

PhD Position

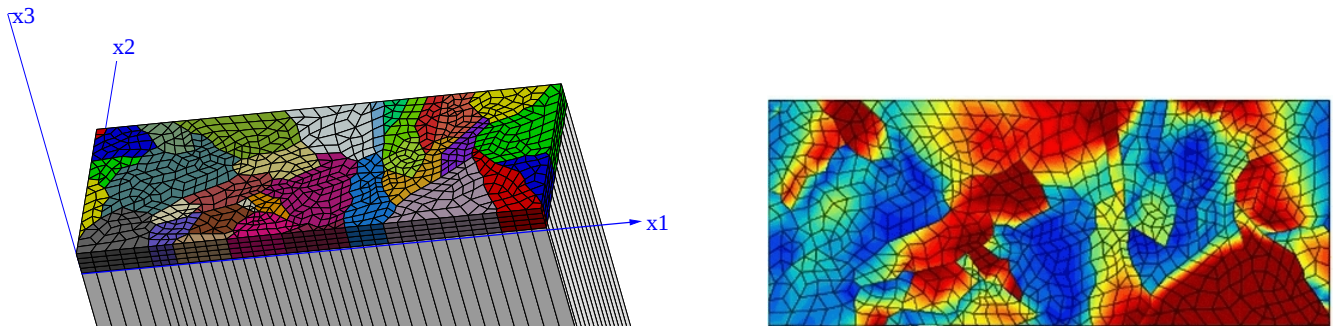
Discrete vs. continuum 3D modelling of the plastic deformation of thin films and lamellar structures in metals

The plastic behaviour of thin films and layers exhibits strong size effects when the thickness of the films decreases from 10 micron to 1 micron and less. Discrete models of dislocation dynamics will be used to simulate the main mechanisms at work during plastic deformation. The results can be used to identify continuum crystal plasticity models that are necessary to compute efficiently configurations involving a larger number of grains.

The aim of the PhD is to provide realistic 3D simulations at both the dislocation dynamics and continuum plasticity levels of deformation processes in crystalline thin films and lamellar structures. Actual crystal orientations from texture analysis will be taken into account. Large scale finite element computations will be performed. The results will be compared to experimental data regarding copper thin films on the one hand, and lamellar structures in steels on the other hand.

A close cooperation with IZBS Karlsruhe and other institutes within and outside the Marie-Curie Research Training Network (RTN) "*SizeDepEn - Engineering mechanics based on size-dependent materials properties*" is wanted. A connection to one industrial partner from steel industry is possible.

We are looking for a PhD student with a first class degree in engineering mechanics or materials science and strong interest or experience in numerical simulations. The candidate must be national of EU or associate states, cannot be French and should not have resided in France for more than 12 months in the last 3 years. Financial support is provided for 3 years. Most of the work will take place at Centre des Matériaux (Evry, France, close to Paris) and the remaining part at IZBS Karlsruhe. Accommodation for the 3 years can be found in Paris or close to Evry.



Finite element computation of a multicrystalline film on a substrate : finite element mesh and plastic slip map during tension

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