

Université de Technologie de Compiègne – Thesis proposal

Part 1: Scientific sheet	
Thesis proposal title	Epistemic uncertainty in material characterization
PhD grant	Doctoral work contract based on a Ministry of Research Grant and labex MS2T
Research laboratory	unité de recherche :Laboratoire Roberval – UMR 7337 research team: computational mechanics team web site: http://roberval.utc.fr
Thesis supervisor(s)	Feissel Pierre (MCF-HDR) Destercke Sébastien (CR-HDR) – Laboratoire Heudyasic UTC co-supervisor: Aboura Zoheir (PR)
Scientific domain(s)	Science and technology Computer science and information technologies
Research work	<p>The multi-instrumentation of the mechanical tests for the characterization of materials is based on the use of multiple measurement systems, the data of which are of different nature and of varied uncertainty. Thus the use of digital cameras (coupled with digital image correlation tools) is generalized during the tests and makes it possible to obtain rich kinematic information (displacement fields). These data can be supplemented by thermal and acoustic emission measurements.</p> <p>The aim of this thesis is two fold:</p> <ul style="list-style-type: none"> • Develop new algorithms for the inverse problem exploiting new uncertainty approaches relaying on random sets or probability sets; • Develop dedicated fusion methods to merge the obtained results from various measurement devices. <p>The objective is in particular to quantify the output uncertainties, in order to identify the models and to characterize the behaviors of the materials. To achieve this, the applicant will have the possibility to rely on previous work and exploit the general framework of non-deterministic methods, in particular random sets. It is therefore necessary to develop a strategy for the exploitation of mechanical tests and to implement it numerically, using in particular computational mechanics tools such as finite elements.</p> <p>The targeted applications concern the characterization of aeronautical composite materials with two aspects: characterization of damage during loading and identification of non-linear material model. Yet the developed methods should be generic enough to be applied to inverse problems in general.</p>
Key words	Model updating, inverse approach, data fusion, uncertainty, imaging, multi-level
Requirements	Computational mechanics, optimisation, uncertainty modelling
Starting time	2017, october, 1st
Location	Laboratoire Roberval UTC – Compiègne - France

Part 2: Job description	
Duration	36 months
Additional missions available	teaching
Research laboratory	Computational mechanics, mechanical experiments
Material resources	Office, computer Means of the unit: static mechanical testing machine, thermal and kinematic field measurement tools, acoustic emission acquisition
Human resources	(nb EC, BIATSS/ITA, doctorants, post-docs etc de l'unité)
Financial resources	From LABEX MS2T
Working conditions	(autonomie attendue, missions (par ex suivi d'un projet, organisation de réunions, etc), fréquence de réunions avec le directeur de thèse, horaires particuliers le cas échéant, etc)
Research project	LABEX MS2T
National collaborations	
International collaborations	
International cosupervision (cotutelle)	non
Contact	Pierre Feissel 03 44 23 46 04 pierre.feissel@utc.fr

Please contact first the thesis supervisor before applying online on <https://webapplis.utc.fr/admissions/doctorants/accueil.jsf>