RECRUITMENT OF ASSOCIATE PROFESSORS 2020 SESSION

Grenoble INP, Engineering Institute of the Univ. Grenoble Alpes, labeled Initiative of Excellence, is a public institution offering engineering courses with solid basic scientific content, a high technological specialization in connection with strong societal challenges related to digital, industrial, environmental and energy transitions. and a major internationalization of its courses. Grenoble INP employs more than 1,200 people (associate and full professors, lecturers, administrative and technical staff) and has 5,500 students in its 6 engineering schools (Ense3, Ensimag, Esisar, GI, Pagora, Phelma) and the Prépa des INP. From 2020, Polytech Grenoble and Grenoble IAE join Grenoble INP and considerably expand its training offer. Grenoble INP is recognized in national rankings as one of the leaders in engineering with international visibility. It is member of international engineering networks as well as the European university UNITE!.

Grenoble INP is a mother institution of more than 30 research laboratories, some of them international, and platforms where state-of-the-art research is carried out to develop knowledge, promote it to our industrial partners and transfer it to students. Grenoble INP is thus at the heart of the technological challenges of the future: Energy and materials; Digital sciences; Micro nanotechnology; Future industry and eco-efficient production in which international rankings recognize it as a leading player.

POSITION DESCRIPTION

Short profile : (150 caractères max) - **Distribution and use of electrical energy**

Teaching activities on: electrical power generation systems, network modeling and operation, micro / smart grids, electrical energy conversion. Active role in M1 and M2 specialities of ENSE3 engineering school and its attached international / advanced masters.
Research: Multiscale and transverse modelling for the study of the resilience of grids

Category : MCF   (Associate Professor)

Job number : 63 MCF 0609

Field of expertise :
Section 1 : CNU 63
Section 2 :

Recruitment date : 01/09/2020

Location : Grenoble

Restricted regime area (ZRR) :   **YES**   ~~NO~~
(French governmental protection of scientific and technological research program)

Key words : microgrids, power grids, intelligent instrumentation systems, distributed and/or multi-scale time modeling, transverse models

School: Grenoble-INP - ENSE3
School website : **http://ense3.grenoble-inp.fr/**
Contact persons : **pascal.tixador@grenoble-inp.fr**

Facing the challenges related to the energy transition and its impact on the management, production and use of electrical energy, Grenoble INP-Ense3 offers a position of assistant professor with a broad profile in electrical engineering.
Teaching activities will take place at Ense3 school and will be concerned with the 3 years of the engineering school.
The applicant recruited will be in charge of various electrical energy courses over the three years mainly in:
1. M1 and M2 specialised curriculum entitled: "Electrical Power Engineering", "Energy Systems and Associated Markets",
2. International or advanced Masters entitled: "Smart Grids and Buildings", "Energy Management and Marketing" as well as "Energy and Environmental Transition of Territories",
3. the apprenticeship training.
The applicant recruited may also develop training for professionals.
Teaching topics will include electrical power generation systems, network modeling and operation, micro / smart grids, electrical energy conversion.
The person recruited will take part in the cross-curricular courses of the school, notably in the supervision of student projects (engineering, industrial or research projects in 2nd and 3rd years), but also in the innovative activities (creativity, innovation, learning by problem, Fablab, ...).
He/She will participate in the evolution and creation of new courses, of practical session, in connection with several unique platforms of the Ense3, such as PREDIS, MHI, PDE…
As Ense3 has a strong international dimension, the person recruited will have to integrate some aspects of interculturality. Given the increasing trend to make courses international at ENSE3, the ability to teach in English and a significant international experience will be key assets.

Research laboratory: G2ELAB (UMR 5269 Grenoble-INP, UGA et CNRS)
Web site : http://www.g2elab.grenoble-inp.fr/
Contacts *:* **Nouredine.Hadjsaid@g2lab.grenoble-inp.fr**

The G2Elab covers a wide spectrum of expertise in the field of Electrical Engineering Research. Its action can be summarized by the following keywords: electrical energy, materials, innovative processes and systems, modelling and design. The work developed ranges from basic "upstream" research to the "downstream" field with a strong involvement in collaborations with actors in the socio-economic sector. With more than 100 permanent staff, 110 doctoral students and 50 masters, G2Elab is a major player in these fields at the national and international level.

Research Profile :

To effectively participate in the energy transition and decarbonization of our energy mix, the massive introduction of renewables-based electricity production systems (RES) into the power grids is a major challenge from the point of view of resource conservation and sustainable development. Nevertheless, these productions, which are often of a variable nature and connected to the grid via power electronic conversion devices, lead to a decrease in overall inertia, which has an impact on the resilience and stability of the entire system. This is one of the key factors limiting the penetration of renewable energy production into the electricity networks at significant rates and thus moving towards safer and more carbon-free electrical energy.

The research areas to be developed concern a breakthrough in the modelling of electrical power systems in order to increase the speed of response of real-time network management systems to various disturbances and their experimental validation at the laboratory level. The candidate should therefore focus on developing the following axes:

- Distributed and/or multi-time scale modelling: for the needs of local grid management of electrical distribution networks, it is possible to consider moving to distributed modelling using a multitude of models, each describing a part of the system. Particular attention will be paid to solutions that make it

possible to construct a "virtual inertia" reproducing the behaviour of synchronous machines (VSG: Virtual Synchronous Generator) of the system comprising RES connected to the electrical grid through power electronics devices.

At the temporal scale, we can consider a multi-scale modeling of the grid where we adapt the finesse of the models according to the needs, thus the dynamics of the phenomena occurring in real time. It is also possible to add a spatial dimension where only part of the grid can see its model change if the dynamic phenomenon is confined to that part.

- Experimental validation of the concepts developed in the previous axes: the G2Elab has valuable experimental resources among its technological platforms at the PREDIS centre. These include the "microgrid and decentralized generation" platforms, "Power-Hardware-In-the-Loop (PHIL) hybrid real-time dynamic simulation" and "Monitoring and Intelligent Housing". All these means can be used to validate multi-scale modelling approaches and solutions for reproducing virtual inertia. Nevertheless, a reflection on the development and coordination of these experimental means will be necessary. The goal here is to set up the tools that will allow an efficient and effective comparison of the models developed and experiments representative of the electrical system.

The assistant professor will join G2Elab laboratory, which has a strong experience in electrical systems and networks through the SYREL team. The first French academic research team on electricity networks founded 3 decades ago, has become known at a European and global level thanks to a strong and original scientific activity focusing on the modelling and resilience of grids. It has also forged strong international partnerships in Europe through the participation and leadership of many European contracts. It has also established unique industrial relations around structuring projects such as the IDEA economic interest grouping for 13 years, the Excellence Industrial Chair on Smartgrids with ENEDIS, the joint research team with CEA LITEN,, ITE SUPERGRID, and the Smart Grids Institute.

The associate professor will have solid experience in research in the field of grids. He (she) will join the SYREL team of the G2Elab and will put his (her) knowledge at the service of new approaches for the modelling and optimization of electrical power systems. He/she will also be sensitive to experimental validation approaches.

The excellence of the applicants' research activities must be certified by recent publications in high quality international journals or conferences in their field.

PARTICULARITIES AND CONSTRAINTS

Please consider teaching and research profiles.

HOW TO APPLY

Online application must be done on the website Galaxie from february the 25th 2020, 10 am (GMT+1) to april the 09th 2020, 16 pm (GMT+1). Postal applications won't be accepted.

The interview will include simulation/situational exercises. The interview will be held in French; a part of it could be held in English. Further information will be provided with the letter of convocation.