Editorial: tunnelling in the urban environment

The response of the ground and nearby structures and services to tunnelling constitutes a complex soil–structure interaction boundary value problem. The conditions around tunnels will depend on the stress state in the ground, soil type, tunnel geometry, construction technique and permeability of the tunnel lining with respect to that of the ground. The complexity of tunnelling conditions increases further when considering a typical urban environment, with buildings above where tunnels are to be constructed, or other tunnels and services crossing above or below the new tunnel construction. For this reason, physical modelling and monitoring of full-scale tunnels are frequently employed to gain insight into mechanisms of deformation and failure of tunnels. More often, with an increasingly congested underground space, sophisticated numerical analyses are the principal means of understanding detailed mechanisms of multiple soil–structure interactions.

With urban tunnel construction growing worldwide, being able accurately to predict the ground and structural response to tunnelling and the associated risks is crucial. This is fundamental to safeguarding the urban fabric, such as existing infrastructure for transport and services and historic and sensitive structures. Even though it faces many engineering challenges, tunnelling design has seen significant advances, both practically and academically, over the past 20 years. In the UK alone, major projects, like the Jubilee Line Extension, Channel Tunnel Rail Link and most recently Crossrail, have left an invaluable legacy of new knowledge, innovation and practical experience in tunnel construction, with many new projects poised to benefit from this legacy.

As a leading geotechnical journal, *Géotechnique* has regularly published papers on tunnelling, from its inception to the present day. It is therefore very timely for the journal to host a symposium in print on this topic. The response to the call for abstracts was considerable. Following the standard *Géotechnique* review process, six papers have been selected for publication in the dedicated symposium issue, while four others that missed the publication deadline will appear in future general *Géotechnique* issues. The papers group very conveniently into four topics, from greenfield tunnelling to effects of tunnelling on surface structures, on existing tunnels and on pile foundations. Moreover,

studies within each topic explore the engineering challenges with different tools, including field monitoring, physical modelling and numerical analysis. The list of the investigated case studies comprises the Channel Tunnel Rail Link and Crossrail in the UK and the Barcelona metro construction in Spain. The last of the selected papers addresses design aspects of sprayed concrete lined tunnels in relation to the Eurocode 7 design code, and how this can be used in conjunction with numerical analysis.

This themed issue of *Géotechnique* is supplemented by the symposium in print event on 14 September 2017 at the Institution of Civil Engineers, also supported by the British Tunnelling Association. This will be a whole-day event, organised in two sessions, with presentations of all ten selected papers and ample time available for discussion. The gathering should provide an excellent interaction forum and is open to all interested participants. Prior registration is required at ice.org.uk/geosip17 or by emailing events@ice.org.uk.

I have enjoyed working with colleagues on the symposium sub-committee, who contributed significant effort in assessing papers over a tight time scale, making this themed issue and the event possible. We thank numerous external reviewers for their prompt and comprehensive responses. Final thanks are due to Craig Schaper, Journals Editor at ICE Publishing, for his efforts and advice during this process.

Lidija Zdravković
Imperial College London

Symposium in print sub-committee chairman
Professor Lidija Zdravković, Imperial College London, UK

Symposium in print sub-committee members
Dr David Chapman, University of Birmingham, UK
Dr Mohammed Elshafie, Cambridge University, UK
Dr Paul Morrison, Arup, UK
Professor Helmut Schweiger, Graz University of Technology, Austria
Dr Jamie Standing, Imperial College London, UK
Professor Giulia Viggiani, University of Rome Tor Vergata, Italy