# Postdoctoral Position: reactive transport modelling in fractured media applied to uranium and hydrogen recovery (M/W) (F/H)

**HIRING DATE 01/01/2027** **LOCATION** 77300 FONTAINEBLEAU, ÎLE-DE-FRANCE 77300
**SCHOOL MINES Paris - PSL**

## WORKING ENVIRONMENT AND CONTEXT

Notre établissement fait partie de l'Université PSL. Située au cœur de Paris, celle-ci fait dialoguer tous les domaines du savoir, de l'innovation et de la création. Classée parmi les 50 premières universités mondiales, elle forme au plus près de la recherche des chercheurs, artistes, ingénieurs, entrepreneurs ou dirigeants conscients de leur responsabilité sociale, individuelle et collective.

**HOSTING STRUCTURE**

Mines Paris-PSL is one of the most prestigious engineering schools in France. Mines Paris-PSL is a public institution that trains generalist engineers through an innovative and multidisciplinary educational approach (engineering sciences and social sciences and humanities). Its affiliation with PSL University, which ranks among the top 50 in international rankings, represents a real opportunity to enrich academic paths.

# TEACHING MISSION

Team / Department: Geosciences and Geoengineering Department/MAGIE Team (Modeling Applied to Geochemistry for Industry and Environment)

**Your environment:**

The energy transition relies on numerous applications involving extensive use of the subsurface, such as geothermal energy, gas storage, CO2 sequestration, and mineral resource extraction. Most of these applications depend on fluid circulation within geological formations, which may be highly fractured. Modeling fluid dynamics in fractured reservoirs represents a major challenge in terms of predictive capability. Some applications involve chemical interactions between water and rock, such as uranium (or other metals) recovery through in situ recovery methods (Lagneau et al. 2019) or stimulation of hydrogen production (Osselin et al. 2022). In fractured environments, the efficiency of producing these resources (U, H2) is strongly controlled by fracture characteristics.

The MAGIE team at the Centre for Geosciences has developed recognized expertise in reactive transport modeling through the Hytec software tool (van der Lee et al. 2003), applied to a wide range of issues. Among these, in situ uranium recovery has been the subject of several publications. Hytec includes a general dual-porosity module, opening the possibility of extending its application to fissured and fractured media (Socié et al. 2023).

**Your challenges and responsibilities:**

The objective of the postdoctoral project is to further develop this tool in order to improve the modeling of hydrogeochemical processes in fractured environments across different applications.

The first objective of the postdoctoral work is to enhance Hytec to improve its performance in modeling fluid migration in fractured media. A literature review will be conducted to identify the most relevant modeling approaches. In parallel, the existing dual-porosity module will be further investigated and developed to assess its relevance and its ability to accurately represent the processes involved.

The second objective is to apply the developed approach to the team’s different research themes. In particular, interactions with two ongoing PhD projects — one focused on hydrogen (H2), the other on in situ recovery in fractured environments — will also allow the successful candidate to develop skills in scientific supervision.

# RESEARCH MISSION

# SKILLS

**Let's talk about you !...**

The main skills required for this post are :

· Knowledge and skills :

Early-career PhD graduate with demonstrated expertise in hydrogeological modeling.

Experience in modeling fractured media (e.g., geothermal systems) and/or geochemistry would be considered as strong asset.

· Soft skills :

Strong motivation for team work with the industrial partners.

**...And about us ! Working at Mines Paris - PSL also means** :

· Joining a prestigious institution with a rich history

· Playing a part in the digital transition and the transition to carbon

neutrality to tackle the climate emergency

· Belonging to PSL University, ranked 33th in the Academic Ranking of World Universities

Mines Paris - PSL is committed to supporting and promoting equality, diversity and inclusion through an open and transparent

recruitment process.

Mines Paris - PSL is also committed to promoting the professional integration and career development of people with disabilities.

**NON DISCRIMINATION, OUVERTURE ET TRANSPARENCE**

Notre établissement, comme l'ensemble de l'Université PSL, s'engage à soutenir et promouvoir l'égalité, la diversité et l'inclusion au sein de ses communautés. Nous encourageons les candidatures issues de profils variés, que nous veillerons à sélectionner via un processus de recrutement ouvert et transparent.

# CONTACT

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# OTHER INFORMATION

Recherche principal : **Géosciences** Recherche secondaire : **Hydrologie**
Durée du contrat12 mois

**Experience years**
**1 à 4 années d'expérience (R2) an**

**Reference**
**nuo85z6no2**

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