprecedented simulations, probing the mechanics and physics of a variety of materials systems of technological interest and gaining insight into fundamental mechanisms of plasticity and failure. *PhD applicants* should have a background in solid mechanics, continuum mechanics, computational physics, or a related field. *Postdoc applicants* should have a strong background in numerical methods or computational science.

Project II (PhD positions available):

Funded by an SNF Grant, we investigate the *thermo-electro-mechanically coupled behavior of ferroelectric ceramics* through a combination of theory, simulations, and experiments. Ferroelectric ceramics are of importance for actuator and sensor technologies, owing to their electro-mechanical coupling. Yet, the link between processing and properties as well as the hierarchical interrelations from atomistics all the way up to the macroscopic performance is not fully understood. We aim to develop new phase-field theory and associated numerical tools using Fourier spectral analysis in order to predict the long-term material performance including fatigue. We calibrate and validate the new simulation toolbox by a series of experiments involving small-scale imaging and measuring the effective long-term behavior through state-of-the-art techniques. The integration of simulations with experiments – both in-house – promises fruitful interactions. *PhD applicants* should have a background in solid mechanics, computational mechanics, applied mathematics, experimental mechanics, or a related field.

Applicants:

- may expect innovative research in an interdisciplinary, international team,
- should have a strong background in solid mechanics, continuum mechanics, computational physics, applied mathematics, computational science, or a related field, and must be fluent in English.
- must have an appropriate degree in an engineering or a related discipline,
- should have enthusiasm for conducting original research and strive for scientific excellence,
- should have programming experience (ideally but not necessarily in C++).

Applications:

Please send your application (including a current CV) by email to Mrs. Maria Trodella. For further information please contact Prof. Dennis M. Kochmann.