

Lecture Notes in Civil Engineering

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# Challenges and Innovations in Geomechanics

Proceedings of the 16th International  
Conference of IACMAG - Volume 1



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# Lecture Notes in Civil Engineering

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Editors

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16<sup>th</sup>  
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# Preface

The XVI International Conference on Computer Methods and Advances in Geomechanics is sponsored by International Association of Computer Methods and Advances in Geomechanics (IACMAG) and organised by the Politecnico di Torino, Department of Structural and Geotechnical Engineering. The previous conferences in the series were held at Vicksburg, USA, 1972; Blacksburg, USA, 1976; Aachen, Germany, 1979; Edmonton, Canada, 1982; Nagoya, Japan, 1985; Innsbruck, Austria, 1988; Cairns, Australia, 1991; Morgantown, USA, 1994; Wuhan, China, 1997; Tucson, USA, 2001; Turin, Italy, 2005; Goa, India, 2008; Melbourne, Australia, 2011; Kyoto, Japan, 2014; and Wuhan, China, 2017.

The general theme of this conference is ‘Challenges and Innovation in Geomechanics’. Never the title was so appropriate! The conference was originally planned to take place in July 2020 in the city of Turin, Italy. The outbreak of the coronavirus brought a new and unexpected challenge to the organising committee and, more seriously, to the whole world. In the light of this development, the conference was postponed to 5–8 May 2021 and, at the time of printing, despite the never-ending hope, there is no guarantee that these new dates will not need to be affected again. Therefore, the decision was taken to anticipate the publication of the proceedings: almost one year before the conference dates. This is, undoubtedly, a very unusual situation for IACMAG and, in general, for conferences. Priority was given to the rights and expectations of authors to have their work published, avoiding additional delays with respect to the submission date.

It is more than clear that the organising committee had another idea for challenges when selecting the topic. The organisers intended the conference as an opportunity to think on new paths for geomechanics beyond computational methods and open thoughts on the challenges that the society needs to face. Many borderline topics were welcomed and received attention. The contributions of authors from all over the world (42 countries represented) provide an up-to-date picture of the broad research field of computational geomechanics. They are included in two volumes of proceedings.

The topics are presented in 4 sections (methods and tools, application in geotechnical engineering, environmental geomechanics and geomechanics for energy). Each section is then divided into more focused subsections. All papers were subjected to a peer-review process, and only the accepted ones are published here: 229 papers are included for a total of roughly 2000 pages.

This volume includes the keynote and special lectures together with papers from the section methods and tools. Volume 2 (ISBN 978-3-030-64517-5) collects the papers of the sections: application in geotechnical engineering, environmental geomechanics and geomechanics for energy.

At this stage, we wish to thank all authors who have submitted papers to this conference and confirmed their willingness to pursue the publication despite the unusual boundary conditions. Special thanks also go to Dr Alessandra Insana and Dr Matteo Baralis for the assistance with the preparation of these proceedings.

In days where we are all struggling with continued videoconferences, we hope and cross fingers to be able to meet in person shortly. We would like to welcome you, to shake hands, to sit at a table and talk, to meet in front of a booth, to discuss a paper while drinking an aperitivo, to see and touch innovations and equipment, to visit new places, to learn from other's experiences, in other words to take advantage of a conference. Hopefully, coming soon, in Torino.

Marco Barla  
Alice Di Donna  
Donatella Sterpi

# Organisation

The XVI International Conference on Computer Methods and Advances in Geomechanics is sponsored by International Association of Computer Methods and Advances in Geomechanics (IACMAG) and organised by the Politecnico di Torino, Department of Structural and Geotechnical Engineering. Endorsements were received by the Regione Piemonte, Città di Torino, Città Metropolitana di Torino, Associazione Geotecnica Italiana (AGI), Gruppo Nazionale di Ingegneria Geotecnica (GNIG), Comité Français de Mécanique des Roches (CFMR), Comité Français de Mécanique des Sols et de Géotechnique (CFMS), European Large Geotechnical Institutes Platform (ELGIP).



The venue: the city of Turin surrounded by the Alps.



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