

Introduction for the 51st Rankine Lecture

The 51st Rankine Lecture of the British Geotechnical Society was given by Professor Scott Sloan at Imperial College, London, on 16 March 2011. The following introduction was given by Professor David Potts, Imperial College London.

Scott William Sloan was born in the small town of Mildura in North Victoria, Australia, in July 1954, and moved to Melbourne when he was 15 years old. Here he attended Monash University, where he graduated with a first-class honours degree in 1978. He then moved to Cambridge in the UK, where he obtained an MPhil degree in 1979 and a PhD in 1981. His research involved the application of the finite-element method to the analysis of geotechnical problems. He wrote his own finite-element software, and investigated the ability of various types of finite element to predict collapse loads. A direct result of this seminal research is the availability of the 15-noded triangular element in most commercial software.

After obtaining his PhD, Scott remained at Cambridge for a further year as a postdoctoral fellow at Trinity College. He then moved to Oxford University to become a research fellow at New College for two years. During these post-doctoral years he continued research on the finite-element method, and developed many novel algorithms. Of particular note are his algorithms for the automatic renumbering of nodes and elements, which led to significant economies in storage and computer run times. Both of these algorithms, along with his 'point in a polygon' algorithm, are widely used in commercial finite-element software.

Scott returned to Australia in 1984 to take up a lectureship at the University of Newcastle. He was promoted to Senior Lecturer in 1989, Associate Professor in 1993 and full Professor in 1998. Since 1990 he has been director of the Geotechnical Research Group, and since 2004 he has also been Deputy Head of the School of Engineering. In his early years at Newcastle he continued his research on the application of the conventional finite-element method. Of particular merit was his research on mesh generation, stress point algorithms, automatic load stepping and constitutive modelling. However, he also initiated research into a new method of analysis that combines limit analysis and finite elements. This has been particularly fruitful, and forms the subject of his lecture tonight.

Scott pursues his research goals with determination, but he also gives unstinting support to whoever may need it at a particular time. It is not surprising, therefore, that he commands a very strong loyalty from the members of his research group, past and present. This gives rise to the situation in which he finds it difficult to see his researchers leave, and they do not wish to go. As a consequence his Geotechnical Research Group has grown significantly over the years, and now numbers some 50 researchers, of whom

about 30 are staff or postdoctoral members. This growth pattern is broadly consistent with Moore's law, which states that computing capacity doubles every two years.

Of course, to maintain such a large group requires significant funds, and Scott has been particularly successful in this respect. To date he and his group have secured in excess of A\$33 million in grant money. Earlier this year, his research group – along with colleagues from the Universities of Western Australia and Woollongong – were made an Australian Research Council Centre of Excellence, which guarantees them funding for the next seven years. To put this in perspective, this was the only centre of excellence in engineering awarded in the last round.

Professor Sloan has authored or co-authored more than 220 technical papers. He has received many distinctions and awards. He has been a Federation Fellow and is currently a Laureate Fellow, both prestigious awards from the Australian Research Council. He was awarded the Telford Medal by the Institution of Civil Engineers (UK) for his research on bearing capacity, and the Thomas A. Middlebrooks Award by the American Society of Civil Engineers for his work on the stability of braced excavations. He was awarded the Booker Medal for contributions to stability analysis and the Desai Medal for outstanding contributions to computational geomechanics, both by the International Association for Computer Methods and Advances in Geomechanics. He was awarded the Centenary Medal by the Prime Minister of Australia for services to civil engineering and geotechnical research.

Scott is a fellow of the Institution of Civil Engineers, Australia, a fellow of the Academy of Technological Sciences and Engineering, Australia (equivalent to the Royal Academy of Engineering in the UK), and a fellow of the Australian Academy of Science (equivalent to the Royal Society in the UK). He is also a visiting principal with Coffey Geotechnics.

In his spare time Scott is an enthusiastic fisherman. He regularly fishes locally, using his own boat, and also has frequent fishing trips to North Australia to catch barramundi. On returning from these trips, whereas most fishermen would have tales about the big fish that got away, Scott often recalls tales of how the boat he was fishing from was attacked by sharks or large crocodiles. In this respect we are fortunate that he is with us tonight. I have personal experiences of fishing with Scott. Like many Australians, Scott takes his hobbies seriously, and with full commitment. Consequently, a fishing trip is a highly charged, full-day event that often results in a boatload of fish and some very tired fishermen.

Ladies and gentlemen, on behalf of the British Geotechnical Association, I am delighted to invite Professor Scott Sloan to deliver the 51st Rankine Lecture.