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Opening position for a Researcher
Numerical modelling in geotechnics

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Field : Geomechanics
Domain of expertise : Numerical modelling
Employer : École des Ponts ParisTech
Research unit : Laboratoire Navier (UMR 8205, Ecole des Ponts
ParisTech/IFSTTAR/CNRS)
To apply : http://www.enpc.fr/lecole-recrute-offres-demploi?intuition_id=112368

École des Ponts ParisTech, created in 1747 under the name École Royale des Ponts et
Chaussées, is a higher education establishment that trains engineers to a high level of
scientific, technical and general competency. Apart from civil engineering and spatial
planning, historically the source of its prestige, the School develops high-quality programs
and research associated with the energy transition.

Laboratoire Navier is a joint research unit between the Ecole des Ponts-ParisTech, IFSTTAR
and CNRS (UMR 8205). Laboratoire Navier gathers about fifty permanent scientists and
general skills in the mechanics and physics of materials and structures and in geotechnics.
Research topics relate to civil and environmental engineering, sustainable development,
energy and transportation. Applications concern the eco-design of structures and building
materials, sustainability and engineering of materials and structures, geotechnical structures,
energy related geomechanics (geological storage, petroleum engineering), mitigation of
natural and human-induced hazards.
In the quest of the mechanical and physical laws relative to these issues, the approaches are
both theoretical, numerical (upscaling, discrete element modelling, finite elements, …) and
experimental. They are worked out using large facilities (Nuclear Magnetic Resonance
Imaging, X ray tomography, Annular Simple Shear Apparatus, Calibration chamber…) and
demonstrators (compsite structures, grid shells, …).
Laboratoire Navier also develops teaching activities in mechanics, physics and geotechnics.
The research laboratory is organized in four research teams, among them the Geotechnics
Group (CERMES) with the support of three technical teams and one administrative team.

The Geotechnics Group performs theoretical, numerical experimental researches in soil and
rock mechanics with applications in civil, environmental and petroleum engineering and
natural hazards prevention. Research performed in the group covers on one hand laboratory
and in situ testing of soils and rocks and on the other hand the modelling of the behaviour of
soils, rocks and geotechnical structures in a thermo-hydro-chemo-mechanical framework.
Research topics are commonly developed through public and industrial partnerships
(ANDRA, EDF Energies Nouvelles, SNCF, Société du Grand Paris, Tunnel Euroalpin Lyon
Turin, Tractebel Engineering, Total…).
The design of geotechnical infrastructures submitted to complex loading conditions (cyclic,
seismic, thermo-hydro-mechanics…) requires a good understanding of the governing
mechanisms of interaction between the structure and its surroundings. This is the case for the
safety of sensitive structures (e.g. nuclear power plants) under seismic loading, the
sustainability of offshore structures (e.g. offshore wind turbine) under the action of the wind
and the waves, the underground infrastructures (e.g. tunnels in urban environment) and their
impact on existing buildings, the durability of transport structures (e.g. railway and road

embankments) under the effect of climate change, the geotechnical design of shallow geothermal systems (e.g. geothermal pile foundations) considering the effect of thermal cycles. The detailed analysis of the coupled response of a geotechnical structure and of the surrounding ground and the development of advanced modelling tools are a key research topic of the Geotechnics Group.

Job description
The successful candidate will develop research in numerical modelling of soil-structure interaction under complex loadings including dynamics. Fundamental and numerical studies will be developed in relation with experimental studies performed in Laboratoire Navier and by outside partners. In addition to the development of classical techniques for numerical modelling of materials and structures (FEM, BEM, FFT, …), the valorization of big data gathered from the monitoring of geotechnical structures will be a priority area of research. This includes the development of new tools based on artificial intelligence systems for modelling and design in geotechnics.
These research activities will make use of advanced numerical methods and will be oriented towards applications to underground structures, foundation engineering, resilience of geotechnical structures, effect of multiphysics couplings on the behavior of geomaterials (partial saturation, thermal effects, …).
The selected researcher will show a strong commitment in developing industrial partnerships and in setting up European and national research projects. He will also participate to consultant and expert activities in geotechnics.

Applicant's profile
Outstanding candidates with a strong background in numerical modelling and in the fundamentals of geotechnical engineering are encouraged to apply. Expertise in dynamics, probabilistic approaches, multiphysics couplings will be highly appreciated. They must have a PhD (or equivalent) in a subject relevant to numerical modelling in Mechanics and Geotechnical Engineering, together with a track record of high quality research activity demonstrated by the publishing of technical papers in leading international peer-reviewed journals.
Applicants should have the ability to work in a team and to develop research networks with other research national and international institutions. They should have an ability and a willingness to seek external funding from Research Councils, EU and Industry. A good knowledge of English both written and spoken is essential.
The successful candidate will have to obtain the *Habilitation à Diriger des Recherches* (HDR) within a time frame of 5 years.