1 ERC POST-DOC POSITION IN "EXPERIMENTAL GEOMECHANICS FOR INDUCED SEISMICITY AND CONTROL"

AVAILABLE POSITION

The appointment forms part of the ERC-CdG project "Preventing human-induced seismicity to fight climate change" (INJECT), funded by the European Research Council (ERC). The research will be conducted at ENSTA Institut Polytechnique de Paris. The position provides the opportunity to work on a challenging and impactful research topic. The knowledge, innovation, and skills developed through this role will provide excellent prospects for career growth in both industry and academia.

RESEARCH CONTEXT AND PROJECT SUMMARY

Climate change poses an imminent threat to our civilization. Prominent new technologies to fight climate change involve the earth's underground renewable and sustainable energy resources and underground storage. However, all these technologies depend on the injection of fluids into the earth's crust, which, in turn, can cause significant earthquakes. INJECT will solve this problem on the basis of a new, ground-breaking scientific method that will prevent human-induced seismicity and will maximize energy production and storage from renewable and sustainable natural resources.

INJECT's interdisciplinary methodology is based on an astute scientific programme that brings control theory and mathematics to the heart of this new challenging problem. Based on cutting-edge theoretical developments, robust controllers and observers will be designed to optimally adjust fluid injection rates, prevent induced seismic events over large regions and optimize energy production and storage. INJECT's innovative theoretical methods will be thoroughly tested through high-fidelity numerical models that will account for poro-elasto-dynamics, Coulomb friction, multiphysics and reduced-order modeling. The experimental plan will build on demonstrators and hybrid lab-computer testing for testing the theory.

For more details: https://cordis.europa.eu/project/id/101087771
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DESCRIPTION OF THE POSITION

The research topic focuses on the development of innovative devices designed to replicate and control induced seismicity within a laboratory setting.

As a Post-Doc Researcher, you will play a leading role in designing and constructing innovative demonstrators tailored to INJECT's methodology. This opportunity encompasses the entire chain of development, i.e. from conceptualizing ideas to assembling and rigorously testing advanced laboratory prototypes for geomechanical experiments. Your expertise in mechanical design, material engineering, sensor and controller integration, data analysis, and numerical modeling will be essential in developing state-of-the-art tools for the needs of INJECT. The ultimate goal is to replicate and control analog earthquake instabilities caused by fluid injections in a controlled laboratory environment, paving the way real-world applications.

REQUIREMENTS

Successful candidates are expected to have strong scientific skills and high motivation. Fluency in spoken and written English is mandatory.

The candidates will carry out research, develop experimental devices and tools, and write scientific articles in close collaboration with the project's PI, Pr. Ioannis Stefanou, and the members of the INJECT group.

The candidate is expected to have:

- Strong background in experimental testing and design (e.g. in Geotechnics/Geophysics/ Geomechanics).
- Interest in numerical modeling, mechanical design and electronics.
- Organization skills and rigor.

It will be highly appreciated:

- Use of industrial design software.
- Skills in Python.
- Experience in a lab and team skills.
- Good knowledge of physics/mathematics/mechanics.

CONDITIONS OF EMPLOYMENT

The appointment is for a duration of two years. The successful candidate will be appointed by ENSTA Institut Polytechnique de Paris (ENSTA IP Paris) and will join the INJECT research group within the IMSIA laboratory. They will be based at the Mechanical Hub building, a collaborative space housing leading research laboratories specializing in solid mechanics, fluid mechanics, and living mechanics from École Polytechnique and ENSTA IP Paris.

The research team provides an engaging and collaborative research environment, access to state-of-the-art research facilities, and opportunities for professional development and collaboration.

In addition to conducting research, the position offers opportunities for engaging in academic activities such as supervising Master's and undergraduate students. The project also includes funding for travel to international conferences and research visits, fostering collaboration and the dissemination of findings within the global academic community.

APPLICATIONS

The position is open and will start upon agreement.

Suitable, **highly-motivated** candidates should send an application (including a CV, a cover letter describing interests and qualifications related to the offered position and contact details of two reference Professors, all compiled in a single PDF file) to ioannis.stefanou@ensta.fr. Candidate selection will be performed on the basis of the excellence of the CV and motivation.