

FACULTY RECRUITMENT PROFILE
Assistant Professor
(EM2C Laboratory / Energy department)

Title: *Modeling and numerical simulation of transport in porous media.*

Position: Assistant Professor at *Energy* Faculty at CentraleSupélec, Paris-Saclay Campus / (EM2C Laboratory UPR CNRS 288).

CNU Section: 62.

Domain: The research profile concerns modeling and numerical simulations of transport phenomena in complex porous structures whose morphology can be time-dependent.

Keywords: Porous media, heat and mass transfer, reactive transport, macroscopic modeling, DNS, fluid-porous interface, effective properties.

CentraleSupélec is a public scientific, cultural and professional institution (EPSCP in French) under the authority of the Ministry of Higher Education and Scientific Research and the Ministry of the Economy, Industry, and Digital Technology. Its primary missions are the training of high-level scientific general engineers, research in engineering and systems sciences, and executive education.

The Energy Faculty is an academic department at CentraleSupélec whose educational scope covers the fields of fluid mechanics, combustion, heat, and mass transfer for the 3-year CentraleSupélec Engineering Program. The department also manages a specialized Masters for CentraleSupélec.

The EM2C Laboratory is a joint CNRS-CentraleSupélec unit. The main areas of research include combustion, plasma, heat and mass transfer; applied mathematics; transport in porous media. These activities are organized around targeted themes: *energy, space, transport...*

Academic profile:

The candidate will be part of the Energetics Faculty. He/she will engage with courses on transfer science, thermodynamics, reactive flows that form part of the CentraleSupélec engineering program. The person recruited must be capable of teaching the fundamental disciplines of the field in English at postgraduate level to audiences of 20 to 100 students with heterogeneous backgrounds within the CentraleSupélec engineering cycle and in connection with the Masters of the Graduate School of Engineering and Systems Sciences of the University of Paris-Saclay. In particular, it will be necessary to be able to deploy pedagogies adapted to the diversity of the students trained. In addition to scientific and pedagogical skills, it is expected to have the ability to interact with actors from the socio-economic world to coordinate the teaching of situational simulation combining technical complexity and management of large-scale projects. Part of the activity also consists of accompanying students in the construction of their professional project and the discovery of industrial sectors within the major *Construction, City, and Transport or Energy* sectors of the engineering curriculum. Candidates are expected to be highly autonomous in their teaching and to be able to interact with lecturers from other departments in order to create multidisciplinary teaching activities that are accessible from the first year of engineering studies. As some of these courses are taught in English, the ability to teach in English is expected.

Research profile:

The research activity of this assistant professor position concerns 'Transport Phenomena in Porous Media', a research program developed within the «Thermal Sciences» team of EM2C laboratory at Centrale-Supélec. This scientific activity is characterized by its transversal nature, where the practical applications concern the challenging sectors of energy, environment, transport, health, and the food industry. Therefore, a large number of the

associated research studies are developed at the interface between various disciplinary fields where heat and mass transfers can be associated to reactive or bio-reactive mechanisms (pyrolysis of the biomass, biofilms, bone growth) or situations involving a change of phase (solidification, dissolution).

The multi-scale nature of the physical problems imposes macroscopic representation, and one of the main challenges lies in the determination of effective transport properties. This point is particularly critical for configurations involving fluid/porous interfaces, evolving porous structures, turbulent flows, or radiation heat transfer.

The candidate will have good expertise in modeling (upscaling) and numerical simulation of transport phenomena in porous media in order to deal with some of the above challenging problems. He should be autonomous but able to work in close collaboration with other members of the team.

Recruitment interview:

For the candidates selected for the audition, the audition will take place in three stages:

- A presentation of the candidate's background and integration project;
- An illustration of a 5-minute lesson, given in English, on a problem, whose subject is identical for all candidates, will be specified on the invitation;
- An exchange with the members of the committee.

The duration of the three parts of the audition will be specified in the invitation letter.

Contacts:

Sebastien Ducruix, Director of EM2C Laboratory, sebastien.ducruix@centralesupelec.fr

Franck Richecoeur, Director of Energy Faculty, franck.Richecoeur@centralesupelec.fr

Benoit Goyeau, Responsible of the research activity "transport in porous media", benoit.goyeau@centralesupelec.fr

For all administrative information, please contact the Department of Human Resources:

Lorraine Maret: lorraine.maret@centralesupelec.fr

Marion Taupin : marion.taupin@centralesupelec.fr

Documents to be provided: (all documents must be uploaded to Galaxie no later than the closing date for registration, please refer to the ANTEE module user guide):

- a copy of a photo ID;
- a document proving possession of one of the documents mentioned in 1° of article 46 of the above-mentioned decree of 6 June 1984;
- a curriculum vitae giving an analytical presentation of their work, works, articles, achievements and activities, specifying those attached;
- a copy of at least one of the works, works, articles and achievements among those mentioned in the curriculum vitae;
- a copy of the defense report of the diploma held, if applicable.

Administrative documents in a foreign language must be translated into French.

GALAXIE portal link:

https://www.galaxie.enseignementsup-recherche.gouv.fr/ensup/cand_postes_GALAXIE.htm