



Offre de thèse / Thesis offer

MSCA Cofund - MISCEA

Template EURAXESS

Note for laboratories/potential supervisors : only fill in the *green and italic parts*

Job Information

Organisation/Company : **Ecole nationale des ponts et chaussées (ENPC)**

Department : *Laboratoire Navier*

Research Field : *Geotechnical engineering, Soil Mechanics*

Researcher Profile : **First Stage Researcher (R1)**

Country : **France**

Type of Contract : **Temporary**

Job Status : Full-time

Is the job funded through the EU Research Framework Programme? : **Horizon Europe (HE) / Marie Skłodowska-Curie Actions COFUND**

Is the Job related to a staff position within a Research Infrastructure? : **No**



Offer Description

Thesis offer :

Sustainable geotechnical foundations for energy transition: design of reused foundations and foundations for light structures

Context and Motivation

The global push for energy and ecological transitions requires innovative solutions to reduce carbon emissions across all sectors, including civil engineering and geotechnics. Traditional geotechnical practices, particularly in foundation design, often rely on resource-intensive materials (e.g., concrete, steel) and methods that contribute significantly to greenhouse gas emissions. To align with sustainability goals, rethinking foundation design is necessary. Two complementary approaches are considered in this project:

- 1. Reuse of existing foundations to extend the lifecycle of infrastructure and minimize material waste.*
- 2. Optimized design of foundations for light structures, to ensure efficiency, durability, and minimal environmental impact.*

This PhD project aims to explore these two avenues, combining experimental, numerical, and field-scale investigations to develop sustainable geotechnical solutions that support the energy transition while reducing the carbon footprint of construction.

Scientific Objectives

The successful candidate will investigate the following key research questions:

1. Reuse of existing foundations

- Assess the structural integrity and load-bearing capacity of decommissioned foundations (e.g., from buildings, bridges, or industrial sites) for repurposing in new projects.*
- Propose design guidelines and adaptation strategies to safely and efficiently repurpose foundations, considering soil-structure interaction, degradation mechanisms, and long-term performance.*
- Quantify the carbon savings associated with foundation reuse compared to conventional demolition and reconstruction.*

2. Design of foundations for PV structures

- Investigate lightweight, low-carbon foundation solutions tailored to PV solar farms, accounting for variable soil conditions, wind/uplift loads, and cyclic loading effects.*
- Develop performance-based design frameworks that balance cost, constructability, and sustainability, with a focus on minimizing embedded carbon and integrating life-cycle assessment (LCA) and circular economy principles.*

Methodology

The PhD project will combine:



- Numerical modeling: Finite element analysis (FEA) to simulate soil-foundation interaction, degradation, and load transfer mechanisms.
- Field monitoring: Instrumentation and data collection from real-world sites to validate models and assess performance.
- Sustainability assessment: Use of LCA tools to quantify carbon reductions and environmental benefits of proposed solutions.

Expected outcomes

- Scientific contributions: Advancements in the understanding of foundation reuse and low-carbon design for renewable energy infrastructure.
- Practical tools: Guidelines, design charts, and decision-support frameworks for engineers and policymakers.
- Policy recommendations: Insights to inform building codes and standards for sustainable geotechnical practices.
- Dissemination: Publications in high-impact journals and presentations at international conferences.

Working environment

The PhD candidate will join a dynamic research group at Ecole nationale des ponts et chaussées (ENPC), with access to state-of-the-art laboratories, computational resources, and a network of industry collaborators. The project offers opportunities for:

- Industry engagement through a close collaboration with SETEC-Terrasol, a geotechnical engineering design office based in Paris, France.
- Professional development via workshops, conferences, and training in advanced geotechnical and sustainability tools.

Supervision

The PhD candidate will be supervised by:

Anh Minh Tang, Laboratoire Navier, ENPC (PhD director)

Charles Bernuy, SETEC-Terrasol (co-supervisor)

Interested candidates must contact the PhD director (anh-minh.tang@enpc.fr) before submitting their official application for the thesis.

Description of the project and the candidates' eligibility criteria :

This position will be part of the EU-funded project [MISCEA](#), which is an ambitious inter- and multidisciplinary Doctoral Training Network under the Horizon-Europe Marie Skłodowska-Curie Actions.

PhD candidate can be of any nationality but has to meet these eligibility criteria:

- **Not being a current employee** working at ENPC.
- Not having resided or carried out their main activity (work, studies, etc) in France **for more than 12 months** during the past 36 months immediately before the deadline of

the MISCEA Programme's call. Compulsory national service, short stays such as holidays and time spent as part of a procedure for obtaining refugee status under the Geneva Convention are not taken into account.

- **Holding a Master's degree** or having a University degree equivalent to a European Master's degree (5-year duration) at the deadline of the MISCEA Programme's call.
- Researchers must be doctoral candidates, i.e. not already in possession of a doctoral degree at the deadline of the co-funded programme's call. Researchers who have successfully defended their doctoral thesis but who have not yet formally been awarded the doctoral degree will NOT be considered eligible.
- **Signing a declaration** of the veracity of the information provided (Declaration of honour, free of form).

If you comply with the eligibility criteria and you wish to submit your application, you must :

- Contact the thesis supervisor and explain your thesis project to her/him so that she/he can validate your application.
- Submit a **5-page thesis proposal** under the proposed research areas, with the agreement of the future supervisor. Additionally, to submitting the 5-page thesis proposal, the applicant will need to complete an ethics checklist based on the ethics guidance provided in the Horizon Europe programme guide.
- **English-translated transcripts** from the master's degree or equivalent.
- **Any specific requirements of the Doctoral School** corresponding to the targeted MISCEA fellowship offer.
- English curriculum vitae, including information about the level of English language knowledge.
- A motivation letter.
- One letter of reference, at least.

Templates are available on the MISCEA website ([link](#)).

When your candidature is complete, please send inquiries and applications to miscea-program@enpc.fr





Requirements

Research Field : *Civil Engineering, Geotechnical Engineering, or a related field*

Education Level : Master Degree or equivalent

Skills/Qualifications : *Experimental work, numerical modelling, and data analysis; knowledge of sustainability metrics (LCA) and circular economy principles is a plus*

Languages : ENGLISH

Level : Excellent

Where to apply

E-mail : miscea-program@enpc.fr



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