Project proposal template
Graduate School studentships
March 2015

Project title	Dynamic Response Prediction of Above-ground/Elevated Liquid Containing Tanks
First Supervisor	Dr — Hamid Zolghadrzadeh- Jahromi
Second Supervisor	
School	Civil Engineering and Construction
Other member of supervisory team (no more than three KU supervisors in total)	
Specific requirements beyond 2:1 degree	The project will be suitable for an applicant with a good knowledge of Structural/Civil Engineering. Experience of numerical modelling and finite

Project summary **(max 4,000 characters)**

Liquid containing tanks can be extremely vulnerable under lateral dynamic loading due to their structural form. Consequently, over the past few decades, many elevated fluid tanks have been severely damaged after being subjected to strong earthquakes. Earthquake resistant design of such structures becomes vital when considering that structures such as water tanks should remain serviceable after an earthquake (controlling fires occurring during the earthquake and ensuring the supply in the affected regions, to name but a few). Accordingly, the aim of this project is to investigate the vulnerability and also the nonlinear behaviour of liquid containing tanks under extreme dynamic loading conditions.

The nature of the interactive structure, soil and fluid sub-systems in such structures defines their multi-physics features. Modelling and discretisation methods of the sub-systems can vary across a wide spectrum, depending on the physical effects to be captured. The treatment of interaction brings more challenge to the problem at different levels, including the coupling algorithms and their implementation for efficient simulation of large scale systems.

In this respect, this proposal supports multi-disciplinary research concerned with nonlinear and fully coupled modelling of structural, geotechnical and fluid sub-systems. This enables the realistic 3D modelling of Fluid-Soil-Structure Interaction (FSSI) of liquid containing tanks under dynamic loading. Building on this, novel simplified and design-oriented models for nonlinear response prediction of such structures will also be developed and investigated. A successful outcome from this project is expected to provide realistic predictive models for seismic response prediction and also assessing the structural and soil failure of liquid containing tank structures.

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