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Research Highlights

Imperial College Department of Civil & Environmental Engineering

Introduction

The Geotechnics Section is one of five constituent groups in the Department of Civil & Environmental Engineering at Imperial College London, UK. The Department has an outstanding international reputation, consistently achieving the highest rating from all previous UK Research Assessment Exercises.

The Section comprises ten full-time academics, one emeritus professor, four technical staff and one administrator. The group contributes to teaching of Soil Mechanics and Engineering Geology in all four years of a MEng degree in Civil Engineering and delivers specialist one-year MSc courses in Soil Mechanics and Engineering Geology. Our cluster of MSc Soil Mechanics courses has been running for over 60 years and is particularly valued by industry.



Figure 1. MSc students on a field course in Kent

Research Highlights (Con't)

Imperial College, Department of Civil & Environmental Engineering

The group has broad research interests, focused on understanding the mechanics, behaviour and properties of soils and soft rocks in order to provide practical solutions to industry, including tunnelling, foundations, oil and gas, offshore wind and general infrastructure. The number of research students at any time is about 30 and their work involves laboratory-based soil element testing, numerical modelling and field monitoring, which feed into each other to provide rigour and confidence in our research discoveries. Some of the major recent projects, such as Crossrail and PISA, described later, are examples of this holistic approach to research that we foster within the group.

More background information about the group can be found in <http://www3.imperial.ac.uk/geotechnics/>



Figure 2. Part of our current research group (Dec 2014), in front of the Queen's Tower

Our research facilities include:

- Soil element testing laboratory, in operation for over 60 years, with advanced equipment designed and built by our own technical and academic staff;
 - Bespoke geotechnical finite element software ICFEP, continually developed and enhanced for over 30 years;
 - Discrete element modelling, established over the last 10 years together with a new micro-mechanics laboratory;
 - Instrumented model pile, extensively applied for over 20 years in field testing and development of new pile design methods for axially loaded driven piles;
 - Ground and structural monitoring equipment, recently enhanced with optical fibre technology
-

Research Highlights (Con't)

Imperial College, Department of Civil & Environmental Engineering

Research facilities

1. Geotechnical Engineering Laboratories

The Geotechnical Laboratories at Imperial College are perhaps best known for their advanced element testing apparatus and developments in small strain instrumentation. The testing facilities have contributed to the characterisation of UK Mudrocks, prediction of tunnelling induced ground deformations and continue to develop practical design methodologies for pile design. The Geotechnical Research Group benefits greatly from the expertise of the skilled resident technical staff who aid the academic staff to develop, design, build and commission cutting-edge geotechnical apparatus. Our stress path cells, hollow cylinder apparatus and advanced instrumentation have been commissioned internationally by research institutions such as University of Bristol, Technical University of Bari and Brescia University in Italy, City University Hong Kong, Newcastle and Wollongong University in Eastern Australia. The recent refurbishment of the Geotechnical Laboratories have improved the laboratory temperature control, in addition, the modernisation of the laboratories has allowed more efficient use of the space enabling new apparatus to be designed and installed. The most recent apparatus developments include temperature controlled stress path cells, active humidity controlled chambers and “creep” cells.



Figure 3. Overview of the Main Geotechnical Laboratory



Figure 4. Stress path triaxial testing apparatus, 100mm

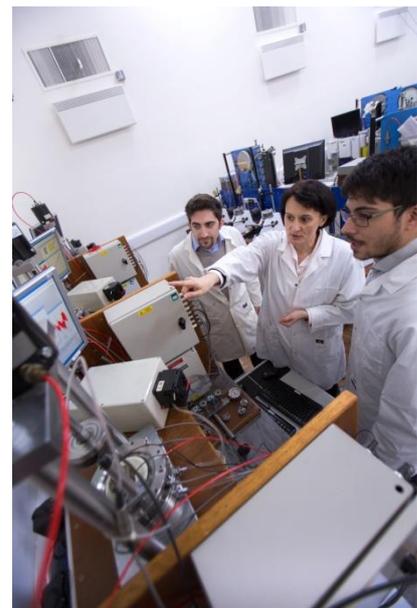


Figure 5. Refurbished laboratory environment



Figure 6. Temperature testing apparatus



Figure 7. Humidity controlled chambers

Research Highlights (Con't)

Imperial College, Department of Civil & Environmental Engineering

2. ICFEP - Imperial College Finite Element Program

The Imperial College Finite Element Program, ICFEP, has been continuously developed at Imperial College under the leadership of Prof. David M. Potts for almost 40 years, using a combination of research programmes and practical applications. The ICFEP numerical team has expanded over time and now includes Prof. Zdravkovic, Dr. Kontoe, Dr. Taborda and Dr. Tsiampousi. The adoption of a systematic development strategy has resulted in a general code for geotechnical analysis with a wide range of capabilities (Potts & Zdravkovic, 1999; 2001):

- 2D and 3D geometry with linear and quadratic elements;
- Bar, beam, membrane and shell elements for simulating structural components;
- Zero-thickness interface elements;
- Fully coupled thermo-hydro-mechanical formulation with corresponding boundary conditions;
- Partial saturated water flow and soil water retention capabilities;
- Advanced elasto-plastic constitutive models for soil and structural components, including models for cyclic loading, thermoplasticity, small strain stiffness, partial saturation, rate-dependency and creep;
- Assessment of factors of safety for any constitutive model (Potts & Zdravkovic, 2012).

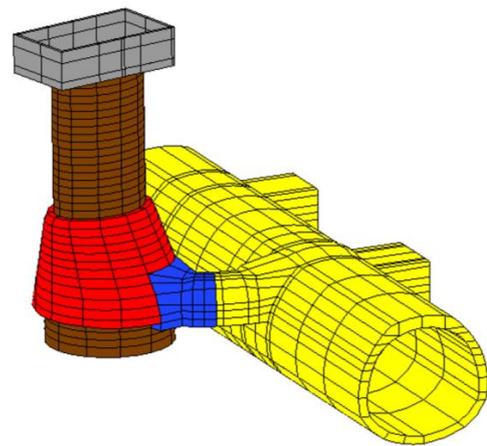


Figure 8. 3D modelling of a shaft access to an underground station (PhD project of A. Pedro, 2013)

ICFEP has been used to tackle some of the most challenging geotechnical engineering projects, including the stabilisation of the Tower of Pisa, the back-analysis of the Heathrow Express tunnel collapse and the failure of Carsington dam, the design of offshore platform foundations, the Jubilee Line extension and Heathrow Terminal 5 excavations, the prediction of tunnelling-induced ground movements due to excavation of Crossrail, the assessment of the stability of underwater slopes in the Gulf of Mexico and offshore Angola. Research output from the application of ICFEP has been recognised by many accolades, including 15 prizes and medals from the ICE and BGA, while the ICFEP research team has been distinguished by Imperial College in 2015 with the President's Award and Medal for Outstanding Research Team.



Figure 9. Heathrow Terminal 5 temporary excavations designed using ICFEP (Kovacevic et al., 2007)

Selected references:

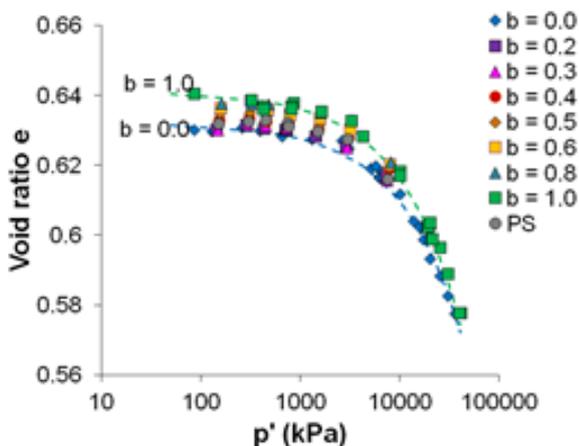
- Kovacevic N, Hight DW, Potts DM (2007) Predicting the Stand-up Time of Temporary London Clay Slopes at Terminal 5, Heathrow Airport. *Geotechnique* 57 (1), 63-74.
- Potts DM, Zdravković L (1999) *Finite Element Analysis in Geotechnical Engineering: Theory*. London, Thomas Telford.
- Potts DM, Zdravković L (2001) *Finite Element Analysis in Geotechnical Engineering: Application*. London, Thomas Telford.
- Potts DM, Zdravković L (2012) Accounting for partial material factors in numerical analysis. *Geotechnique* 62 (12), 1053-1065.

Research Highlights (Con't)

Imperial College, Department of Civil & Environmental Engineering

3. Discrete Element Modelling

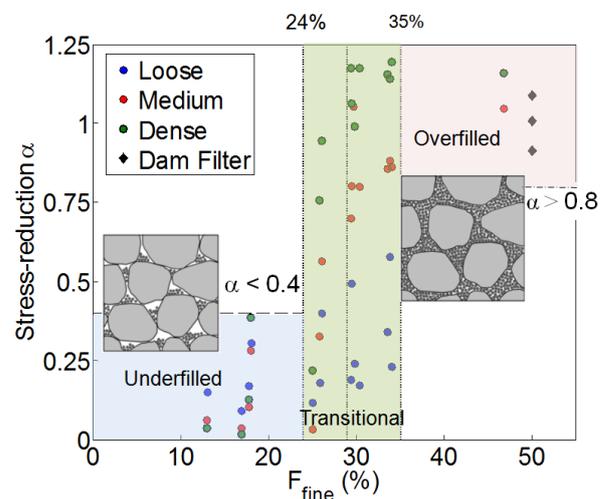
The discrete element method (DEM) enables fundamental soil mechanics research that considers the particle-scale mechanisms underlying the complexity of soil response. DEM-related research at Imperial College has focused on simulation of element tests to look at soil strength and stiffness under true-triaxial stress conditions, the internal stability of dam materials, particle crushing and shear wave propagation. Recent research has exploited the computational advantages offered by high performance computing (HPC) facilities including the UK national facility ARCHER and the Imperial College clusters cx1 and cx2.



Dependency of critical state line position on b
(Huang et al., 2014a)

True triaxial tests were simulated using an in-house modified version of the molecular dynamics code LAMMPS. Huang et al. (2014a) showed that the position of the critical state line in $e-p'$ space depends on the intermediate principal stress ratio, b . Huang et al. (2014b) found that the variation between peak and critical state strengths observed in DEM simulations quantitatively matches experimental data from Jeffries and Been (2006). These findings indicate that DEM can be exploited to develop constitutive models to consider stress states that cannot easily be achieved in physical laboratory tests.

A key mechanism enabling internal instability (a form of internal erosion) is the formation of a stress-transmitting matrix dominated by the coarse particles, which leaves the finer particles under lower effective stress. Shire et al. (2014) used DEM to revisit the earlier hypotheses by Skempton and Brogan (1994) that relate the stress reduction factor in the finer material (α) to the fines content (F_{fine}). The DEM simulation results found that the critical fines content where fines just fill voids is $F_{\text{fine}}=24-29\%$, the finer fraction separates the coarse fraction particles at $F_{\text{fine}}=35\%$ and there is a transition zone where the stress carried by the finer particles is dependent on the material density.



Selected references:

- Huang X, Hanley KJ, O'Sullivan C, Kwok CY, Wade MA (2014a) DEM analysis of the influence of the intermediate stress ratio on the critical-state behaviour of granular materials. *Granular Matter* 16, 641-655.
- Huang X, O'Sullivan C, Hanley KJ, Kwok CY (2014b) Discrete-element method analysis of the state parameter. *Géotechnique* 64(12), 954-965.
- O'Donovan J, O'Sullivan C, Marketos G, Wood DM (2015) Analysis of bender element test interpretation using the discrete element method, *Granular Matter* 17, 197-216.
- Shire, T, O'Sullivan, C, Hanley, K, and Fannin, R (2014) Fabric and Effective Stress Distribution in Internally Unstable Soils. *J. Geotech. Geoenviron. Eng., ASCE* 140(12).

Research Highlights (Con't)

Imperial College, Department of Civil & Environmental Engineering

4. Field monitoring within the Geotechnics Section

Field monitoring has been an integral part of the Soil Mechanics Section's research activities since the early 1950s primarily at that time with the instrumentation of various earth dams and slopes. Particularly important developments have been made in the measurement of pore water pressures and the design of grout needed to seal in piezometers. A major advance was made in the 1990s with the measurement of suction using the Imperial College tensiometer (probe), providing much greater insight into slope stability, equalisation of pore pressures and seasonal cyclic responses.

Building and structural monitoring is another key activity. In early years the effect of consolidation settlements on building deformations was investigated. More recently building and ground response to tunnelling and deep excavation-induced movements (short and long term) have been extensively investigated (e.g. for the JLEP, CTRL and Crossrail).

The Imperial College Pile has been used extensively to investigate the development of pile resistance in the short and longer term. Several full-scale piling research projects have been run to investigate for example the effects of using jet-grouted bases, the effects of tunnelling on existing piles and more recently the lateral response of driven piles. In all these cases the piles were heavily instrumented and the interpretation of the results has led to major steps forward in pile design (ICP design method), time effects and redistribution of pile loads during tunnelling.

New technologies have been used and developed, sometimes in collaboration with others, e.g. ETH Zurich for optical fibre measurements and GeoObservations for SAA monitoring (Shape Accel Array). Recently the use of multi-level piezometers has been investigated.

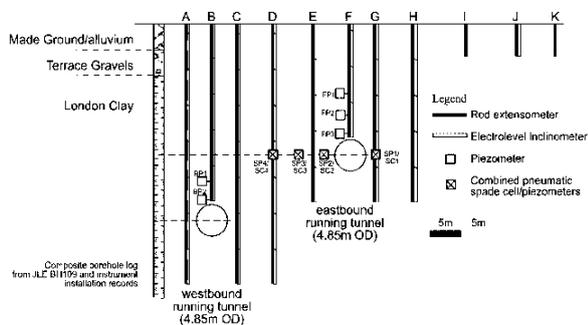


Figure 10. Field instrumentation at St James's Park (Jubilee Line Extension Project)



Figure 11. Structural monitoring of cracks with DEMEC Gauge



Figure 12. Pile testing at Dunkerque, France



Figure 13. Use of optical fibres for monitoring existing Central Line tunnels during Crossrail tunnel construction beneath them

Research Highlights (Con't)

Imperial College, Department of Civil & Environmental Engineering

Academic staff

Dr Richard C. Ghail

<http://www.imperial.ac.uk/people/r.ghail>

Richard is a Lecturer in Engineering Geology, with research interest in tectonic processes which drive geological activity and structure at all scales in the Earth and other planets and are the primary cause of hazards and unexpected ground conditions in engineering. His research seeks to understand processes that operate away from plate boundaries in order to better predict ground conditions and site hazards at the engineering scale.



With his colleague Philippa Mason, he refined satellite radar (PSI) techniques to measure east-west and vertical block movement rates of only a few $\text{mm}\cdot\text{a}^{-1}$ in London, from which they inferred the presence of major strike-slip and blocking reverse normal faults under London that control surface and groundwater flow, the occurrence of periglacial hazards, and even the primary fissures in the London Clay. His PhD student Christine Bischoff is testing and improving these techniques using radar data from suitable locations in Europe, Australia and Canada. Planned future research is to relate the measured surface block movements to shear displacements at depth and hence, ultimately, to assess their seismic hazard potential.

The goal is to use these measurements and a knowledge of the geological materials and history as a tool for predicting engineering conditions at the site level. At present we know that many joints in rocks and stiff soils owe their origin to tectonic processes either directly or through unloading and we can now reliably predict joint orientation in a wide variety of geological settings; research is underway to also predict joint density and quality, which are required for rock mass assessment. Similarly, we now know that there is a relationship between faulting and drift filled hollows in regions of past periglaciation but it is complex and indirect. Through the London Basin Forum, Richard has been building these detailed 3D geological site models into a more general model of faulting in London and exploring ways to make these accessible with the British Geological Survey, for the benefit of industry.

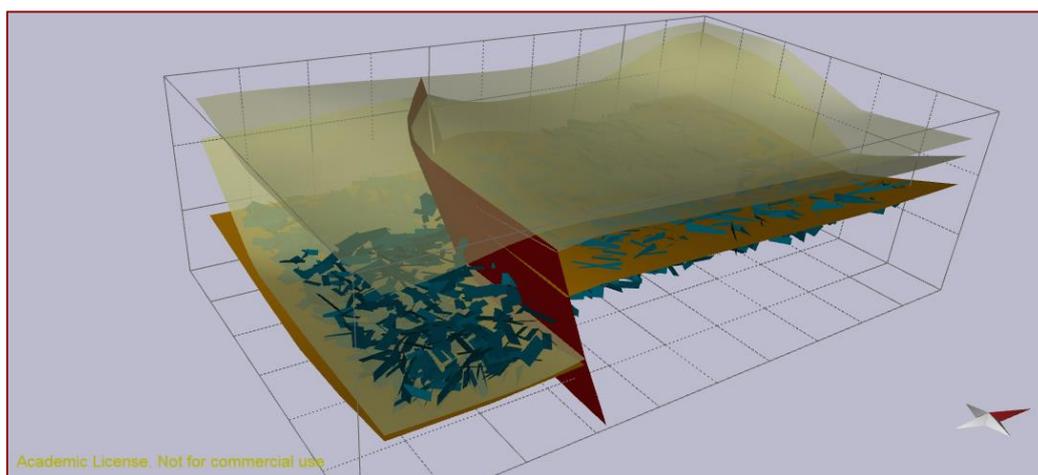


Figure 14. Site model (in Move) showing two surfaces of the London Clay, A1 (lower) and A2 (upper), in semi-transparent brown, the reverse normal fault (red) and upper surface of the Lambeth Group (orange-brown). The orientations and densities of major fissures predicted in the lower London Clay by restoration and fracture modelling in Move are shown in blue. Each grid square is 10 m (no vertical exaggeration)

Research Highlights (Con't)

Imperial College, Department of Civil & Environmental Engineering

Professor Richard J. Jardine

<http://www.imperial.ac.uk/people/r.jardine>

Richard Jardine is Professor of Geomechanics and Consul for Engineering and the Business School at Imperial College London. In addition to his Consul tasks, he undertakes research and both undergraduate and post graduate teaching. His earlier assignments include being Deputy Head of Civil and Environmental Engineering (2011-2012), leading the Geotechnics group (2005-2011) and Panel membership for the UK's national Research Assessment Exercises in 2008 and 2014. He is a Fellow of the Royal Academy of Engineering and of the City and Guilds Institute.



Richard has managed several large international research JIPs and collaborates with groups worldwide. He is currently involved in offshore piling research in conjunction with Grenoble University (France), the PISA JIP, Sydney University and UWA (Australia), Zhejiang University (China) and Iberdrola (large pile testing in Chalk in the German Baltic sea), as well as laboratory research into the cyclic response of seabed sediments, the constitutive behaviour of sands, soft organic soils and stiff clays. He has been appointed an International Distinguished Visiting Scholar by the Chinese Ministry of Education, advises the French national SOLCYP cyclic programme on deep foundations, is researching the behaviour of flood embankments on peat with Deltares in Holland and recently led a study for BP into climate change impact on permafrost.

Richard has delivered a number of distinguished lectures and received prizes and awards for his work, most recently the Imperial College's President's Medal for External Collaborative Research. He will deliver the prestigious Rankine Lecture in 2016.



Figure 15. Field testing set up for ICP model pile

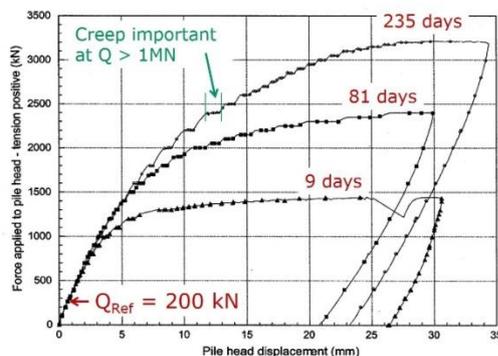


Figure 16. Ageing, creep and nonlinear axial shaft stiffness

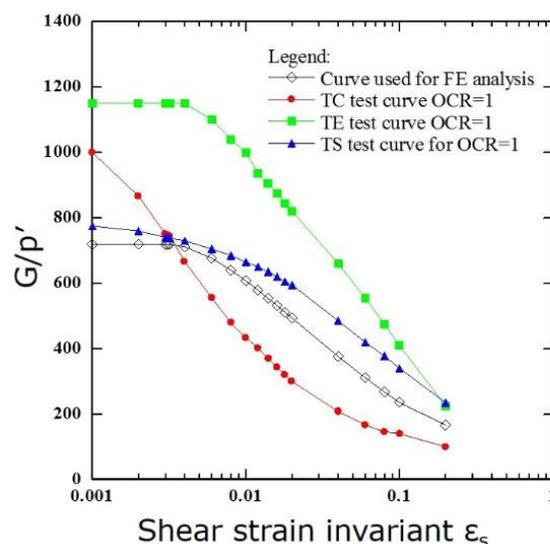


Figure 17. Soil element testing: Dunkirk sand, secant shear stiffness in nonlinear range

Research Highlights (Con't)

Imperial College, Department of Civil & Environmental Engineering

Dr Stavroula Kontoe

<http://www.imperial.ac.uk/people/stavroula.kontoe>

Stavroula Kontoe is a Senior Lecturer in Geotechnics specialising in Computational Geomechanics and Earthquake Engineering. Her main research field is the development and application of numerical methods to study the performance of geotechnical structures under static, dynamic and seismic loading. In collaboration with her colleagues in the numerical group she has worked on the development of dynamic analysis capabilities in the finite element code ICPEP (advanced time integration schemes with hydro-mechanical coupling, rigorous boundary conditions for wave scattering, sub-structuring and constitutive models to simulate soil behaviour under dynamic loading). Dr Kontoe has led a large number of research projects on the seismic performance of tunnels, retaining structures and dams, on site response analysis and its incorporation in seismic hazard studies, topographic effects on seismic ground motion, modelling vibrations induced by pile driving and slope stability in strain softening materials. She serves on various committees in her field (SECED, ISSMGE TC203, EAEE), sits on the editorial boards of *Géotechnique* (2013-2015) and *Computer & Geotechnics* and was awarded the 2008 BGA medal.

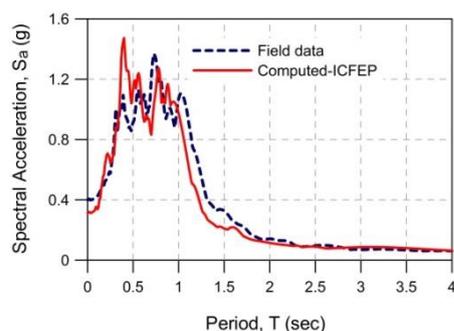


Figure 18. Numerical prediction of crest acceleration response of La Villita dam versus field measurements (Pelecanos et al., 2015)

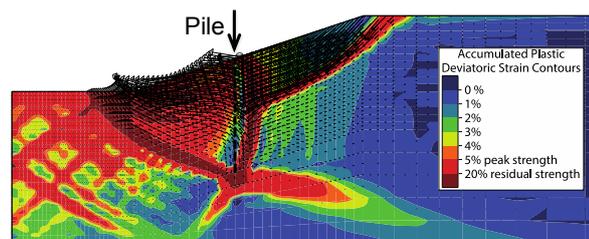


Figure 19. Failure mechanism of a slope excavated in a stiff clay and reinforced with piles using a nonlocal strain softening model (from the recently completed PhD thesis of Summersgill 2015 supervised by S. Kontoe & D.M. Potts)

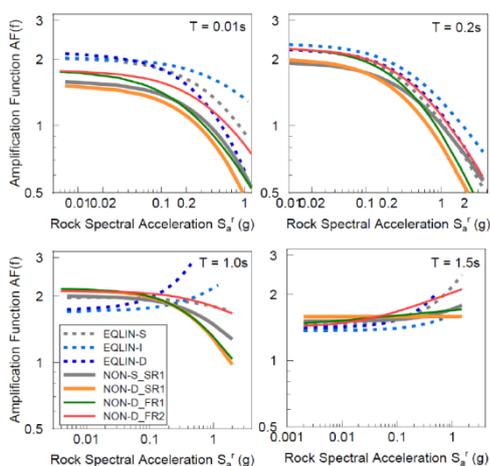


Figure 20. Sandy site amplification functions for various analysis approaches (Papaspiliou et al., 2012)

Selected references:

- Pelecanos L, Kontoe S, Zdravkovic L (2015) A case study on the seismic performance of earth dams *Geotechnique* available online ahead of print. doi:10.1680/geot.SIP.15.P.009
- Kontoe S, Avgerinos V, Potts DM (2014) Numerical validation of analytical solutions and their use for equivalent-linear seismic analysis of circular tunnels *Soil Dynamics & E/q Eng* **66**, 206-219.
- Tripe R, Kontoe S, Wong TKC (2013) Slope topography effects on ground motion in the presence of deep soil layers, *Soil Dynamics & E/q Eng*, **50**, 72-84.
- Pelecanos L, Kontoe S, Zdravkovic L. (2013) Numerical modelling of hydrodynamic pressures on dams, *Computers & Geotechnics* **53**, 68-82.
- Papaspiliou M, Kontoe S, Bommer JJ (2012) An Exploration of Incorporating Site Response into PSHA Part II: Sensitivity of Hazard Estimates to Site Response Approaches, *Soil Dynamics & E/q Eng*, **42**, 316-330.

Research Highlights (Con't)

Imperial College, Department of Civil & Environmental Engineering

Dr Catherine O'Sullivan

<http://www.imperial.ac.uk/people/cath.osullivan>

Catherine O'Sullivan is Reader in Particulate Soil Mechanics. Her research explores the influence of particle characteristics and particle-scale interactions on the observed overall complexity of soil response. Her contributions in the area of discrete element modelling (DEM) include experimental validation (e.g. Cui et al., 2007), interpretation of DEM data (e.g. O'Sullivan et al., 2015), and simulation of reservoir sandstone behaviour (Cheung et al., 2013). She has applied DEM to look at aspects of soil response including the critical state (Huang et al., 2014), and interpretation of bender element tests (O'Donovan et al., 2015). She has also adopted experimental techniques including micro computed tomography (Fonseca et al., 2013), and analytical methods (O'Sullivan et al., 2013).

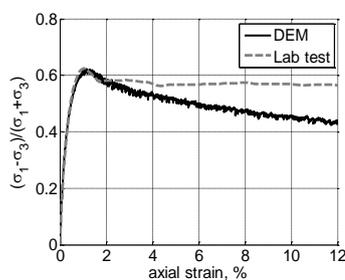


Figure 21. Stress-deformation response of Castlegate sandstone - comparison of lab data and DEM model (Cheung et al., 2013)

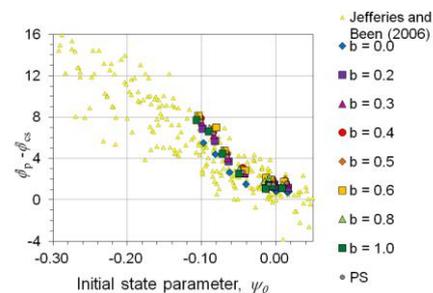


Figure 22. DEM capturing state-dependency of peak strength (Huang et al., 2014)

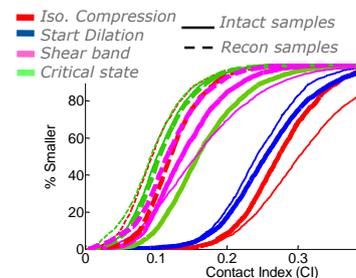


Figure 23. Variation in contact index during shearing of locked sand (Fonseca et al., 2013)

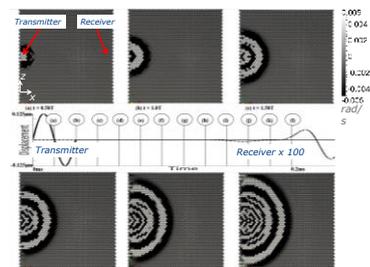


Figure 24. Shear wave propagating in DEM bender element test (O'Donovan et al., 2015)

Selected references

- Cheung LYG, O'Sullivan C, Coop MR, 2013, Discrete element method simulations of analogue reservoir sandstones, *Int. Journal of Rock Mechanics and Mining Sciences*, **63**, 93-103.
- Cui L, O'Sullivan C, O'Neill S, 2007, An analysis of the triaxial apparatus using a mixed boundary three-dimensional discrete element model, *Géotechnique*, **57**, 831-844.
- Huang, X., O'Sullivan, C., Hanley, K. J., Kwok, C.Y. (2014) DEM Analysis of the State Parameter, *Géotechnique* **64**(12) 954-965 DOI 10.1680/geot./14-P-013.
- Fonseca J, O'Sullivan C, Coop MR, Lee PD, 2013, Quantifying the evolution of soil fabric during shearing using scalar parameters, *Géotechnique*, **63**, 818-829.
- O'Donovan J, O'Sullivan C, Marketos G, Wood DM, 2015, Analysis of bender element test interpretation using the discrete element method, *Granular Matter*, **17**, 197-216.
- O'Sullivan C, Bluthe J, Sejpar K, Shire T, Cheung LYG, 2015, Contact based void partitioning to assess filtration properties in DEM simulations, *Computers and Geotechnics*, **64**, 120-131.
- O'Sullivan C, Wade MA, et al, 2013, Use of DEM and elastic stability analysis to explain the influence of the intermediate principal stress on shear strength, *Géotechnique*, **63**, 1298-1309.

Research Highlights (Con't)

Imperial College, Department of Civil & Environmental Engineering

Professor David M. Potts

<http://www.imperial.ac.uk/people/d.potts>

David Potts is the GCG Professor of Geotechnical Engineering. His Chair is sponsored by the Geotechnical Consulting Group where he holds the position of Senior Consultant. He is a former Head of the Geotechnics Section (1998-2006, 2011-2014) and Deputy Head of Civil & Environmental Engineering Department (2002-2012). His research interest is in the development and application of coupled THM numerical analysis to the design of real geotechnical structures. He is the principal author of the finite element software ICFEP.



David's research has been concerned with the design of piles, including tension piles for offshore anchored structures, the response of offshore gravity platform foundations to cyclic loading, retaining structures of various types, cut-and-cover tunnels, bored tunnels, culverts subject to mining subsidence, the stability of embankments on soft ground, the stability and deformation of earth dams, the behaviour of reinforced earth structures, the prediction of ground movements around deep excavations and the role of progressive failure in embankment and cut slope problems. His research portfolio includes prestigious projects such as the stabilisation of the leaning Tower of Pisa, the Carsington Dam failure, the Heathrow tunnel collapse, and more recently raising of the Abberton reservoir dam, the stability of underwater slopes in the specific geological setting of the Gulf of Mexico, the Gerrards Cross tunnel collapse and the Crossrail project.

David has received numerous awards and medals for his research, has advised several oil companies, consultants and a government research laboratory on the use of computational methods in geotechnics and has delivered a number of distinguished lectures, most notably the premier Rankine Lecture in 2002. He is a Fellow of the Royal Academy of Engineering and of the City & Guilds Institute.

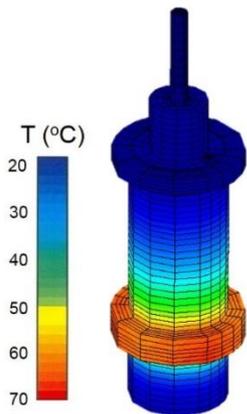


Figure 25. Use of ICFEP in the design of new thermal triaxial cell

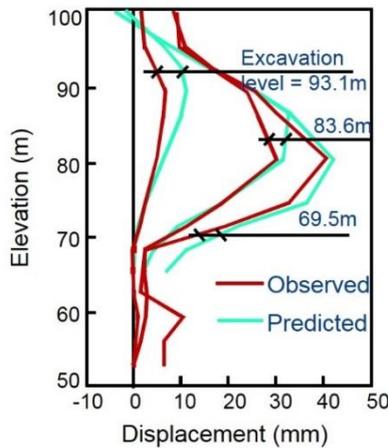


Figure 26. Design of the Westminster deep excavation for the JLE project

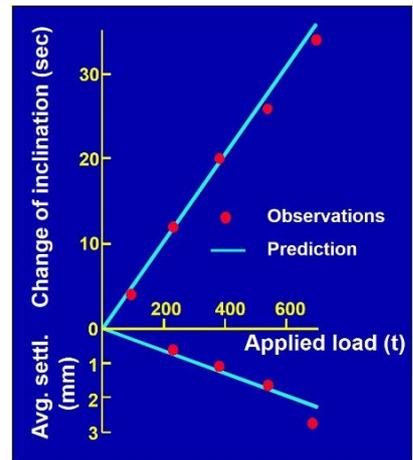


Figure 27. Leaning Tower of Pisa - design of temporary stabilisation measures

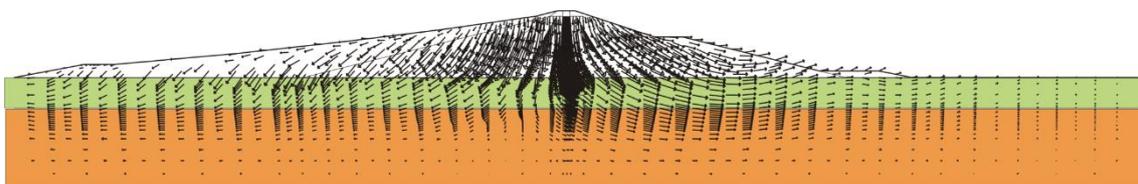


Figure 28. Confirmation of stability of the raised Abberton main dam

Research Highlights (Con't)

Imperial College, Department of Civil & Environmental Engineering

Dr Way Way Sim

<http://www.imperial.ac.uk/people/w.sim>

Way Way Sim is a Lecturer in Geotechnics and academic manager of the Geotechnical Laboratories. Her research interests lie in advanced laboratory testing of soils with research projects spanning; the cyclic loading of sands for application to offshore foundations (Aghakouchak et al., 2015), stability of granular filters and constriction size distribution (Taylor et al., 2015), the effect of grain packing and roughness on mechanical behaviour (Otsubo et al., 2015) and the thermo-hydro-mechanical testing of soil (Martinez Calonge, 2013).

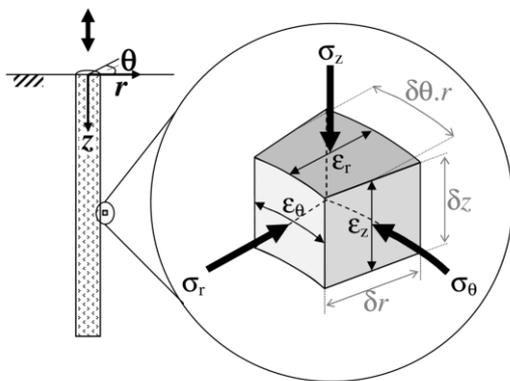


Figure 29. Consideration of an element of soil adjacent to a cyclically loaded pile

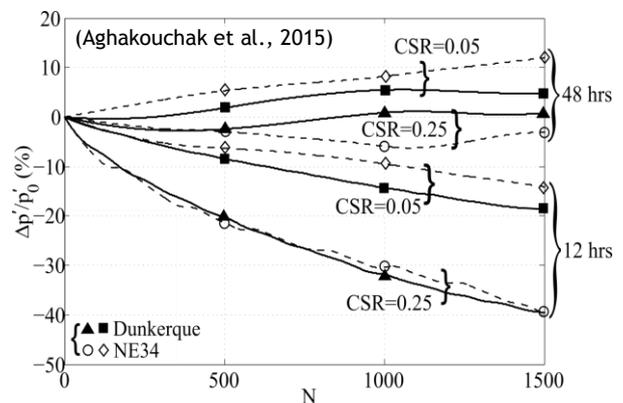
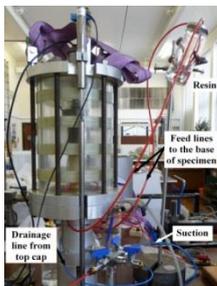
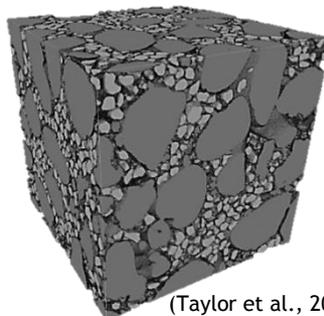


Figure 30. Effect of ageing and creep on two samples of sand subjected to undrained cycles



(Fonseca et al., 2014)

Figure 31. Resin impregnation of cohesionless sands



(Taylor et al., 2015)

Figure 32. 3D scan of particle assemblage

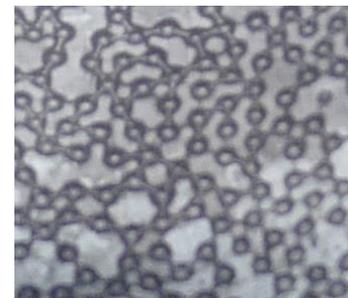
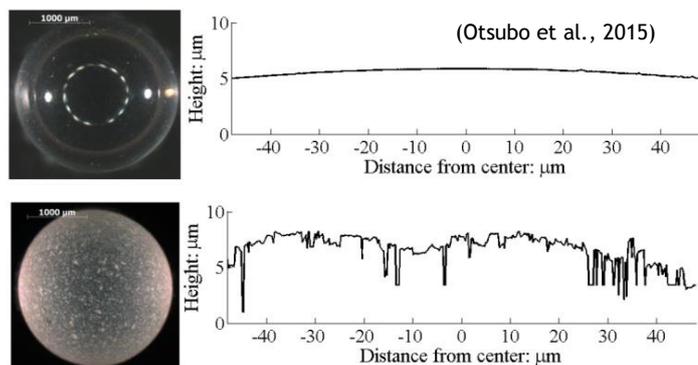


Figure 33. Particle contact points



(Martinez Calonge, 2013)

Figure 34. Temperature testing apparatus



(Otsubo et al., 2015)

Figure 35. Surface roughness measurements

Research Highlights (Con't)

Imperial College, Department of Civil & Environmental Engineering

Dr Jamie R. Standing

<http://www.imperial.ac.uk/people/j.standing>

Jamie Standing is Reader in Ground Engineering and currently the course director for the MSc Soil Mechanics cluster. His main research areas are tunnelling-induced ground movements, the effects of tunnelling on the urban environment (surface and subsurface structures, services etc.), and in particular piled foundations and existing tunnels, full-scale monitoring of the ground and structures (surveying, instrumentation etc.). He has an overall interest in problems involving soil-structure interaction, including soil nailing and reinforced earth and small-scale modelling. He has also been supervising research into fundamental properties of various soils (London Clay, residual soils from Malaysia, expansive soils from Sudan, gypsiferous soils from Libya) and partly saturated soil mechanics.

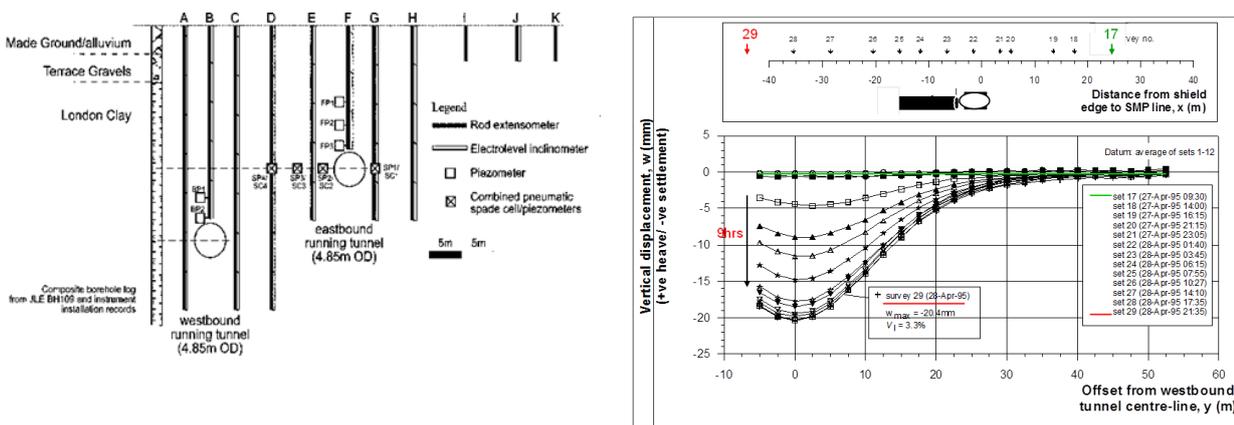


Figure 36. Field monitoring of greenfield ground response to tunnel construction at St James's Park for Jubilee Line Extension Project: section showing subsurface instrumentation layout, vertical displacements from first westbound tunnel



Figure 37. Field monitoring of ground and full-scale pile response to tunnelling in conjunction with Channel Tunnel Rail Link Project (site at Dagenham)

Research Highlights (Con't)

Imperial College, Department of Civil & Environmental Engineering

Dr David M. G. Taborda

<http://www.imperial.ac.uk/people/d.taborda>

David Taborda is a Lecturer in Geotechnics, with his research activity focusing on Energy Geotechnics, with particular emphasis on Ground Source Energy (GSE) Systems and Thermo-Active Structures.

Dr. Taborda has developed work in collaboration with colleagues at Imperial College and industrial partners on three distinct aspects of this topic: (i) design methodologies for GSE Systems (Sailer et al., 2015), (ii) computational modelling of heat transfer in porous media and of thermo-hydro-mechanical behaviour of soils using the numerical code ICPEP (Cui et al., 2015) and (iii) development and commissioning of laboratory equipment for the characterisation of thermal soil properties and soil behaviour under varying temperature. The latter includes temperature-controlled stress path cells and oedometers, as well as a combined thermo-hydraulic conductivity cell.



Simultaneously, Dr. Taborda develops, implements and applies constitutive models for soils in numerical analyses of geotechnical structures. In particular, he has worked on the simulation of cyclic soil behaviour for application to the design of foundations subjected to repeated loading, wave propagation problems (Taborda & Zdravkovic, 2012) and the triggering and development of liquefaction in sand deposits (Taborda et al., 2014).

Dr. Taborda is a member of the Editorial Panel of Computers & Geotechnics and acts regularly as a reviewer to multiple international journals.

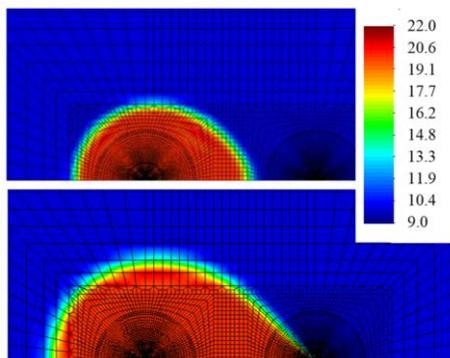


Figure 38. Contours of simulated aquifer temperature due to operation of an open-loop GSE system (Cui et al., 2015)

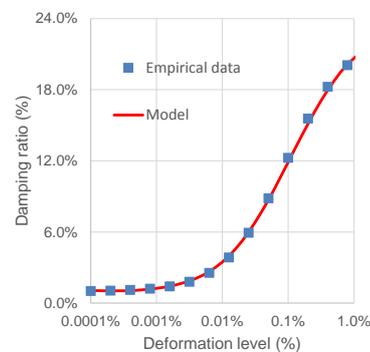


Figure 39. Simulation of the damping ratio using a new cyclic nonlinear elastic model (Taborda & Zdravkovic, 2012)

Selected References:

- Cui W, Gawecka K, Potts DM, Taborda DMG, Zdravkovic L (2015) Investigations on Numerical Analysis of Coupled Thermo-Hydraulic Problems in Geotechnical Engineering. *Proceedings of the 1st International Symposium on Energy Geotechnics*, Universitat Politècnica de Catalunya, Barcelona.
- Sailer E, Taborda DMG, Keirstead J (2015) Assessment of Design Procedures for Vertical Borehole Heat Exchangers. *Proceedings of the Fortieth Workshop on Geothermal Reservoir Engineering*, Stanford University, California.
- Taborda DMG, Zdravkovic L (2012) Application of a Hill-Climbing Technique to the Formulation of a New Cyclic Nonlinear Elastic Constitutive Model. *Computers and Geotechnics*, **43**, 80-91.
- Taborda DMG, Zdravković L, Kontoe S, Potts DM (2014) Computational Study on the Modification of a Bounding Surface Plasticity Model for Sands. *Computers and Geotechnics* **59**, 145-160.

Research Highlights (Con't)

Imperial College, Department of Civil & Environmental Engineering

Dr Katerina Tsiampousi

<http://www.imperial.ac.uk/people/aikaterini.tsiampousi05>

Katerina Tsiampousi is a Lecturer in Geotechnics, specialising in unsaturated soil mechanics. Her research interests focus on both experimental investigation and numerical modelling of the behaviour of unsaturated soils, with applications on deep geological disposal of nuclear waste; the effect of soil-atmosphere interaction on natural and cut slopes and railway and flood embankments; slope stability. Other research interests include the behaviour of segmental tunnel linings and the assessment of reliability and risk of geotechnical structures.



Dr Tsiampousi has contributed, in collaboration with colleagues in the numerical group, in the development of the in-house finite element code ICFEP, in particular with reference to constitutive and soil-water retention models for unsaturated soils.

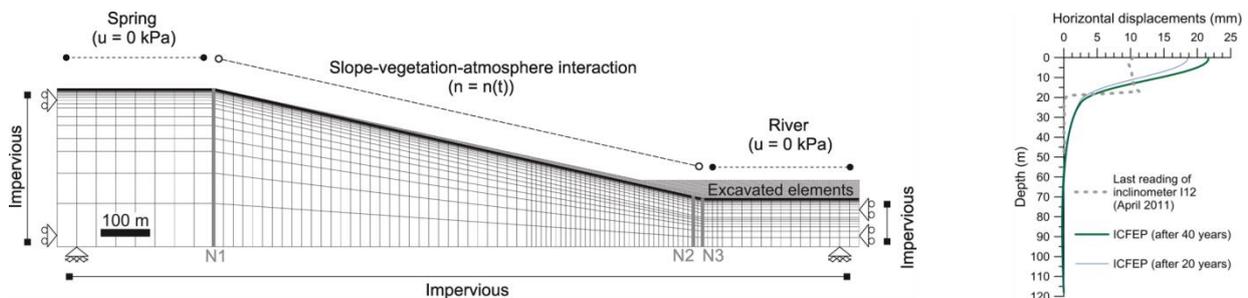


Figure 40. Numerical analysis of deep landslides in south Italy with the numerical code ICFEP

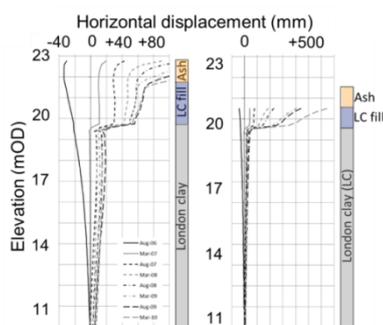


Figure 41. Prediction of failure in railway embankment following the removal of vegetation

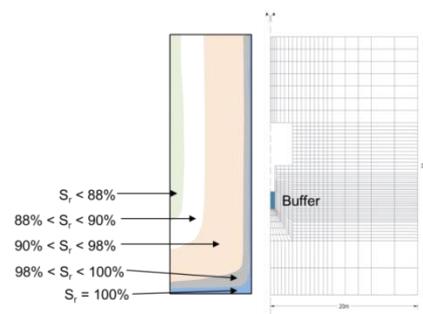


Figure 42. Advancement of saturation front in buffers for nuclear waste disposal

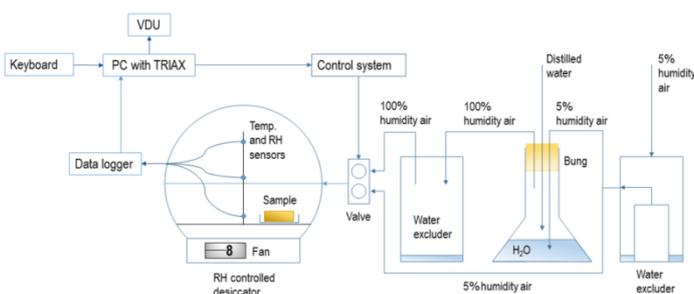


Figure 43. Control of relative humidity in sealed chambers

Research Highlights (Con't)

Imperial College, Department of Civil & Environmental Engineering

Professor Lidija Zdravkovic

<http://www.imperial.ac.uk/people/l.zdravkovic>

Lidija Zdravkovic is Professor of Computational Geomechanics and Head of the Geotechnics Section. Her research activities are focused on the development and application of numerical methods in geotechnical engineering. This work involves the finite element code ICPEP and her particular input has been in the development of solution algorithms, constitutive models and boundary conditions for the analysis of unsaturated soils and soil dynamics problems, soil-atmosphere interaction, creep and ageing, involving fully coupled hydro-mechanical soil behaviour.



Lidija's recent research interests have expanded to foundation systems for offshore wind turbines, where she currently leads Imperial's contribution to the PISA project; as well as to modelling of temperature effects on soil behaviour with application to nuclear waste disposal, with current funding from AMEC Nuclear UK supporting research on bentonite buffers. She has applied numerical tools in the analyses of a wide range of geotechnical problems, both in her research and in consulting activities, the latter involving major recent projects such as Crossrail, The Shard (currently the tallest building in the EU), Heathrow Terminal 5, Rome metro and Gerrards Cross tunnel collapse.

Lidija is a former elected member of the BGA Executive Committee (2010-2013), sits on editorial boards of Géotechnique and Computers & Geotechnics, is a core member of ISSMGE TC 103 for Numerical Analysis and a member of ISSMGE Awards Committee. She delivered the 2013 Géotechnique Lecture.

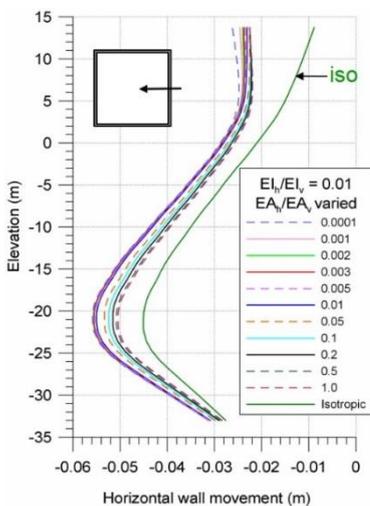


Figure 44. Effect of lateral wall stiffness on its deformation; Crossrail (Zdravkovic et al., 2005)

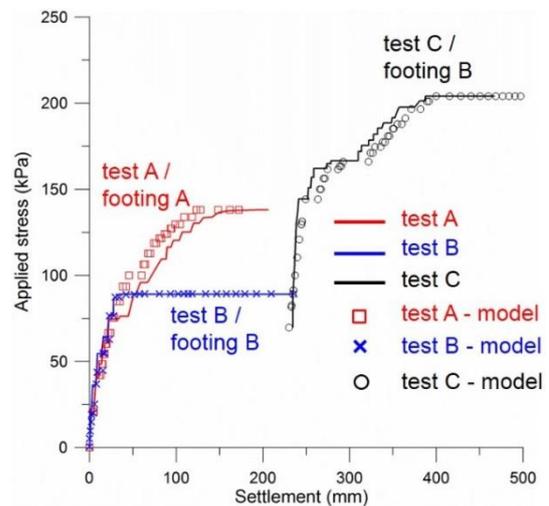


Figure 45. Effect of creep on the bearing capacity of foundations; Bothkennar case study (Bodas Freitas et al., 2015)

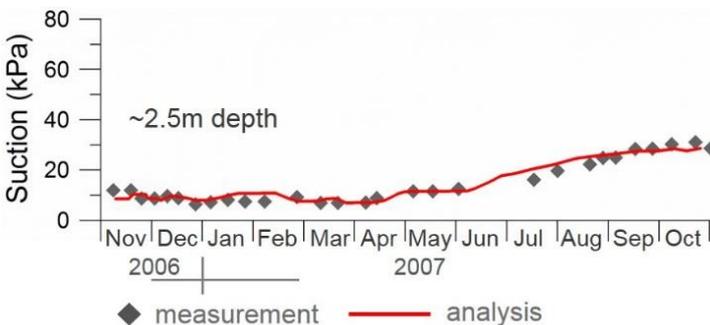


Figure 46. Annual variation of suction in the slope; case study of a pyroclastic slope, Italy (Pirone, 2010)

Research Highlights (Con't)

Imperial College, Department of Civil & Environmental Engineering

Major research projects

1. Crossrail research project: The effect of tunnelling on existing tunnels

<http://www3.imperial.ac.uk/geotechnics/research/crossrail>

Academic team: Dr J. Standing (PI), Prof. D. Potts (Co-I), Prof. J. Burland (Co-I), Dr R. Vollum (Co-I)

Research team: J. Yu, M. Wan, V. Avgerinos, K. Tsiampousi, R. Hosseini, S. Afshan, K. Al Haj

Background: This research was run in conjunction with the Crossrail project - involving construction of 21km of twin-bore railway tunnels through central London where the new tunnels interface with existing networks of London Underground tunnels and other utility tunnels. For the western tunnel section, the twin tunnels are constructed using 7.2m diameter earth-pressure-balance tunnel boring machines (TBMs), mostly in London Clay.

The research focus is on tunnels lined with grey cast-iron segments which are the most common type constructed pre-war in London.

Research aim: To understand the interactive behaviour of the cast-iron segmental linings of existing tunnels and the ground in response to the adjacent tunnelling.

Methodology: Research covered five interlinked aspects.



Figure 47. Structural modelling (half-scale lining)

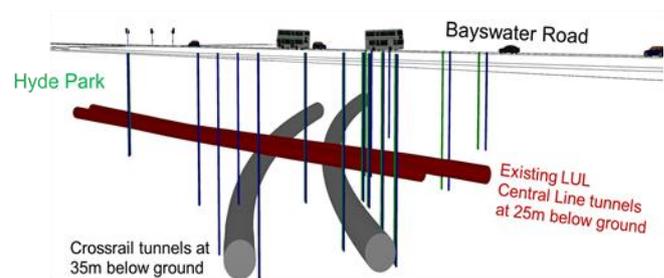


Figure 48. Field measurements

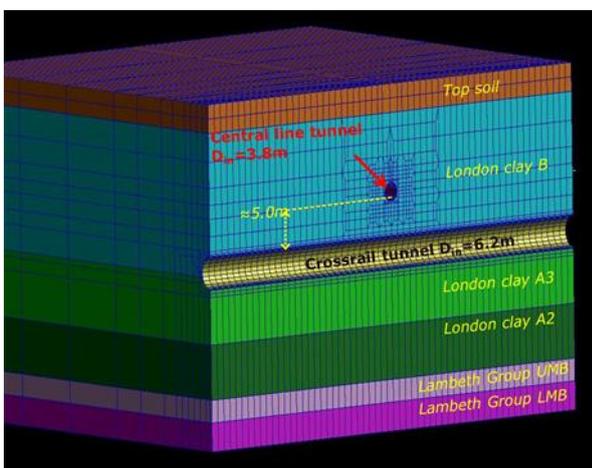


Figure 49. Numerical modelling of field conditions

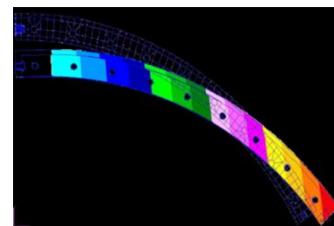


Figure 50. Numerical modelling of cast-iron segments



Figure 51. Soil laboratory testing on London clay samples

Research Highlights (Con't)

Imperial College, Department of Civil & Environmental Engineering

2. The PISA (Pile Soil Analysis) research project

Academic team: Prof. L. Zdravkovic (PI), Prof. D. Potts (Co-I), Prof. R. Jardine (Co-I), Dr D. Taborda (Co-I)

Research team: David Abadias Gomez, Emil Ushev, Tingfa Liu

The PISA project is a joint industry research project led by DONG Energy and run through the Carbon Trust's Offshore Wind Accelerator programme, with the industry group including companies who, collectively, own over 70% of the total offshore wind projects in the UK. The academic working group consists of academics from Oxford University (project lead), Imperial College and University College Dublin.

This project resulted from the need to address the shortcomings of current design methods for laterally loaded piles, which rely on the p-y methodology with the soil being simulated by nonlinear springs. This method relies on rules established from limited field lateral load testing on piles with large slenderness ratios, L/D, that were typical for oil and gas offshore platforms.

However, the monopiles used in the offshore wind industry are subjected to a different loading regime and their geometry is characterised by relatively low L/D ratios (2-10). The piles are less flexible than platform piles and their failure mechanism typically involves rigid body rotation. Additionally, the modelling of the stiff glacial tills and dense marine sands encountered in the North Sea is known to be problematic within the p-y framework.

Two different sites, representative of North Sea conditions, were chosen: Dunkirk, Northern France (dense marine sand) and Cowden, Northeast England (stiff glacial till). Initial ICPEP analyses were carried out at Imperial College to help design of the large scale testing. Concurrently, an advanced soil testing programme was initiated to improve the characterisation of the two soil deposits.

ICPEP analyses were also carried out covering a wide range of real monopile geometries. Their interpretation allowed a new 'spring' model to be developed at Oxford University, which takes into account further components of soil reaction and can reproduce with a high degree of accuracy the FE predicted pile behaviour. Large-scale testing has been carried out to allow the proposed design methodology to be benchmarked and refined.

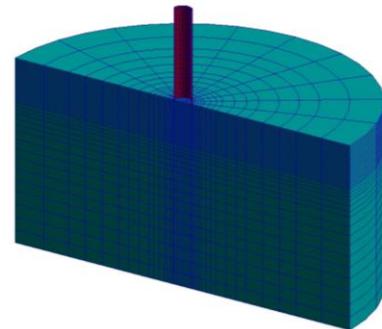


Figure 52. 3D mesh used in advanced analysis of laterally loaded piles



Figure 53. Advanced laboratory testing of soil

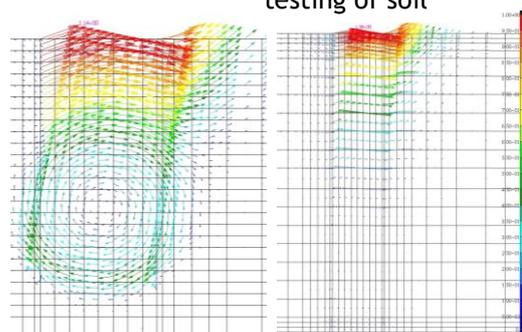


Figure 54. FE modelling of piles with L/D = 2 and 6

Research Highlights (Con't)

Imperial College, Department of Civil & Environmental Engineering

3. Rationalising offshore wind turbine pile design & assurance in difficult ground conditions

Academic team: Prof. R. Jardine & Dr S. Kontoe

Research team: R. Buckley

Joint industry project (JIP) between Scottish Power Renewables/Iberdrola (leader Pedro Barbosa), Imperial College London & the Geotechnical Consulting Group (Dr Felix Schroeder). Funding: Innovate UK.

Offshore wind farm (OWF) developments in Northern Europe often encounter Chalk (see Figure 55); a highly variable and problematic soft rock. Existing design guidance for driven piles in Chalk indicates low limiting shaft resistances which are thought to be conservative. However, it is well known that while driving resistance in Chalk can be very low, set up effects with shaft resistances increasing over time can be significant. Furthermore, previous research on sands and clays identified a strong “h/R” or ‘friction fatigue’ effect which may impact on the resistances mobilised in Chalk. Sharp reductions in strength under cyclic loading have also been demonstrated in the literature. However, in general, the mechanisms at work remain to be investigated systematically.

Iberdrola are currently developing the Wikinger OWF in the Baltic Sea, offshore Germany, consisting of 70 wind turbine generators (WTG), installed in 35 to 42 m water depth with a total installed capacity of 350 MW. The WTGs will be supported by 4 legged jacket structures with 2.67 m diameter open-ended driven pipe piles. The piles will be founded in about 50% Weichsellian Glacial Till and 50% Chalk of Maastrichtian age. A full-scale pile test programme, completed in early 2015, employed original and innovative static and cyclic pile testing, as well as dynamic monitoring during driving, to examine foundation behaviour and set-up. The tests involve the largest scale piles and water depths attempted to date.

The interpretation of the test data from Wikinger along with the outcomes of further planned field work of instrumented piles and data collected from third parties aim to explain fundamental aspects of the behaviour of driven piles in Chalk (low driving resistance, set up and ageing effects, impact of cyclic loading on strength) and to ultimately propose a comprehensive, secure and cost-effective design method.

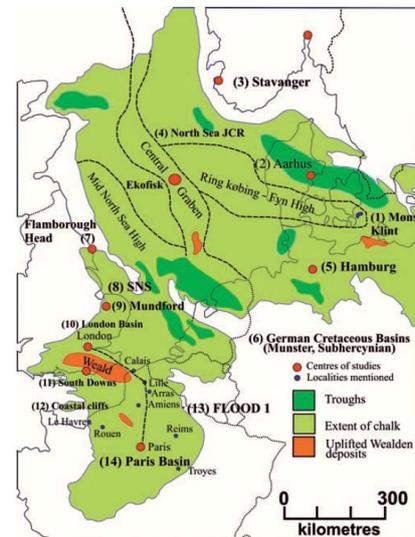


Figure 55. The extent of Chalk in NW Europe (after Mortimore, 2012)

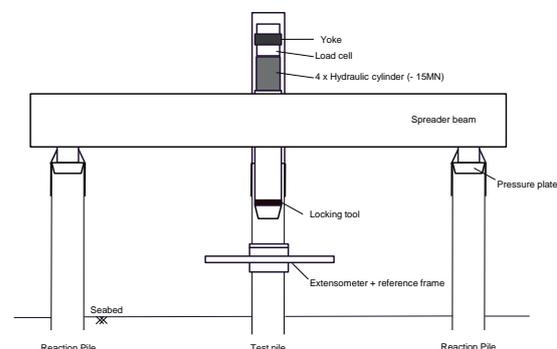


Figure 56. Schematic of bespoke robotic test frame deployed at seabed



Figure 57. Test piles during loading at Sassnitz

Report from Egyptian Geotechnical Society EGS Lecture by Prof. Dr. Eng. Yasser El-Mossallamy

The Egyptian Geotechnical Society organized a public Geotechnical lecture at the evening of 8 June 2015. The lecture took place in Cairo at Housing and Building National Research Centre (HBRC). The lecture was entitled "FOUNDATIONS OF HEAVY STRUCTURES". It was delivered by Prof. Dr. Eng. Yasser El-Mossallamy. In the lecture, Prof. El-Mossallamy showed that reaching the most economic foundation system for heavy structures requires the co-operations between the geotechnical and structural engineers. He demonstrated the role of such co-operation through excellent well documented case histories. First, he showed that the mentioned co-operation as well as well-established soil investigation program has led to elimination of use of deep foundations of Clinker Silo in Hungary on medium to stiff cohesive soils allowing uniform settlement of the raft foundation of the structure up to about 30 cm without any damage or tilt to the structure. He further showed several cases of the foundation systems of high rise buildings in Frankfurt - Germany through which he demonstrated the involvement of the piled-raft foundation system that reduced the maximum as well as the differential settlement and the associated tilt. Additional examples of case histories from Kuwait and Saudi Arabia were also used to show the attendees of the lecture some aspects of behaviour of piled rafts. Prof. El-Mossallamy showed additional examples of the challenges that geotechnical engineers may face in the design of foundations of heavy structures such as those of elevated bridges and LNG Tanks on difficult soil and subjected to high seismic loads.

The lecture was very well attended. Due to heavy inclusions by interesting case histories, it was very well received by the attendees. The lecture was followed by interesting and fruitful discussions.



Prof. Dr. Eng. Yasser El-Mossallamy is a professor at Ain Shams University, Cairo, Egypt. He has been a researcher and consultant for 30 years. He received his PhD from Germany. His work includes the application of numerical modeling and analyses in geotechnical projects. He has a wide experience by the design and construction of high-rise buildings, bridge foundation and heavy industry foundations such as clinker silos and LNG tanks. He was also involved in many projects dealing with stability of landslides, soil improvement, rock fall hazards and tunneling. He has more than 80 publications dealing with different geotechnical topics. He is a member of many national and international technical committees such as the German Committee of Piled Raft and Soil Improvement as well as the Egyptian Bridge Design Committee, the Egyptian Committee of Piling as well as the International Committee TC 207.

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Report from Egyptian Geotechnical Society (Con't)

EGS Lecture by Prof. Dr.-Ing. Herbert Daniel Klapperich

The Egyptian Geotechnical Society organized a public Geotechnical lecture at the evening of 14 April 2015. The lecture took place in Cairo at Housing and Building National Research Centre (HBRC). The lecture was entitled "BROWNFIELD REDEVELOPMENT & RENEWABLE ENERGIES". It was delivered by Prof. Dr.-Ing. Dr. H.C. Herbert Klapperich.

In the lecture, the "groundwater protection" was demonstrated as an issue in the context of Brownfield revitalization to slow down land consumption (greenland) as well as in the construction of deposits and landfills. For the redevelopment of derelict land, different technical solutions were presented for urban sites and former mining areas by forming new landscapes.

The focus on "energy consumption" were stressed by comparison of standard construction principles and innovative approaches taking into account the CED (Cumulative Energy Demand) with the role of geothermal energy as a promising one of the renewable fractions.

Results of extensive research activities governed by the role of geosynthetics - including experimental investigations to soil-geosynthetics interaction (shear, friction & pull out tests) - in cohesive soils with and without additive improvements were presented.

At the end, Prof. Klapperich demonstrated examples from landfill and Brownfield construction and retaining structures.

The lecture was very well received by the attendees. The lecture was followed by interesting discussions.



Prof. Dr.-Ing. Herbert Daniel Klapperich is University Professor at the Geotechnical Institute, TU Bergakademie Freiberg (Technical University of Mining and Technology), Germany for Soil Mechanics, Foundation Engineering, Geotechnique in Mining and Dynamics. He is Board of directors (speaker), CiF Interdisciplinary Centre of Excellence for Brownfields & renewable energy, Freiberg/Berlin/Aachen, Germany. He has broad interests in several areas of geotechnical engineering including environmental geotechnics, tunnelling and underground construction, soil reinforcement and design with geosynthetics, and geotechnical aspects of natural hazards including landslides and earthquakes. He has more than 100 papers published in scientific journals and conference-proceedings.

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Conference Report

The 16th African Regional Conference on Soil Mechanics and Geotechnical Engineering, Hammamet, Tunisia, 27th – 30th April 2015

The 16th African Regional Conference on Soil Mechanics and Geotechnical Engineering (16th ARCSMGE) was successfully held at Hammamet, Tunisia from 27th to 30th April, 2015. The four day conference was very well organized by The Tunisian Society for Soil Mechanics (ATMS) with the support of ISSMGE. The conference provided a platform for exchange of knowledge and experiences. It also allowed discussion between engineers, professionals, scientists, researchers, equipment or solution providers operating in the field of soil mechanics and geotechnical engineering. The main theme of the conference was *Innovative Geotechnics for Africa* aiming to highlight on African soils in all aspects: identification, characterization, behavior in connection with the design, implementation and monitoring of geotechnical structures.

The conference was very well attended by 430 participants from 43 countries distributed as follows; 25 countries from the lovely African continent, 11 countries from Europe, 2 countries from North America and 5 countries from Asia. The full papers were published in the proceedings with a volume of 641 pages. The proceedings contain 75 papers of which 72 were presented orally during the conference sessions. The full papers were also published in an electronic form on flash disk.

The opening ceremony of the 16th ARCSMGE was held under the auspices of Mr Mohamed Salah Arfaoui the Tunisian Minister of Equipment. Mr. Slaheddine Haffoudhi, the president of the Tunisian Society for Soil Mechanics (ATMS), gave a welcome speech. The chairman of the organizing committee of the conference, Mr. Mehrez Khemakhem, gave a speech about the organizational details of the conference. Prof. Mounir Bouassida, the chairman of the scientific committee of the conference presented the scientific program. The platform of the opening ceremony was also attended by both Prof. Hatem Zenzri, the dean of "Ecole Nationale d'Ingénieurs de Tunis" (Université de Tunis El Manar) and Prof. Fatma Baligh (Egypt), the Vice president of ISSMGE for Africa for the term 2013-2017. The opening ceremony was introduced by Dr. Imen Said (The Vice chairman of the organizing committee).

The conference included five Keynote Lectures and eighteen technical sessions. In addition, three workshops were organized. The 18 technical sessions with 72 oral presentations covered the following topics: soil characterization, soil behaviour, shallow and deep foundations, environmental geotechnics, landslides and slope stability, expansive clays, ground improvement, lateritic soils, geosynthetics and soil reinforcement techniques.

Dr E.M. Kana (Cameroon, CTGA) gave the first Keynote Lecture. The lecture was entitled "*Geotechnical engineering practice for roads works in tropical regions of Africa*" focusing on the role of the national civil engineering laboratories in the development of the infrastructure, especially the road networks in Africa. He clarified that those laboratories require support and renovation to be able to continue their role in conducting research, especially in relation to characterization of tropical soils of Africa, building and design dealing with those soils.

Prof. E.E. Alonso (Spain) delivered the second Keynote Lecture entitled "*Landslides in saturated and unsaturated soils*". The relevance of sedimentation and shearing planes in clayey soils was discussed as well as residual strength as a strong indication of the widespread occurrence of progressive failure. The discussions were driven through case histories. The position and geometry of the failure surface was shown to be a consequence of deformation processes. Landslide run-out was illustrated through a theoretical exercise which showed the direct correlation between run-out and brittleness index. Finally, some aspects of the behaviour of partially saturated soils subjected to rain infiltration were discussed. Analysis of a real case highlighted the behaviour of slopes in weathered soil profiles.

The third Keynote Lecture was given by Prof. A.J. Puppala entitled "*Controlled Low Strength Materials (CLSM) with Native Clays for Geotechnical Civil Infrastructure: Design, Challenges, and Sustainability Assessments*". In the lecture, a sustainable engineering solution is presented through providing an effective use of excavated waste high plasticity clay. An attempt was presented to substitute native high plasticity soil for aggregate bedding material in the preparation of controlled low strength material (CLSM) to be used as a bedding material to support large diameter pipelines.

Conference Report (Con't)

The 16th African Regional Conference on Soil Mechanics and Geotechnical Engineering, Hammamet, Tunisia, 27th – 30th April 2015

Prof. R. Katzenbach (Germany) gave the fourth Keynote Lecture entitled “*Development in deep excavation and deep foundation technologies*”. Prof. Katzenbach explained the basics of qualified design and construction of deep excavations and deep foundations and showed the application in engineering practice. Such qualified design should be based on an adequate soil investigation and an independent peer review for the planning, design and the construction stages. It is possible to use hybrid foundation technologies like the Combined Pile-Raft Foundation and in-situ load test of deep foundation elements using pressure cells. For the successful construction of deep foundation systems main regulations and recommendations have to be considered.

The fifth Keynote Lecture was delivered by M.I. Zerhouni (France) entitled “*Standardization in Geotechnics*”. An overview was presented of the organization of normative structures working for geotechnical standardization and synthesis of published or in developing standards.

All keynote lectures were very well received by participants. The keynote lectures were followed by interesting discussions between the lecturers and participants.

The three parallel workshops covered the following topics: Lateritic soils (S.K. Ampadu (Ghana) & E.M. Kana (Cameroon)), Geosynthetics (E. Zannoni (South Africa), N. Touze & H. Bannour (France)) and soil improvement techniques (S. Haffoudhi & K. Zaghouni (Tunisia)).

A large exhibition was organized accompany the conference, gathering professional partners who introduced the conference, and allowed participants to learn about the solutions offered by professionals towards specific challenges for Africa. There were 38 exhibitors including; contractors, consulting firms, service providers, specialized software developers, manufacturers and providers of laboratory testing, in-situ testing, drilling and instrumentation equipment.

During the conference, two optional technical visits were organized. The first visit, attended by 25 participants, was to the cliff of Monastir where solutions were presented for protection against marine erosion, geotechnical stabilization of the cliff and storm water drainage. The second visit, attended also by 25 participants, was to a deep foundation site in Tunis with the construction of an office building consisting of two underground levels of parking and 6 floors.

Also a meeting of African member societies took place. Some ISSMGE board members also attended the meeting that was chaired by Prof. Fatma Baligh (Vice President of ISSMGE for Africa) and Prof. Roger Frank (President of ISSMGE). At the end of the meeting, a vote delivered that the next African Regional Conference will be hosted by South Africa in Cape Town in 2019 and that the fifth Young Geotechnical Engineering Conference will be held in Ghana in 2016.

Cultural and touristic visits were also organized including three main tours mainly to Tunis (Bardo Museum, Medina, Carthage, SidiBou Said), Kairouan & El Jem and Nabeul & Hammamet.

A marvelous cultural dinner was organized at the night of the third day. The dinner was very well attended. The dinner, the musical, the songs, and the show were very well enjoyed by attendees.

The closing ceremony was held at the morning of fourth day and was introduced by Prof. Roger Frank (President of ISSMGE), Prof. Mounir Bouassida (Chairman of Scientific Committee), Mr. Slaheddine Haffoudhi (President of ATMS), Mr. Mehrez Khemakhem (Chairman of Organizing Committee), Dr. Imen Said (Vice Chairman of Organizing Committee). Conclusions and statistics of the conference have been made. Tunisian gifts were offered to persons who contributed to the success of the 16th ARCSMGE (keynotes, sponsors, 3 best papers, Members of ISSMGE). It is worth to mention that 14 papers were selected for submission in extended form to Environmental Geotechnics Journal (ICE) and Geotechnical Engineering Journal of SEAGS.

Finally, the fruitful exchange of ideas and discussions between all participants of ARCSMGE 2015 is a positive sign for the recent wake up of Africa in Geotechnical Engineering.

Conference Report (Con't)

The 16th African Regional Conference on Soil Mechanics and Geotechnical Engineering, Hammamet, Tunisia, 27th – 30th April 2015

The conference was followed by a special Symposium (ISP'7) on the occasion of the 60th anniversary of Ménard pressuremeter.



Photo 1. Opening Ceremony



Photo 2. Group photo



Photo 3. Plenary session



Photo 4. Speech given by Prof Roger Frank

Conference Report (Con't)

The 16th African Regional Conference on Soil Mechanics and Geotechnical Engineering, Hammamet, Tunisia, 27th – 30th April 2015



Photo 5. Meeting of African members societies



Photo 6. Gala Dinner

Prepared by

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Conference Report

International Symposium for the 60th Anniversary of the Pressuremeter (ISP7-PRESSIO 2015), Hammamet, Tunisia, 1st – 2nd May 2015

The International Symposium for the 60th Anniversary of the Pressuremeter (ISP7-PRESSIO 2015) was successfully held on 1st and 2nd May 2015 at Hammamet, Tunisia. The two day symposium took place immediately after the 16th African Regional Conference on Soil Mechanics and Geotechnical Engineering (16th ARCSMGE). The symposium was very well organized by the Tunisian Society for Soil Mechanics (ATMS) with the support of the In-Situ Testing Technical Committee TC102 of ISSMGE. The symposium aimed to provide a golden opportunity to exchange experience between contractors, manufacturers, consulting firms, engineers, scientists and academics. The symposium is the seventh in the series. The earlier symposia were organized in various cities including Paris-France (1982), Texas-USA (1986), Cambridge - UK (1990), Sherbrooke - Canada (1995), and Paris - France (2005) and (2013). It is the first time a symposium of such series has been organized in the lovely African Continent.

The symposium was very well attended by many of the participants of the mother 16th Regional African conference. They were from 32 countries distributed as follows: 18 countries from the African continent, 8 countries from Europe, 4 countries from Asia and 2 countries from North America.

For the opening ceremony, Mr. Slaheddine Haffoudhi, the president of the Tunisian Association of Soil Mechanics, gave a welcome speech. The chairman of the organizing committee of the symposium, Dr. Wissem Frikhagave, gave a speech about the ISP7. Prof. Roger Frank (President of ISSMGE) read the speech of Prof. Michel Gambin (the honorary president of the symposium). Finally, the scientific program was presented by Mr. Serge Varaksin, the chairman of the scientific committee.

A half day short course on Ménard Pressuremeter was organized the day before the opening of the symposium and was coordinated by Dr. Roger Frank, Dr. Wissem Frikha and Dr. Serge Varaksin. The short course was very well attended (45 participants).

The program of the symposium included four keynote lectures and eight technical sessions. The eight technical sessions with 27 oral presentations covered the topics: Role of the Pressuremeter in Geotechnical Engineering, Applications to Structures Design, Pressuremeter Theory, Equipment and Methods, and Interpretation of Pressuremeter Tests.

Prof. Jian Chu (Singapore-USA) gave the first Keynote Lecture just after the opening ceremony. The lecture was entitled “*Use of pressuremeter tests for land reclamation projects in Singapore*”. The lecture presented a case study of using the Cambridge self-boring pressuremeter tests to determine the soil properties for a land reclamation project in Singapore. The results from the pressuremeter tests were compared with those from other in-situ and laboratory tests. The differences between the different tests were also explained.

The second Keynote Lecture was delivered by Michael Pavlakis. The lecture entitled “*Ménard Pressuremeter Testing in Residual Soils and Weathered Rocks of South Africa*”. The lecture dealt with the use of the Ménard Pressuremeter test in assessing the engineering behaviour of residual soils and weak rocks in South Africa, mostly as part of geotechnical investigations carried out for a number of projects over a period spanning more than 30 years. The lecture concluded that the Ménard Pressuremeter test had become an important instrument suited to obtaining information on the strength and compressibility of residual soils and weak rocks in South Africa and lead to reliable and economical foundation design.

The third Keynote Lecture was given by Prof. Viana Da Fonseca (Portugal), the Chairman of In-Situ Testing TC102 of ISSMGE. The lecture entitled “*The Use of Pressuremeter Tests for Modeling Residual Soils Geomechanics and Foundation Behaviour*”. In the lecture, the conditional assessment of mechanical characteristics of residual soils based on interpretation of in-situ testing due to microstructure, cohesive-frictional characteristics, stiffness non-linearity, small and large strain anisotropy, weathering and destructuration, saturation, consolidation/permeability characteristics and rate dependency was discussed

Conference Report (Con't)

International Symposium for the 60th Anniversary of the Pressuremeter (ISP7-PRESSIO 2015), Hammamet, Tunisia, 1st – 2nd May 2015

in the light of parametrical correlation proposals developed for these soils, both saprolitic as lateritic. The lecture further presented the analysis of the axially and laterally load-tested piles in a particular residual soil, by recourse to PMT semi-empirical curves in the light of their singularities.

Prof. Jean-Louis Briaud (USA) gave the fourth Keynote Lecture entitled “*Horizontal Load on Piles: Evaluation of the S.A.L.L.O.P. method*”. Prof. Briaud presented the results of horizontal load - horizontal displacement tests in loose sand, soft clay, medium hard clay and very dense crushed limestone. The results were used to evaluate the Simple Approach for Lateral Loads on Piles (S.A.L.L.O.P.) method that was based on pressuremeter tests results and was developed by Prof. Briaud in 1997.

All keynote lectures were very well received by the participants. The keynote lectures were followed by interesting discussions between the lecturers and participants.

On the night of the first day, a spectacular reception and ceremony of the 60th year anniversary of the pressuremeter was organized. The huge cake symbolizing the pressuremeter equipment was unforgettable by the attendees who enjoyed the entire evening.

The same large exhibition accompanied by the mother conference (16th Regional African Conference) was extended and continued to accompany the symposium.



Photo 1. Group Photo of ISP'7

Conference Report (Con't)

International Symposium for the 60th Anniversary of the Pressuremeter (ISP7-PRESSIO 2015), Hammamet, Tunisia, 1st – 2nd May 2015



Photo 2. Opening Ceremony of ISP'7



Photo 3. Ceremony of the 60 years anniversary of the pressuremeter

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Hot News

XVI European Conference on Soil Mechanics and Geotechnical Engineering (XVI ECSMGE)

The XVI ECSMGE will be held in Edinburgh, UK on 13th - 17th September 2015. It is fast approaching and is shaping up to be a fantastic conference. With only weeks to go, please ensure you register as soon as possible to secure your place!



You will have the option to purchase conference dinner tickets and technical tour tickets when registering. The conference dinner will take place at the beautiful National Museum of Scotland where you can expect some traditional Scottish entertainment and food! Technical tours include a boat trip on the Firth of Forth to view the construction works for the Queensferry Crossing cable-stayed bridge and the existing cantilever rail and suspension road bridge; the Falkirk Wheel, one of the 21st century engineering wonders, as well as a range of other options. Registration is available at: http://xvi-ecsmge-2015.org.uk/?page_id=62.

We have some excellent keynote and invited lecturers and further information about each speaker can be found on our conference website: http://xvi-ecsmge-2015.org.uk/?page_id=758.



Professor Kenichi Soga
University of Cambridge, UK
The Contribution of Monitoring
to Resilient Infrastructure and
Development



Professor Giulia Viggiani
Roma Tor Vergata, Italy
Recent Developments in Soil
Mechanics with Applications and
Case Studies



Professor António Gomes Correia
University of Minho, Portugal
Geotechnical Engineering for
Sustainable Transportation
Infrastructure

The exhibition for the conference has now sold out, so there will be a fantastic range of stands and displays. However, should your company wish to participate we still have sponsorship opportunities available - see http://xvi-ecsmge-2015.org.uk/?page_id=50.

Professor Mike Winter
Chair, Conference Organising Committee

Event Diary

ISSMGE EVENTS

Please refer to the specific conference website for full details and latest information.

2015

International Symposium on Geohazards and Geomechanics

Date: Thursday 10 September 2015 - Friday 11 September 2015

Location: University of Warwick campus, Coventry, United Kingdom

Language: English

Address: University of Warwick, Library Road, Coventry, CV4 7AL, Coventry, United Kingdom

E-mail: C.Voulgari@warwick.ac.uk

Website: <http://www2.warwick.ac.uk/fac/sci/eng/research/civil/geo/conference/>

European Young Geotechnical Engineers Conference

Date: Friday 11 September 2015 - Saturday 12 September 2015

Location: Durham University, Durham, United Kingdom

Language: English

Organizer: BGA

Contact person: Dr Ashraf Osman

Address: School of Engineering and Computing Sciences, Durham University, DH1 4QU, Durham, United Kingdom

Phone: +44 191 3342425

E-mail: ashraf.osman@durham.ac.uk

XVI European Conference on Soil Mechanics and Geotechnical Engineering

Date: Sunday 13 September 2015 - Thursday 17 September 2015

Location: Edinburgh International Conference Centre, Edinburgh, Scotland, United Kingdom

Language: English

Organizer: British Geotechnical Association

Contact person: Derek Smith

Address: Coffey Geotechnics Limited, The Malthouse, 1 Northfield Road, RG1 8AH, Reading, UK

Phone: +44 1189566066

Fax: +44 1189576066

E-mail: derek_smith@coffey.com

Website: <http://www.xvi-ecsmge-2015.org.uk/>

GEO-EXPO 2015 Scientific and Expert Conference in Zenica, Bosnia and Herzegovina

Date: Friday 18 September 2015 - Saturday 19 September 2015

Location: Faculty of Polytechnical Engineering, University of Zenica, Zenica, Bosnia and Herzegovina,

Language: Bosnian, Croatian, Serbian, English

Organizer: Geotechnical Society of Bosnia and Herzegovina

Contact person: Prof. Sabid Zekan

Address: Univerzitetska 2, 75000, Tuzla, Bosnia and Herzegovina

Phone: +387 61 56 22 77

Fax: +387 35 32 05 70

E-mail: geotehnika@geotehnika.ba

Website: <http://www.geotehnika.ba>

Event Diary (Con't)

2015

Workshop on Volcanic Rocks & Soils

Date: Thursday 24 September 2015 - Friday 25 September 2015

Location: Isle of Ischia, Italy

Language: English

Organizer: Associazione Geotecnica Italiana (AGI)

Contact person: Ms. Susanna Antonielli

Address: Viale dell'Università 11, 00185, Roma, Italy

Phone: +39 06 4465569 - +39 06 44704349

Fax: +39 06 44361035

E-mail: agi@associazionegeotecnica.it

Website: <http://www.wvrs-ischia2015.it/>

International Conference on Landslides and Slope Stability (SLOPE 2015)

Date: Sunday 27 September 2015 - Wednesday 30 September 2015

Location: The Discovery Kartika Plaza Hotel, Bali, Indonesia

Contact person: Paulus P. Rahardjo / Susana Dewi Santoso

Address: Universitas Katolik Parahyangan, 40141, Bandung, West Java, Indonesia

Phone: +62 22 2034072

Fax: +62 22 2060278

E-mail: secretariat@slope2015.com

Website: www.slope2015.com

The 6th International Conference on Earthquake Geotechnical Engineering

Date: Sunday 01 November 2015 - Wednesday 04 November 2015

Location: Christchurch, New Zealand

Contact person: The Conference Company

Address: PO Box 3727, Christchurch, New Zealand

Phone: +64 3 365 2217

Fax: +64 3 365 2247

E-mail: 6icege@tcc.co.nz

Website: <http://www.6icege.com>

The 15th Asian Regional Conference on Soil Mechanics and Geotechnical Engineering -New Innovations and Sustainability

Date: Monday 09 November 2015 - Friday 13 November 2015

Location: Fukuoka International Congress Center, Fukuoka, Kyushu, Japan

Language: English

Organizer: The Japanese Geotechnical Society

Contact person: Toshifumi Mukunoki

Address: 2-39-1 Kurokami, Chuou-ku, Kumamoto, JAPAN, 860-8555, Kumamoto, Japan

Phone: +81-96-342-3535

Fax: +81-96-342-3535

E-mail: 15tharc@kumamoto-u.ac.jp

Website: <http://www.jgskyushu.net/uploads/15ARC/>

Event Diary (Con't)

2015

XV Pan American Conference on Soil Mechanics and Geotechnical Engineering

Date: Sunday 15 November 2015 - Wednesday 18 November 2015

Location: Hilton Hotel, Buenos Aires, Argentina

Language: Spanish - Portuguese - English (simultaneous translation)

Organizer: Argentinean Society for Soil Mechanics and Geotechnical Engineering

Contact person: Dr. Alejo Oscar Sfriso

Address: Rivadavia 926 Suite 901, C1002AAU, Buenos Aires, Argentina

Phone: +541143425447

Fax: +541143423160

E-mail: presidente@saig.org.ar

Website: www.panam2015.com.ar

Geo-Environment and Construction European Conference

Date: Thursday 26 November 2015 - Saturday 28 November 2015

Location: Polis University, Tirana, Albania

Language: Albanian, English

Organizer: Polis University, Albanian Geotechnical Society and Co-PLAN

Contact person: Msc. Eng. Erion Bukaçi

Address: Polytechnic University of Tirana, Faculty of Civil Engineering, 1001, Tirana, Albania

E-mail: erion.bukaci@gmail.com, Correspondence and information, MSc. Eng. Erdi Myftaraga (erdi.myftaraga@hotmail.com), Prof. Dr. Luljeta Bozo (lulibozo@gmail.com)

International Conference on Soft Ground Engineering ICSGE2015

Date: Thursday 03 December 2015 - Friday 04 December 2015

Location: Singapore, Singapore

Language: English

Organizer: Geotechnical Society of Singapore

Contact person: Dr Kam Weng Leong

Address: OPE3, Faculty of Engineering, NUS, 117578, Singapore

E-mail: ICSGE2015@nus.edu.sg

Website: <http://www.geoss.sg/icsge2015>

The 1st International Conference on Geo-Energy and Geo-Environment (GeGe2015)

Date: 4th and 5th December 2015 (Friday and Saturday)

Location: The Hong Kong University of Science and Technology (HKUST), Hong Kong

Language: English

Organizers: HKUST, Chongqing University, Hohai University and Zhejiang University in mainland China, and EPFL in Switzerland

Contact person: Ms Shirley Tse

Address: The Geotechnical Centrifuge Facility, HKUST, Clear Water Bay, Kowloon, Hong Kong

Phone: +852-2358-0216

Fax: +852-2243-0040

E-mail: gege2015@ust.hk

Website: <http://gege2015.ust.hk>

Event Diary (Con't)

2015

GIFT - Geotechnics for Infrastructure and Foundation Techniques

Date: Thursday 17 December 2015 - Saturday 19 December 2015

Location: Govt. College of Engineering (Established 1853 AD), PUNE, MAHARASHTRA, India

Language: English

Organizer: Indian Geotechnical Society, Pune Chapter

Contact person: Prof. Yashwant Apparao Kolekar

Address: Associate Professor, Geotechnical Engineering Division, Dept. of Civil Engineering, Govt. College of Engineering, Wellsley Road, Shivajinagar, 411005, Pune, Maharashtra, India

Phone: +91-20-25507070 / +91-9420963672

Fax: +91-20-25507299

E-mail: igc2015pune@gmail.com

Website: <http://www.igc2015pune.in/GUI/index.aspx>

2016

Underground Construction Prague 2016

Date: Monday 23 May 2016 - Wednesday 25 May 2016

Location: Clarion Congress Hotel Prague Prague, Czech Republic

Language: English

Organizer: Czech Tunnelling Association

Contact person: SATRA, spol. s r. o.

Address: Sokolská 32, 120 00, Prague 2, Czech Republic

Phone: +420 296 337 181

Fax: +420 296 337 189

E-mail: ps2016@satra.cz

Website: <http://www.ucprague.com>

NGM 2016, The Nordic Geotechnical Meeting

Date: Wednesday 25 May 2016 - Saturday 28 May 2016

Location: Harpan Conference Centre, Reykjavik, Iceland

Language: English

Organizer: The Icelandic Geotechnical Society

Contact person: Haraldur Sigursteinsson

Address: Vegagerdin, Borgartún 7, IS-109, Reykjavik, Iceland

Phone: +354 522 1236

Fax: +354 522 1259

E-mail: has@vegagerdin.is

Website: <http://www.ngm2016.com>

Fifth International Conference on Geotechnical and Geophysical Site Characterisation (ISC'5)

Date: Monday 05 September 2016 - Friday 09 September 2016

Location: QT Hotel, Gold Coast, QLD, Australia

Contact: Hannah

Address: 113 Harrington St, 7000, Hobart, TAS, Australia

Phone: +61 03 6234 7844

E-mail: hannah@laevents.com.au

Website: www.isc5.com.au

Event Diary (Con't)

2016

International Mini Symposium Chubu (IMS-Chubu)

Date: Thursday 26 May 2016 - Saturday 28 May 2016

Location: Disaster Mitigation Research Building, Nagoya University, Nagoya, Aichi, Japan

Language: English

Organizer: The Japanese Geotechnical Society

Contact person: International Affairs Department, Japanese Geotechnical Society

Address: 4-38-2 Sengoku, Bunkyo-ku, 112-0011, Tokyo, Japan

Phone: +81-3-3946-8671

Fax: +81-3-3946-8678

E-mail: kokusai@jiban.or.jp

Website:

https://www.jiban.or.jp/index.php?option=com_content&view=article&id=1737:2016052628&catid=16:2008-09-10-05-02-09&Itemid

SEAGC2016

Date: Tuesday 31 May 2016 - Friday 03 June 2016

Location: Dorsett Grand Subang, Subang Jaya, Selangor, Malaysia

Language: English

Organizer: Malaysian Geotechnical Society and Institution of Engineers, Malaysia

Contact person: SEAGC2016 Secretariat

Address: c/o IEM Training Centre Sdn Bhd, No.33-1A (1st Floor) Jalan 52/18, PO Box 224 (Jalan Sultan), 46720, Petaling Jaya, Selangor, Malaysia

Phone: +(603) 7958 6851

Fax: +(603) 7958 2851

E-mail: seagc2016@gmail.com / choy.iemtc@gmail.com

Website: www.mygeosociety.org/SEAGC2016

12th International Symposium on Landslides

Date: Sunday 12 June 2016 - Sunday 19 June 2016

Location: Naples, Italy

Language: English

Contact person: Italian Geotechnical Association (AGI)

Address: Viale dell'Università, 11 - 00185, Roma, Italy

Phone: +39 064465569 - 0644704349

E-mail: agi@associazionegeotecnica.it

Website: <http://www.isl2016.it/>

GeoChina 2016

Date: Monday 25 July 2016 - Wednesday 27 July 2016

Location: Shandong, China

Language: English

Organizer: Shandong University in Cooperation with Shandong Department of Transportation and University of Oklahoma

Contact person: Antony Warden

Address: Shanghai, China

Phone: +86-021-54721773

E-mail: geochina.sec@gmail.com

Website: <http://geochina2016.geoconf.org/>

Event Diary (Con't)

2016

3rd ICTG International Conference on Transportation Geotechnics

Date: Sunday 04 September 2016 - Wednesday 07 September 2016

Location: Vila Flor Cultural Centre and University of Minho, Guimaraes, Portugal

Language: English

Organizer: Portuguese Geotechnical Society and University of Minho

Contact person: Prof. A. Gomes Correia (Chair)

Address: University of Minho, School of Engineering, 4800-058, Guimarães, Portugal

Phone: +351253510200

Fax: +351253510217

E-mail: agc@civil.uminho.pt

Website: <http://www.webforum.com/tc3>

13th Baltic States Geotechnical Conference

Date: Thursday 15 September 2016 - Saturday 17 September 2016

Location: Vilnius University, Vilnius, Lithuania

Language: English

Organizer: Baltic Sea states Geotechnical Societies / Main organizer Lithuanian Geotechnical Society

Contact person: Danutė Sližytė

Address: Saulėtekio ave. 15-510, LT-10224, Vilnius, Lithuania

Phone: +37068690044

Fax: +37052500604

E-mail: danute.slizyte@vgtu.lt

Website: <http://www.13bsgc.lt>

2017

ICSMGE 2017 - 19th International Conference on Soil Mechanics and Geotechnical Engineering, Seoul

Date: Sunday 17 September 2017 - Thursday 21 September 2017

Location: Coex Convention Center, Seoul, Korea

Language: English and French

Organizer: Organising Committee of ICSMGE 2017

Contact person: Ms. Soi Lee

Address: 4F, SUNGJI Building, 192, Bangbae-ro, Seocho-gu, 137-835, Seoul, Republic of Korea

Phone: +82-2-6288-6347

Fax: +82-2-6288-6399

E-mail: secretariat@icsmge2017.org

Website: <http://www.icsmge2017.org>

Event Diary (Con't)**NON-ISSMGE SPONSORED EVENTS****2015****International Conference in Geotechnical Engineering - ICGE-Colombo 2015**

Date: Monday 10 August 2015 - Tuesday 11 August 2015

Location: Colombo, Colombo, Sri Lanka

Language: English

Organizer: Sri Lankan Geotechnical Society

Contact person: Eng. K. L. S. Sahabandu

Address: Central Engineering Consultancy Bureau, 415, Baudhaloka Mawatha, Colombo 7, Sri Lanka

Phone: +94 11 2668803

Fax: +94 11 2687369

E-mail: gm@cecbsl.com ; sahabandukls@gmail.com

Website: www.sigs.lk

The 2nd International Symposium on Transportation Soil Engineering in Cold Regions (TranSoilCold2015)

Date: Thursday 24 September 2015 - Saturday 26 September 2015

Location: Siberian State University of Railway Engineering, Novosibirsk, Russia

Language: English, Russian

Organizer: Universities of Russia, China, USA

Contact person: Yury Moryachkov

Address: Novosibirsk, Russia

E-mail: transoilcold@inbox.ru

Website: <http://transoilcold2015.stu.ru/>

5th International Symposium on Geotechnical Safety and Risk (ISGR 2015)

Date: Tuesday 13 October 2015 - Friday 16 October 2015

Location: WTC, Rotterdam, The Netherlands

Language: English

Organizer: KIVI, GEOSnet, Geo Impuls

Contact person: Maarten Profittlich

Address: Zekeringstraat 41A, 1014BV, Amsterdam, The Netherlands

Phone: +31206510800

E-mail: nssmge@kivi.nl

Website: www.isgsr2015.org

FOR FURTHER DETAILS, PLEASE REFER TO THE WEBSITE OF THE SPECIFIC CONFERENCE

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UNITED STATES



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Foundation Donors

The Foundation of the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE) was created to provide financial help to geo-engineers throughout the world who wish to further their geo-engineering knowledge and enhance their practice through various activities which they could not otherwise afford. These activities include attending conferences, participating in continuing education events, purchasing geotechnical reference books and manuals.

- **Diamond: \$50,000 and above**

- a. ISSMGE-2010 <http://www.issmge.org/>



- b. Prof. Jean-Louis and Mrs. Janet Briaud
<https://www.briaud.comand>
<http://ceprofs.tamu.edu/briaud/>



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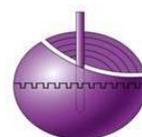
- b. Geo-Institute of ASCE
<http://content.geoinstitute.org/>



- c. Japanese Geotechnical Society
<http://www.jiban.or.jp/>



- d. The Chinese Institution of Soil Mechanics and Geotechnical Engineering - CCES
www.geochina-cces.cn/en



CISMGE-CCES

- e. Korean Geotechnical Society
www.kgshome.or.kr



- f. Comité Français de la Mécanique des Sols et de Géotechnique
www.cgms-sols.org



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<http://civil.yonsei.ac.kr>



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- d. CalGeo - The California Geotechnical Engineering Association
www.calgeo.org



- e. Prof. Ikuo Towhata



<http://geotle.t.u-tokyo.ac.jp/>

towhata@geot.t.u-tokyo.ac.jp

- f. Chinese Taipei Geotechnical Society

www.tgs.org.tw

- g. Prof. Zuyu Chen
<http://www.iwhr.com/zswenglish/index.htm>



- h. East China Architectural Design and Research

Institute <http://www.ecadi.com/en/> **ECADI**

- i. TC 211 of ISSMGE for Ground Improvement
www.bbri.be/go/tc211



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www.enu.kz/en, www.kgs-astana.kz

- k. TC302 of ISSMGE for Forensic Geotechnical Engineering
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