Job offer – Post-doctorate in Geotechnical Field
(*For non-French scientists only*)

Research Project Short Title as Submitted to CEFIPRA: "GRUPROSS"
Principal Investigator contact (Name and email id): "Laurent Briançon, Directeur du laboratoire GEOMAS, INSA DE LYON, 69621 VILLEURBANNE Cedex, laurent.briancon@insa-lyon.fr"
Reference Number of the Job Offer: IFI_CEF_26_13

Project description

- **Keywords :** Geosynthetics, weak soil, reinforcement, traffic loading, numerical study

- **Context** : Molecular Poor subgrade quality is a pervasive challenge in the construction of unpaved roads. Geosynthétics have emerged as innovative solutions since their initial usage in the late 1970s. Depending on the type of GSY employed, they can fulfil one or several roles, including separation, reinforcement by tensioned membrane effects, and stabilization by interlocking and/or friction at the soil-GSY interface. Few design methods exist in the literature to quantify these mechanisms, but they have limitations due to their calibration on specific GSY and soil parameters and, at times, under static rather than cyclic loading conditions. The various factors and parameters that influence the dominant mechanism and its corresponding contribution to platform enhancement underscore the necessity for further exploration in this area.

- **Abstract of the Research Project :** The project GRUPROSS brings together the French GEOMAS laboratory, the Indian Institute of technology in Hyderabad and Strata Geosystems.

  The project GRUPROSS aims to study the response of unpaved roads constructed on soft-subgrade soil. The unpaved roads constructed over soft subgrades are prone to excessive rutting and hence to strengthen the road, base course thickness is increased which is economically not viable and not feasible due to the limited supply of natural aggregates. However, an alternative exists in the form of reinforcing the pavements using geosynthetics. In the present study, the use of biaxial geogrids and geotextiles for strengthening unpaved roads will be studied. Conventionally static plate load tests were performed on pavements to study their rutting behavior but it has a limitation since it is not able to replicate the dynamic nature of vehicular movement. A traffic accelerator simulator was designed and built at the IITH to study the response of these unpaved roads. A numerical study, calibrated on experimental results, was also conducted.

- **Scientific Objectives of the Project :** In the framework of the GRUPROSS Project, the laboratory GEOMAS propose a post-doc position to study the behaviour of granular platforms reinforced with geocells. Two PhD theses have been carried out on this subject in the GEOMAS laboratory at INSA Lyon (Khouiery 2019 with geogrids and Abou Chaz 2024 with geotextiles). These theses led to the development of a full-scale laboratory experiment to assess the efficiency of granular platforms reinforced with geosynthetics on poorly-bearing soil subjected to traffic loads. An Indian thesis follows on from previous studies with a geocell as reinforcement. Experimental tests with a traffic accelerator simulator and a numerical study with the ABAQUS software were carried out in this thesis. To transfer these results to engineering companies, it is necessary to use commercial software such as Plaxis or Flac in order to check if it is capable of reproducing the complex mechanisms developed in the reinforced platform. The objective of this project is to simulate the experimental tests with a commercial software and to compare them to ABAQUS results.

- **Methodology and Timeline of the Project :**. The candidate has to do a state-of-the-art review to well understand the subject. In particular, he (she) will search papers highlighting the capability of FLAC software to well simulate the traffic loading and the geosynthetic behavior. He (she) will work with the Indian PhD student of the GRUPROSS project to get all parameters required dor the simulation and understand how the Indian PhD student of the GRUPROSS project simulated the experimental tests with ABAQUS.

  Then, he (she) will write a program with FLAC 3D to simulate the behavior of the granular platform under traffic loads reinforced or not by a geosynthetic. He (she) will simulate the behavior of a geogrid and that of a Geocell.

He (she) will compare his/her numerical results with experimental tests and with the ABAQUS results.
December: state of the art review
January-May: numerical simulation with FLAC 3D and analysis
June-July: Report redaction and scientific paper redaction

Candidate profile

- Candidates can be all nationalities except French. In case of double nationality (French and another one), the candidate is not eligible. In the context of CEFIPRA, Indian candidates are preferred
- Applicants for post-doctorate must have a PhD degree (or be in the process of obtaining one)
- No competences in French language is required
- Candidate competences: Numerical simulation with FLAC 3D, Geosynthetic simulation, cyclic loading simulation
- Candidate know-how: State of the art review, FLAC program writing
- Expected starting date: December 2026
- Expected duration: 8 months

How to candidate?

Documents to be provided :

i. A cover letter (reasons for the candidature, professional project …) max 2 pages
ii. A copy of the master's degree or a proof of the program followed (and expected date of end) OR A copy of the PhD degree or a proof of the PhD program followed (and expected date of defense) max 1 page
iii. A copy of results for previous scholarship (max 3 pages)
iv. International curriculum vitae (max 2 pages)
v. One letter of recommendation from any Indian institution –mandatory- (max 2 pages)
vi. All should be submitted within 1 pdf file of no more than 10 pages.
vii. Applications must be submitted through this **Google Form** selecting the appropriate reference number for the job offer.

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Benefits:

- Monthly allowance of 2400 euros for Post-Doc
- Travel allowance
- University fee
- Carte de séjour fee
- Campus France management fee
- Registration to the French social security scheme

Selection process:

The final selection is made by a dedicated selection committee of scientific experts after a pre-selection phase by the French principal investigator. Decisions will be transmitted by the Embassy of France to CEFIPRA.

Criteria for applicants' selection:

Academic excellence

- Excellence of the Academic background, Academic records, Honors, Letters of support, Participation to international research projects, exchange programmes and conferences.

Motivation and qualities

- Academic maturity: appropriation of the thesis project (stakes and contexts) • Quality of the presentation (oral expression, skills for synthesis, English level) • Maturity of the professional project: capacity to project her/himself within five years in terms of career development.

About CEFIPRA:
Indo-French Center for the Promotion of Advanced Research (CEFIPRA/IFCPAR) is an Indian body which promotes scientific cooperation between France and India in advanced fields of Science and Technology. It is supported by the Department of Science and Technology, Government of India and the Ministry of Europe and Foreign Affairs of the French government