



ICAMS Seminar

Prof. Alphonse Finel

Laboratoire d'Etudes des Microstructures, CNRS-ONERA, Chatillon,
France.

Monday, December 19, 4:30 p.m. ICAMS Seminar room UHW 11/1102

Microstructures and mechanical properties: a phase field modeling of phase transformation and plastic activity.

The Phase field method has emerged as a very powerful tool to analyze and predict microstructural evolutions in heterogeneous materials at mesoscale. This task is a very complex, as it involves a coupling between different physical aspects (phase transformations, elasticity, plasticity...) and different length scales (precipitate sizes, interface widths, dislocation cores...).

We will present our recent results along this task within two different subjects.

First, we discuss a recent phase field method that couples phase transformation and plastic activity. The model incorporates an internal plastic length scale within a continuum approach based on a second gradient theory.

Second, we present an analysis of the dynamics of the martensitic transition observed in shape memory alloys, using both an overdamped phase field and a Lagrange-Rayleigh modeling, and show that dynamics exhibits intermittency. If the system is sufficiently underdamped, the discrete events (avalanches) self-organize into a critical state that displays scale invariance. Instead, the overdamped system does not show criticality. To explain the role of inertia, we analyze a simple 1D spring model with a double well potential.

For more information contact STKS secretary: Hildegard.Wawrzik@rub.de

ICAMS/ Uni-Hochhaus-West/ Stiepel Str. 129/ 44801 Bochum