# Postdoctoral fellowship (1 year)

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| **Title** | **Discrete numerical simulation of bonded granular materials as a model for hydrate-bearing sands** |
| **Laboratory** | Laboratoire Navier (http://navier.enpc.fr) |
| **University** | Ecole des Ponts ParisTech, Université Paris-Est |
| **Starting date** | October 2018 |
| **Funding** | Project HYDRE (ANR-15-CE06-0008), 1 year |
| **Supervision** | Jean-Noël ROUX, Anh Minh TANG, Jean-Michel PEREIRA |

## Project description

While gas hydrates (mostly methane) present in solid form within permafrost or continental margin sea floors are an attractive energy ressource, their dissociation caused by pressure or temperature changes may trigger catastrophic mechanical instabilities or massive greenhouse gas releases. The proposed postdoctoral internship is part of project HYDRE, funded by the French National Research Agency (ANR) on the mechanical behaviour of hydrate-bearing sediments, as studied at different scales. It aims at the understanding of the basic mechanisms by which an interstitial solid material within the pore space of a granular material affects its mechanical properties. The interstitial material may gradually invade the pore space, dissolve due to change of thermodynamic conditions, or break under mechanical load. It may also assume different geometries (intergranular bonds, surface coating, disconnected inclusions). Such model materials will be dealt with by grain-level (discrete element or DEM) simulations, exploiting local numerical tools and know-how. Usual DEM approaches may be supplemented by static methods appropriate for solid networks. By focussing on simple models, one expects to identify generic mechanisms and to be able to test existing models and homogenization approaches. Numerical observations will be confronted to experimental ones (mechanical tests, X-ray microtomography) carried out in the same laboratory.

## Candidate profile

The position is open to candidates with a PhD in mechanics, physics of materials, civil engineering or geosciences, with some familiarity with disordered material modeling and some practice of discrete numerical simulations.

## Application

Candidates should send a CV, a letter of motivation, and letter(s) of recommendation, preferably before June 30, to Dr Jean-Noël ROUX, email: jean-noel.roux@ifsttar.fr

http://www.agence-nationale-recherche.fr/en/anr-funded-project/?tx_lwmsuivibilan_pi2%5BCODE%5D=ANR-15-CE06-0008