

PhD position at Paris 13 University

Subject: Multiscale Large Damage-Elastoplastic Deformation Modelling

General context

The needs for ultra fine microstructures are considerable from both scientific and technological viewpoints. Among the available processes for producing such microstructures, powder metallurgy routes play a key role. The need for such microstructures keeps growing for a variety of new applications such as Catalysts & Hydrogen Storage, Conducting Paste, Solid Rocket Fuel, etc. These applications are identified and developed with respect to many advantages such as increased surface area, increased electrical conductivity, enhanced magnetic properties, mechanical properties, size dependant absorption properties and faster sintering kinetics ... Along with the development of processes to fabricate such microstructures, the properties of nanocrystalline metals have been a major focus for computational materials science in recent years, particularly the behaviour of the grain boundaries (GBs) often associated with the atomic level mechanisms of plastic deformation, as analyzed through experiments, numerical simulations and theoretical models.

Objective

A rather consequent work of modelling in interaction with the experimental analysis remains to be made, and this in spite of encouraging results of our micromechanical modelling already obtained within the framework of recent PhD studies, but which remain confined at small deformations. The experimental analysis will first of all provide us the most relevant mechanisms of plastic deformation and damage, which will be carried out during MIMIC project. Then, a more theoretical work dealing with a large strain damage elastoplastic formulation and its numerical finite elements implementation will be carried out. The recruitment is based mainly on academic credentials such as Computational Mechanics. The candidate will have to interact with various partners in the framework of the MIMIC project.

Financial support:

This PhD position is financed by the project ANR 09-BLAN-0010-01 **MIMIC** (Methods in Engineering of multi-scale metal/metal **M**icrostructures: Mechanical properties & Micromechanical Modelling. <http://mimic.anr.free.fr>). The possibility of teaching during the PhD period will be offered within the framework of a management or that of simple vacations.

Contacts

PhD Supervisors

S. Ramtani, Professeur université Paris 13
Laboratoire L.P.M.T.M / UPR9001 du C.N.R.S.
Université Paris 13, Institut Galilée
99 Avenue Jean-Baptiste CLEMENT
F-93430 VILLETANEUSE
Phone : + 33 (1) 49.40.39.53 Fax : + 33(1) 49.40.39.38
<http://www-lpmtm.univ-paris13.fr/>

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Laboratoire LISMMA
Supméca
3 Rue Fernand Hainaut
93400 Saint Ouen
http://espace.supmeca.fr/lismma_cocq/page_perso.php?id=128

A. Abdul-Latif, Professeur université Paris 8
IUT de Tremblay-en-France, Département GIM
3 rue de la Râperie
93290 Tremblay-en-France
phone: + 33 (1) 41 51 12 34 Fax: + 33 (1) 48 61 38 17
<http://www.iu2t.univ-paris8.fr/>

PI of the ANR Project

G. Dirras, Professeur université Paris 13
Laboratoire L.P.M.T.M / UPR9001 du C.N.R.S.
Université Paris 13, Institut Galilée
99 Avenue Jean-Baptiste CLEMENT
F-93430 VILLETANEUSE
Phone : +33 (1) 49.40.34.88 Fax : +33 (1) 49.40.39.38
<http://www-lpmtm.univ-paris13.fr/>



Laboratoire des Propriétés Mécaniques et Thermodynamiques des Matériaux

UNIVERSITÉ PARIS 13 - INSTITUT GALILÉE - 99, AVENUE J.-B. CLÉMENT - 93430 VILLETANEUSE (FRANCE)
TÉL. (33) 01 49 40 35 01/... - TÉLÉCOPIE : (33) 01 49 40 39 38
Mél : direction@lpmtm.univ-paris13.fr - Web : <http://www-lpmtm.univ-paris13.fr>