**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:** Dureisseix  
**Given names:** David

**Status (prof., assistant prof., …):** Professor

<table>
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<tr>
<th>Laboratory:</th>
<th>Contact and Structure Mechanics Laboratory (LaMCoS)</th>
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<td><strong>Institution:</strong></td>
<td>INSA Lyon</td>
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**Website address:**
- https://www.insa-lyon.fr/

**Scientific competence of the supervisor:**
- Multiphysics coupled problems, contact mechanics, computational mechanics and numerical strategies, homogenization methods, domain decomposition and parallelism.

**Two major publications in the field proposed for the PhD:**

**Website address of the personal page:** http://lamcos.insa-lyon.fr/front/fiche_pers.php?L=2&Numpers=870

**Supervisor’s email:** david.dureisseix@insa-lyon.fr

**Description of the research work proposed for a PhD**

**Title:** Multiscale and multiphysics robust design of a complex microstructure with uncertainties, driven by target performances

**Subject:**
- New materials are nowadays designed from their fine scale (i.e. microscale) and benefit from a dedicated design of their microstructure. They can target specific performances once this microstructure has been optimized. This Ph.D. concerns the multiscale and multiphysics behavior of material microstructures, taking into account the uncertainties, for the design of a complex microstructure. The design aims to optimize the performances of micro-architected materials. These micro-structures may arise from the processing of biological materials, or from dedicated engineered materials (aerogels, foams, composites…) We intend herein to study the performances of the micro-structure at the macroscopic scale to design an optimal micro-structure by controlling its parameters at the different modeling scales. We will begin by the thermal properties and then extend the approach to multiphysics behavior (vibrations, acoustics of porous materials, piezo-electricity, bio-chemical, etc.) The framework we intend to develop concerns primary the modeling and simulation aspects, the experimental point of view could be explored with different collaborations. The PhD student will work closely with Prof. D. Dureisseix, A/Prof. Beatrice Faverjon (uncertainty quantification), one Postdoc, several Master students in our lab and with the international partners of MURMUR.

**Keywords:**
- Robust design; multifunctionnal material; numerical simulation; homogeneization process

**Expected collaborations:**
- MURMUR is a 2 years project starting January 2018 on the robust design of micro-architected materials such as acoustics and composite metamaterials. International partners from MURMUR are the University of Southern California, USA, with Pr. R. Ghanem (uncertainty quantification), and University of New South Wales with A/Prof. N. Kessissoglou (acoustics). Other collaborations will be with another group in our lab for micro-architected materials (Pr. D. Baillis) and a biomechanical group for natural materials (IMFT Toulouse, France, Pr. P. Swider).

**Background required from the applicant:**
- Skills and taste for numerical simulations, possibly previous use of finite element methods.

**Existence of a PDF file detailing the proposal (“yes” or “no”):** yes

*(see guidelines on the website www-csc.utt.fr)*