

## **1 ERC POST-DOC POSITION IN “DESIGN OF EARTHQUAKE CONTROL STRATEGIES”**

(GEM LABORATORY, ECOLE CENTRALE DE NANTES, FRANCE)

### **AVAILABLE POSITION**

The appointment forms part of the ERC-StG project “CoQuake” (Controlling earthQuakes, <http://coquake.eu/>), funded by the European Research Council (ERC, <https://erc.europa.eu/>). The position offers the possibility of working on a challenging and stimulating research topic. The knowledge, innovation and skills to be developed will open perspectives for career development.

### **RESEARCH CONTEXT**

Earthquakes are responsible for more than half of the total human losses due to natural disasters (see CRED). CoQuake explores an alternative, ground-breaking approach for exploring the possibility of avoiding earthquakes in the future by inducing them at a lower energy level and mitigating seismic risk.



For more details: [https://cordis.europa.eu/project/rcn/212726\\_en.html](https://cordis.europa.eu/project/rcn/212726_en.html)  
<http://coquake.eu/index.php/publications/>

### **DESCRIPTION**

The research topic is on “*Design of earthquake control strategies*”.

Inspired by real, well-documented systems of faults, a large-scale numerical model of a fault system will be first studied and simulated in this subtask. Then based on the mathematical Theory of Control the stabilization of the system will be explored.

Real parameters for the geometry of the main faults, the stresses and the far-field tectonic plate movement will be extracted from available literature in order to account for the necessary physics and real conditions. Classical (e.g. Coulomb and Rate and State Friction) and advanced frictional models involving Thermodynamics-based Machine Learning, developed in other tasks of CoQuake, will be used into the large-scale numerical model. Robustness of the approach and discrete time dynamics will be studied.

### **REQUIREMENTS**

Successful candidates are expected to have strong scientific skills and high motivation. Fluency in spoken and written English is highly advantageous. French is not required, but is appreciated.

The candidates will carry out research, develop tools and write scientific articles in close collaboration with the project’s PI, Pr. Ioannis Stefanou, and the members of CoQuake group at the Ecole Centrale de Nantes (GeM & LS2N laboratories).

The candidate is expected to have:

- Knowledge of the mathematical Theory of Control.
- A strong background in numerical modeling in dynamics (e.g. Finite Elements, Boundary Elements, Spectral Methods).
- Skills in programming (e.g. Python).

Knowledge of:

- Mechanics, Geomechanics or Geophysics.
- Dynamical systems and bifurcation theory.
- Machine Learning.

will be highly appreciated.

## CONDITIONS OF EMPLOYMENT

The duration of the appointment is two years.

Personal initiative and independent research tasks related with the candidate's interests and CoQuake project will be encouraged. Other activities will include PhD supervision and interaction with Master and undergraduate students.

The project will cover travel expenses for attending international conferences and making research visits.

The successful candidate will a) be part of the CoQuake research group in GeM laboratory (<https://gem.ec-nantes.fr/>) of the Ecole Centrale de Nantes, which gathers nearly 230 people (including 75 researchers, approximately 120 PhD students and Post-Docs and 35 technical and administrative staff), who work in the areas of mechanics and physics of materials, structures and geomaterials, and their applications and b) will collaborate with colleagues in LS2N laboratory (<https://www.ls2n.fr/>) of the Ecole Centrale de Nantes (<https://www.ec-nantes.fr/>).

## 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@ec-nantes.fr](mailto:ioannis.stefanou@ec-nantes.fr). Candidate selection will be performed on the basis of the excellence of the CV and motivation.



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