

JOB VACANCY ANNOUNCEMENT

VAC-2023-83 – Research Engineer

Number of places: 1

Category: Research Engineer – RENG 5

Workplace: Barcelona

Salary (gross): 22.886,59 €

Weekly working hours: 40h

Contract type: PRTR

Duration: Until the end of project

Functions to be developed:

Development work of GPFEM code and its application to soil-root interactions. In particular:

The modelling of the mechanical behaviour of a root or the root system architecture into the soil for the analysis of the soil stability.

The research engineer task will be to explore, test and implement the large displacement beam theory, the contact interactions with the soil and the constitutive models for the characterization of such interaction. All inside the G-PFEM framework.

For the modelling of structural roots, a hybrid solution will be explored: large roots modelled as beam elements with a covering mesh of shell elements representing the root surface. Movements on the surface mesh will be governed by point constraints (movements of beam nodes). The mesh of shell elements (representing the root surface) will be considered for the finite element interaction between the soil and the root, while the root behaviour will be represented by the deformation of a large displacement beam element.

Large roots will be also modelled as volumetric finite elements that can be linked to roots modelled by beams. Linking conditions must be developed. Adhesion with the surrounding soil and the mechanical contact conditions must be considered:

Extended developments of the current contact conditions available in G-PFEM have to be implemented to cope with these 3D contact interactions. Frictional behaviour laws representing the physics of a hydromechanical contact must be developed.

Extended developments in the constitutive models for the G-PFEM code must be implemented

All cases must face large deformations, finite strain constitutive modelling and simulate complex geometrical contacts.

Required skills:

- Familiarity with geotechnical application of the Particle Finite Element Method. C++ GPFEM code.
- Familiarity with the G-PFEM Guided User Interface.
- Experience in coding the Particle Finite Element Method, coupled problems and contact interactions.
- Experience in the implementation of large displacement plasticity models.
- Ability to communicate research findings as evidenced from a published track record

Other valued skills (not mandatory):

- Interest in pursuing a doctorate

Qualification system:

The requisites and merits will be evaluated with a maximum note of 100 points. Such maximal note will be obtained summing up the following points:

- **Publication and career track:** 15%
- **Previous research and academic experience in the field of the position:** 40%
- **Programming skills:** 25%
- **Language skills:** 10%
- **Communication/Teaching skills:** 10%

Candidates must complete the "Application Form" form on our website, indicating the reference of the vacancy and attaching the required documents.

The deadline for registration to the offer ends on January 9th, 2023 at 12 noon.

The preselected candidates may be requested to send the documentation required in the "Requirements" and "Merits" sections, duly scanned, and may be called to go through selection tests (which might be of eliminatory nature) and / or personal interviews.

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