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Introduction for the 54th Rankine Lecture

The 54th Rankine Lecture of the British Geotechnical Association was given by Professor Guy Houlsby at Imperial College, London, on 19 March 2014. The following introduction was given by Professor H. J. Burd, Associate Professor, Department of Engineering Science, University of Oxford.

It is a great pleasure for me to introduce Professor Guy Houlsby, the British Geotechnical Association's 54th Rankine Lecturer.

Guy Houlsby was born and brought up on Tyneside. In 1972 he was admitted to St John's College, Cambridge to read engineering and, 3 years later, he graduated with first-class honours with distinction. After completing his undergraduate degree, Guy spent 2 years working in civil engineering consultancy. Then, in 1977, he decided to return to Cambridge to register for a PhD in soil mechanics under the supervision of the late Peter Wroth.

Two years later, Peter Wroth left Cambridge to take up the Professorship of Engineering Science at the University of Oxford. Soon after, Guy was able to follow Peter to Oxford by securing a junior research fellowship at Balliol College. Later, in 1983, Guy was appointed to a university lecturership in the Department of Engineering Science at Oxford University and was elected to a fellowship at Keble College. During these years, the professional relationship with Peter Wroth that Guy had formed during his graduate student days continued to flourish. Peter was particularly influential in Guy's early research on the interpretation of various forms of in situ test. This line of research resulted in a string of highly cited papers, including an award-winning publication, in *Géotechnique* in 1988, on the analysis of the cone pressuremeter test in clay.

In 1990, Peter Wroth vacated his Oxford chair to return to Cambridge. Guy was his natural successor and, in 1991, he was duly elected to the – newly renamed – Professorship of Civil Engineering, a post that he has held ever since.

It is interesting to reflect on the title that Guy chose for his PhD thesis, completed in 1981, 'A study of plasticity theories and their applicability to soils'. This gives a taster of the two key themes of 'theory' and 'application' that would become distinctive features of Guy's later research. First, theory. Mathematical theory; elegant, clear and concise, forms a consistent thread through his published work. In particular, since his early days as a graduate student, Guy has harboured a fascination with the development of plasticity models that are derived directly from the principles of thermodynamics. These methods provide a rigorous framework within which plasticity theories of various sorts can be developed. Much of Guy's work in this area has been conducted during evenings and weekends and various other spare moments, but from time to time it was given impetus by academic visitors and colleagues, and by mathematically minded graduate students. This research has been influential not just within the soil mechanics community, but also in the wider world of constitutive modelling of non-linear materials.

The second key theme is 'application'. Guy's publications demonstrate a well-developed sense of the importance of publishing research that is actually useful. A good example is his 1984 *Géotechnique* paper, with Professor Mark Randolph, on 'The limiting pressure on a circular pile loaded laterally in cohesive soil'. The simple and elegant results developed in this classic paper have been widely applied in the world of piling engineering.

Professor Guy Houlsby

Much of Guy's research has been concerned with the design of offshore foundations – the topic of this evening's lecture. He has conducted extensive research on spud-can footings for jack-up rigs and has published important work on the design of piled foundations as well as the analysis and design of suction caissons for static and cyclic loading. He has consulted widely on a range of offshore foundation projects and he recently served on an ISO panel drafting guidance on the safety of jack-up units.

Guy's research in offshore foundations was initially motivated by the oil and gas industry, but in recent years it has led him to become increasingly interested in a range of other opportunities associated with offshore power generation. Initial research in this area was concerned with foundations for offshore wind turbines. But this contact with the wind energy industry encouraged Guy to develop a rather more wide-ranging portfolio in offshore renewable energy. He currently leads a rapidly expanding group working on systems for tidal power extraction. Research is being conducted at a range of scales from the interaction between a single turbine blade and the surrounding fluid, up to entire tidal basins and geographical regions.

Guy has a strong commitment to his graduate students. He is an assiduous supervisor, generous with his time and an invaluable source of creative and wise advice. He is strongly supportive of the geotechnical community outside the confines of the university. He has been particularly committed to the journal *Géotechnique* and has published numerous papers in this journal alone. Guy has served as a member of the *Géotechnique* Advisory Board and, from 2003 to 2005 he was the journal's Honorary Editor.

No introduction to Guy would be complete without mention of his wife, Jenny. Jenny has been a strong supporter of the Oxford civil engineering research group in her own right. Generations of graduate students, post-docs and academic colleagues will remember with affection the various gatherings and events, and warm general hospitality that they have enjoyed at the Houlsby's house on the outskirts of Oxford.

Visitors to their home will notice, mounted on the wall of the dining room, a painted rowing oar; a trophy from Guy's

undergraduate rowing days. Guy had some success as a college oarsman which, in his own words, he puts down to being 'more due to enthusiasm than ability'. He has kept up his rowing interests as the years have moved on and has been a committed supporter of the boat club at Brasenose College, where he is a Professorial Fellow. He still rows on a casual basis on a Sunday morning, weather permitting. Guy has a range of other outdoor interests and, in particular, he is an enthusiastic ornithologist.

Guy was elected a Fellow of the Institution of Civil Engineers in 1997 and was made a Fellow of the Royal Academy of Engineering in 1999. He was awarded the DSc in 2003. He is currently the Head of the Department of Engineering Science at Oxford. He has won numerous research prizes and awards, including, from the Institution of Civil Engineers, the Geotechnical Research Medal in 1989, a Telford Prize in 2001, the David Hislop Award in 2003, the Halcrow Prize in 2006 and the TK Hseih Award in 2011.

I am very pleased, on behalf of the British Geotechnical Association, to now invite Professor Guy Houlsby to deliver the 54th Rankine Lecture.