

2004816 – Postdoctoral Research Associate in Geotechnical Engineering

1. Background & job specification

Applications are invited for an exceptional individual to join our Future Infrastructure and Environment Research Cluster as a Postdoctoral Research Associate in Geotechnical Physical Modelling, with a particular emphasis on centrifuge modelling of braced excavations. The post holder will work on the EPSRC-funded research project “Braced Excavations: what about the corners?” jointly held by the University of Dundee and Durham University and will be expected to work with other academics working on the project at both institutions. The aim of this joint project is to develop new and more accurate ways to predict ground movements and prop loads for large, braced excavations as regularly used around the world for the construction of new underground transportation infrastructure. For this specific role, the post holder will create and test models of 2- and 3-dimensional braced excavations using the University of Dundee Geotechnical Centrifuge Facility to provide validation data for numerical approaches developed at Durham University.

Braced embedded retaining walls are substantial pieces of temporary works for building deep basements and metro stations. Key issues for designers are prediction of ground movements and propping forces and while guidance exists in the 2017 CIRIA guide C760, coverage of the behaviour at excavation corners as regards both design issues is poor. There is substantial published research on the 2D modelling of braced excavations, some of it validated against field data, however accounting for 3D effects as required for the analysis of corners is rare and insubstantial. Improving our understanding of the behaviour of these corners and how it is affected by soil behaviour, system stiffness and prop loading would lead to (a) greater economy in propping schemes and (b) more certainty in the prediction of ground movements adjacent to corners, potentially reducing the accommodation works required to prevent damage to adjacent structures and the potential for insurance claims.

The successful candidate will join a stimulating, diverse and collaborative research environment as part of the Geotechnical Engineering Research Group, within the Future Infrastructure & Environment Research Cluster. Mentoring will be provided by two senior academics with strong international profiles, and the successful candidate will also have access to a well-equipped supporting soil testing laboratory, specialist technical support and numerical modelling tools. The post offers exciting opportunities to work closely with researchers at the other partner organisations during the R&D aspects of the project, as well as participation in wider collaborative research activities with other project partners and stakeholders.

2. Role Information

Role Title:	Postdoctoral Research Associate in Geotechnical Engineering
School:	Science & Engineering
Discipline	Civil Engineering
Grade/Salary:	7/ £37,474 (starting)
Terms:	Full time
Duration of employment:	Fixed-Term/Contract (36 months)

Location: The post holder will be based within Civil Engineering, School of Science & Engineering in the Fulton Building on the main City Campus.

3. Key responsibilities

Specific Duties of Post:

The post holder will be expected to:

- Develop specific apparatus and control systems for centrifuge model simulations of braced excavations with actively controlled propping.
- Design and execute scaled physical modelling experiments aligned with the data requirements of the numerical modelling work packages.
- Conduct data post-processing and analysis using appropriate methodologies and software (e.g. Excel, MATLAB, Python) to develop validation datasets for numerical modelling, and (ii) to inform the development of empirical guidance on the design of bracing systems for deep excavations.
- Contribute to the production of design guidance, in collaboration with the other investigators and researchers working on the project.
- Manage the project work at Dundee in terms of programme monitoring and financial budget control.
- Assist in external collaborative research activities (e.g. steering group meetings, knowledge exchange) and the provision of strategic research outputs (e.g. journal papers, conference presentations) aligned to the project objectives and research collaboration agreement between Dundee and Durham University and associated project partners.

Additional Duties of Post:

On top of the specific research tasks outlined above, the post holder will also be expected to:

- Write high-profile publications for peer-reviewed journals and disseminate findings at meetings, conferences, workshops and other networking events.
- Actively participate in other dissemination, reporting and knowledge exchange activities (e.g. outreach events, institutional seminar series and research away days).
- Work collaboratively with, and informally supervise, current PhD, MSc and UG project students working in related areas within the research cluster, providing assistance with their professional development, as required.
- Pursue or contribute to pursuing research funding opportunities that expand the portfolio of the research cluster, support ongoing research projects and/or exploit future funding opportunities in relevant research areas.
- Undertake administrative, School representative and associated tasks, as required.

4. Person specification

Essential Candidate Criteria:

- Completion or near-completion of PhD in a relevant discipline or area, e.g. geotechnical engineering, geotechnical centrifuge testing and physical modelling, structural engineering or civil engineering.
- Experience in designing and/or conducting experimental studies in a logical, precise and systematic manner, preferably in geotechnical engineering and/or soil mechanics.
- Experience in utilising advanced laboratory facilities and/or measurement techniques and/or development of actuation and control systems: e.g. geotechnical centrifuge, strain gauging, tactile earth pressure measurement, feedback controlled actuation systems.
- A developing track record of publishing research outcomes in high quality academic journals and/or presentations at international conferences.
- Excellent data analysis skills using appropriate software packages and/or programming languages [e.g. Microsoft Office (Excel), MATLAB, Python].
- Proven ability to generate research ideas or equipment development and implement them independently with a disciplined and methodological approach.
- Proven excellent communications skills, both verbal (including presentations) and written (including scientific journal publications).

Desirable Candidate Criteria:

- Evidence of developing advanced physical modelling, measurement and/or control system development to support experimental and laboratory studies in geotechnics and/or soil mechanics.
- Experience of developing control and/or data acquisition within the LabVIEW environment.
- Evidence of undertaking and/or successfully participating in cross-disciplinary collaborative research and working with industry.
- Experience of supporting undergraduate or post graduate experimental projects.
- Ability to show innovative thinking to advance research area and/or resolve a problem.
- Emerging track record of applying for and/or securing small research grants.

5. Application Requirements

In addition to the online form, applicants must include with their application:

- Cover letter outlining the candidate's suitability for the role
- CV with publication list
- Names and contact details of at least three referees

We ask that you do not include in your CV or application documentation any of your sensitive personal data – racial or ethnic origin, political opinions, religious or philosophical beliefs, health, sexual orientation, or biometric data.

6. Contacts

To further discuss the details of this post, informal inquiries may be made to Professor Jonathan Knappett (j.a.knappett@dundee.ac.uk)