Research Grants for PhD students from the China Scholarship Council

Information Form (please read the guidelines carefully on the website www-csc.utt.fr)

Supervisor's name : Rachik | Given names : Mohamed

Status (prof., assistant prof., …) : Assistant professor (with Habilitation to supervise research)

Laboratory :	Laboratoire Roberval, FRE CNRS-UTC 2012	Website address : http://roberval.utc.fr/
Institution :	Sorbonne universités, Université de technologie de Compiègne	Website address : www.utc.fr

Scientific competence of the supervisor:

• Constitutive modeling of materials including rate dependent and pressure dependent elastoplasticity and hyperelasticity.
• Algorithms for constitutive model integration
• Constitutive model calibration with inverse anlysis
• Development of load stepping algorithms for non linear problems with special interest in non iterative schemes (4th order Runge-Kutta)

Two major publications in the field proposed for the PhD :

1. Hou et al,A novel artificial dual-phase microstructure generator based on topology optimization, Computational Materials Science. 123 (2016) 188–200.
2. Hou et al., Micromechanical modeling of the effect of phase distribution topology on the plastic behavior of dual-phase steels, Computational Materials Science. 158 (2019) 243–254.

Website address of the personal page : https://www.researchgate.net/profile/Mohamed_Rachik2

Supervisor's email : mohamed.rachik@utc.fr

Description of the research work proposed for a PhD **Topic # (see list) :** IV-6

Title : Characterization and modelling of mechanical properties generated by high strain-rate shearing

Subject :

A high strain rate shearing enables complex kinematics and non-equilibrium transformations that can generate structural changes with gradient properties. Constitutions and morphologies and the phases within the structure can results in enhanced mechanical an physical properties. Thus, the macroscopic mechanical behaviour of the materials is strongly dependent to the microstructure generated by the high-strain shearing. Our objective is to develop computational model capable for predicting macroscopic properties based on the nature of such microstructure using homogenization technique combined with various experimental characterization (SEM, EBDS, TEM, mechanichal testing). Then, the candidate will develop knowledges about the metallurgical transformations due to high strain rate shearing and the properties they create. The numerical modelling will be performed using Matlab and Abaqus packages.

Keywords :

Metals, high strain rate, properties, modelling, homogenization, constitutive law

Expected collaborations :

Collaboration: 1 R.N. Raoelison, 2 Y. Hou, 3 T. Sapanathan
1 Université de Bourgogne Franche-Comté - UTBM, Laboratoire ICB, UMR 6303 CNRS, 90100 Belfort, France
2 School of Mechanical Engineering, Zhengzhou University, China 3
Institute of Mechanics, Materials and Civil Engineering, Université catholique de Louvain, B-1348 Louvain-la-Neuve, Belgium

Background required from the applicant :

Computational material science, Mechanics of materials, Finite elements method, Structural characterization, Constitutive model implementation

Existence of a PDF file detailing the proposal ("yes" or "no") : yes

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