PhD Studentship: Modelling the combined cyclic and creep behaviour of natural soils

**Application deadline:** 15 January 2018

**Start date:** 1 February 2017 preferred, alternative dates will be considered for the right candidate.

**Duration:** 3 years

Applications are invited for a PhD position in geomechanics at the School of Engineering of the University of Warwick. The research focuses on mathematical development, stress integration and numerical implementation of advanced constitutive models for soft to stiff clays, and their applications for boundary value problem simulations.

**The Project:**

Time-dependent behaviour of soils that are under cyclic loading conditions is of significant importance for long-term deformation and stability analysis of geo-structures that are subject to combined influence of soil creep and dynamic loadings, particularly offshore turbine foundations and railway embankments. The time-dependency in geomechanics is often related to soil viscosity which can lead to particular effects such as creep, stress relaxation, and strain-rate dependency of soil response. On the other hand, there are significant experimental evidence on soils hysteretic behaviour that is mainly related to non-linearity of soil response within the very small strain domain and the accumulation of irrecoverable strains under repetitive small-strain loadings. Although, in recent years considerable developments have been made on independent modelling of creep and cyclic responses in natural soils, but very few studies have focused on capturing their combined effect within a unified framework. The aim of this research project is to develop a unified cyclic-creep constitutive model, mainly for clayey soils, and validate the model at both element-level and boundary value-level simulations. The project benefits from a considerable head start as it is in continuation of on-going research in the group on advance constitutive model development and numerical implementation.

The PhD student will become a member of the Ground Engineering research group which has well-equipped research laboratory and computational facilities and carries out practical research in geotechnical engineering. Within the project, there is scope to carry out advanced element-level experiments, should the project require original data for model verifications. There will also be opportunities to present the research outputs locally and at international conferences.

**Eligibility:**

Due to funding restrictions this award is available for well-qualified UK or EU students (overseas students can apply, but need to meet the difference in costs). Other motivated students are encouraged to apply but will need to secure their own funding.

- The applicants must have a minimum of 2:1 honours degree level (or equivalent) in civil or mechanical engineering, or related subjects with relevant numerical experience. An MSc degree with distinction or equivalent, in geomechanics or computational mechanics or applied mathematics is highly desirable.
- The applicants should be able to demonstrate a strong interest in numerical modelling of soils with working experience in a programming language (FORTRAN, C++ or MATLAB); they should have excellent written and oral presentation skills as well as strong analytical and problem solving skills.

**Funding:** The studentship covers tuition fees at the UK/EU rate (£4,191* at the 2017/18 rate) and standard stipend (£14,700* at the 2017/18 rate) per annum for three years.

*Home/EU PGR tuition fees for 2017/18 onwards are subject to RCUK funding rate changes and are therefore not yet confirmed. Fees are expected to increase and the inflation rate applied by RCUK is generally expected to be in line with RPI.
How to apply:

For informal enquiries, please send a CV, a covering letter stating how your interests and experience relate to the project, your academic transcripts and the names and email addresses of two academic referees to Dr Mohammad Rezania, email: m.rezania@warwick.ac.uk.

To apply for this post you must complete the online application form and quote scholarship reference MR17.

As soon as you have a University ID number you will be invited to upload your degree certificate, transcripts, CV and a personal statement that explains your specific research interests and why you should be considered for this award.

Application Form Course Details:

Department: School of Engineering

Course Type: Research

Course: Engineering (PhD)

Application form: http://www.go.warwick.ac.uk/pgapply.