Department of Civil, Environmental & Geomatic

Eng D Urban Sustainability & Resilience

4 year tax-free stipend at £17,803pa.

In collaboration with Ramboll UK, the Department of Civil, Environmental & Geomatic Engineering has funding from the EPSRC for an EngD studentship (4 year programme) for the following project:

INNOVATIVE CONCEPTS FOR SEISMICALLY RESISTANT MUD BRICK CONSTRUCTION

Introduction

The international distribution of mud brick buildings (adobe, rammed earth and cement stabilised blocks) closely follows the distribution of earthquake zones and it is estimated that one third of the world's population live in mud brick buildings. The recent earthquakes in Iran (2003), Peru (2007) and Pakistan and China (2008) have resulted in large loss of life due to the collapse of such structures.

Wall and roof collpase at Kili Wam, Pakistan, October 2008. Courtesy of UN-Habitat, Pakistan

Recent research has developed a rigorous and scientific approach to the understanding of the engineering behaviour of this building material by viewing mud bricks in the framework of unsaturated soil mechanics. This methodology allows a much more quantitative approach to be adopted, and may allow a bridge between earthquake soil dynamics and building dynamics, which has not previously been investigated.

Collapse of adobe building corner, Cañete river valley, Peru, September 2007. Courtesy of EEFIT

This project extends this approach through theoretical and experimental investigations of the seismic performance of plain mud-brick structures and those that have been reinforced with fibres, using unsaturated soil mechanics concepts in a way that has not been done before. This project also aims to produce manuals and guidelines based on sound engineering principles, modelling and physical testing. These would then be used by field engineers and local masons in both disaster relief and long term reconstruction projects.

Methodology

- Review of the existing literature and construction techniques currently in use
- Establish links with other research groups around the world
- Develop understanding of unsaturated soil mechanics and principles of seismic engineering
- Visit regions of the world where seismic mitigation techniques have been introduced
- Develop of new theory, drawing together unsaturated soil mechanics, earthquake soil dynamics and seismic engineering
- Develop of experimental studies to verify this new theory
- Produce of guidelines to be used by field engineers

Candidate

Applicants must have at least a 2.1 degree in an Engineering, Physics or Maths discipline or an MSc or MA in a related subject. Ability to speak Spanish would be useful in collaborating with research groups in South America but it is not essential. Applicants should be curious, highly motivated, and able to work both independently and in a team.

For a place on the EngD programme, applicants must meet the EPSRC eligibility requirements. Visit this website for more information: http://www.epsrc.ac.uk/PostgraduateTraining/StudentEligibility.htm

To apply, please e-mail a short statement about your suitability for the position and your CV to Dr. Pedro Ferreira (p.ferreira@ucl.ac.uk). Successful applicants will be called for an interview as soon as possible. The application deadline will be published later.