

## Recruitment Associate/full professors School year 2012-2013

<b>Short profile</b>	<b>Dynamics of mechanical structures</b>		
<b>Category</b>	MCF	<b>Job number</b>	688
<b>Posted</b>	26-1		
<b>Field of expertise</b>	<b>Section 1 : 60</b>		
	<b>Section 2 : (eventually)</b>		
<b>Position available</b>	01/09/2012		
<b>School to which the position is attached</b>	Ense <sup>3</sup>		
<b>Associated Research lab</b>	3SR		
<b>Location</b>	Site : Grenoble		
<b>Contact (mail – tel)</b>	Teaching: <a href="mailto:Fabrice.Emeriault@grenoble-inp.fr">Fabrice.Emeriault@grenoble-inp.fr</a> – 04 76 82 71 40  Research: 3SR-Direction@grenoble.cnrs.fr – 04 76 82 51 73 <a href="mailto:Didier.imbault@grenoble-inp.fr">Didier.imbault@grenoble-inp.fr</a> – 04.56.52.86.03		

Grenoble INP, Grenoble Institute of Technology has been training engineers, and PhDs, and developing outstanding international research for the past hundred years. As a public Higher Education Institution and a leader in innovation, it is one of the preferred partners of the industrial world. As a cofounder of MINATEC, and an active member of Grenoble Innovation University, it is involved in international projects. Grenoble INP, Grenoble Institute of Technology is made up of approximately 1100 staff (administrative and academic), 6 engineering schools, 5400 students and 32 Research labs.

[Lien internet Grenoble INP](#)

### School to which the position is attached

Ense3 - National School of Energy, Water and Environment - is an engineering school of the Grenoble INP group. It trains engineers in industries to meet the challenges of tomorrow and respond to the major societal challenges of the 21st century.

Over 1000 students (engineers and masters) for a total of 100 faculty members - 350 temporary teachers - 50 administrative staff.

The school offers a comprehensive and multidisciplinary training based on a strong interaction with industry and research, particularly through the technological platforms PREDIS and IEE. The number of partnerships with large groups provide a good fit with the training needs of industry. The strong link with the research laboratories of Grenoble internationally recognized allows to change the teachings in line with the latest technological developments. Ense3 also works for an opening to the world and its issues, including the promotion of international mobility of students and by diversifying the public (foreign students, learning).

Website Ense<sup>3</sup>: <http://ense3.grenoble-inp.fr/index.jsp>

### Teaching experience

The applicant will mainly teach in the Master speciality « Mechanics and energetics » (ME) and in the newly opened work-study program in «Engineering of Production and Supply of Energy ».

The hired associate professor will contribute to the elective courses of the 1st year program as well as in compulsory courses of continuum mechanics and strength of materials. In 2nd year (1st year of ME master specialty), the new staff member will mobilize his/her competences in the field of Structural mechanics, Materials and Mechanical design to participate in mentoring « Ateliers de l'Ingénierie ».

Within the work-study program, he/she will be responsible for the development, coordination and supervision of courses and activities in the aforementioned field of engineering.

### **Associated research lab**

The laboratory Soils, Solids, Structures - Risks comprised all the geomechanics manpower of Grenoble, civil engineering and associated risks as well as mechanics and multiphysics couplings in complex solid media. This is a mixed research unit (UMR 5521) between CNRS (ST2I departments and EDD), the University Joseph Fourier and the Institut National Polytechnique de Grenoble.

### **Objectives**

The objectives are the analysis and the development of tools for optimization and the vulnerability of structures and systems:

- In the field of environmental and technological risks,
  - \* for underground and surface storages
  - \* for gravity and seismic risks
  - \* for underground collapses (structure-environment interaction)
  - \* regarding the safety of sensitive structures
- In the field of mechanical behavior and conduct in-service
  - \* structures and geo-structures
  - \* systems and complex solid media (granular, porous, woven, reinforced...)

In all these areas, research based on work where the experiment is conducted to understand, analyze and provide for the development of models taking into account the physico-mechanical coupling and multi-scale analysis. 3S-R is equipped with original and relevant experimental mechanics of materials, geomaterials (soils, rocks, concrete) and structures. The numerical modeling is in goal for all research based on numerical technology advances (finite elements, discrete elements, couplings...) leading to powerful tools and is available in simplified methods to help with engineering.

Website 3SR lab : <http://www.3sr.hmq.inpg.fr/3sr/>

### **Research experience**

The research associated with this position mainly deals with activities linked to dynamical behaviours of structures as well as divided media or cohesive porous media, in which microstructures can be ordered (architected materials, polycrystals, cellular media, textiles, composites...) or disordered (powders, wools...).

The research approaches correlate, by theoretical and/or experimental and/or numerical techniques, the vibrating behaviour analysis to the possible effects on structures degradation or on impact behaviours related

to contact or impact mechanics. The research field is mainly focused on the behaviour of structures under dynamic loadings at time (frequency or energy dependent behaviour) and on the relations between the internal structures of material and the global behaviour of structure (influence at the meso-scale or macro-scale level).

The numerical tools and methods fall within finite elements or distinct element methods in which dynamical effect will have to be considered.

The prospective theoretical approaches are phenomenological approaches or homogenization techniques.

The experimental facilities include installations with quasi-static and dynamic mechanical testing devices. Concerning material testing at high strain rate, representative equipments include: high velocity loading with shock (12 m/s; 400 J); dynamic material testing system DMA (100 Hz, -150°C / 500°C); rotating beam testing system.

These aspects mainly concern the research axes developed in the teams CoMHet and 2MSMC in 3SR Lab. An extensive experience in mechanical testing and/or numerical simulations in solid mechanics will be appreciated. Capacity to the development of original experimental devices and interest in new application fields will be important assets.

**Keywords :**

Materials Engineering  
Mechanical engineering  
Finite Element Method  
Dynamics of structures and materials