

# International Workshop: Adopting and Developing Eurocode 7 for Rock Engineering Design

Organised by:



Society for Rock  
Mechanics & Engineering  
Geology (Singapore)

5-6 November 2015, 9.00AM – 5.00PM  
Grand Copthorne Waterfront Hotel, Singapore

Co-organisers:



AUSTRIAN  
SOCIETY FOR  
GEOMECHANICS



International  
Society for  
Rock Mechanics  
Commission on  
Evolution of EC7



Geotechnical  
Society of  
Singapore

## SUMMARY

The Eurocode for Geotechnical Design, EN-1997-1:2004, informally known as Eurocode 7 or EC7, was fully implemented within the EU in 2010. In Singapore, the Building and Construction Authority Singapore started accepting the Singapore version of the Eurocodes from 1 April 2013. Structural Eurocodes became the only prescribed structural design standards from 1 April 2015.

However, in Europe and Singapore, it is widely recognised that the current version of EC7 is in many ways inappropriate and in some circumstances inapplicable to rock engineering design. This 2-day workshop is an attempt to bridge some of the gaps. It brings together local and international experts to share their expertise and experience in EC7 and to discuss ways for using EC7 for geotechnical engineering, with a focus on adopting and developing EC7 for rock engineering design.

**FEATURING 10 SPEAKERS FROM:  
AUSTRIA, CANADA, ITALY, NORWAY AND SINGAPORE**

**12 PDU  
3 STU**

**Markus BRANDTNER**, IGT Consulting Engineers, Austria

**Alfred FASCHING**, 3G Gruppe Geotechnik Graz ZT GmbH, Austria

**Anna Maria FERRERO**, University of Turin, Italy

**Bak Kong LOW**, Nanyang Technological University, Singapore

**John HARRISON**, University of Toronto, Canada

**Bjørn NILSEN**, Norwegian University of Science and Technology, Norway

**Kok-Kwang PHOON**, National University of Singapore, Singapore

**Wulf SCHUBERT**, Graz University of Technology, Austria

**Andrea SEGALINI**, University of Parma, Italy

**Yingxin ZHOU**, Defence Science and Technology Agency, Singapore

### COMMITTEE

Chairman: Yingxin ZHOU  
Co-Chairs: John HARRISON  
Wulf SCHUBERT

### REGISTRATION FEES

SRMEG/GeoSS Members: S\$750.00  
Non-Members: S\$800.00



Register online today!

[http://www.cma.sg/events/  
srmeg-workshop-ec7.html](http://www.cma.sg/events/srmeg-workshop-ec7.html)

Society for Rock Mechanics and Engineering Geology (Singapore)

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## PRELIMINARY PROGRAMME

### Thursday, 5 November 2015

Time	Title	Speaker
8.30AM	Registration	
9.00AM	Welcome	
	<b>BACKGROUND AND BASICS</b>	
9.10AM	History and Basic Principles of EC7 and Limit State Design	John Harrison
9.55AM	Variability and Reliability in Geotechnical Engineering	Kok-Kwang Phoon
10.40AM	<i>Coffee/tea break</i>	
11.00AM	Rock Mechanics Uncertainty, Variability and Vagueness in the Context of EC7	John Harrison
	<b>OBTAINING REAL DATA</b>	
11.45AM	Geological and Geotechnical Investigation of Complex Geological Structures - Strategies and Case Histories	Alfred Fasching
12.30PM	<i>Lunch</i>	
1.30PM	Modern Remote Sensing Tools for Obtaining Discontinuity Data, and the Analyses of Such Data to Generate Input for EC7 Designs	Anna Maria Ferrero
	<b>CURRENT APPROACHES</b>	
2.15PM	Rock Engineering Practice in Singapore	Yingxin Zhou
3.00PM	<i>Coffee/tea break</i>	
3.30PM	Risk-oriented Design and Construction of Tunnels - Austrian Style	Wulf Schubert
4.15PM	Facilitated Discussion - EC7 Issues	John Harrison
5.00PM	End of Day 1 Programme	

### Friday, 6 November 2015

Time	Title	Speaker
	<b>CURRENT APPROACHES</b>	
9.00AM	Adaptation of Norwegian Rock Engineering Practice to EC7	Bjørn Nilsen
9.45AM	Insights from Reliability-based Design to Complement EC7	Bak Kong Low
10.30AM	<i>Coffee/tea break</i>	
	<b>NEW DEVELOPMENTS</b>	
11.00AM	Design of Rock Fall and Debris Flow Barriers in Accordance with EC7	Andrea Segalini
11.45AM	Requirements and Execution of the Observational Method During Construction	Alfred Fasching & Wulf Schubert
12.30PM	<i>Lunch</i>	
1.30PM	Monitoring as Part of the Observational Approach	Wulf Schubert
2.15PM	Proposed Design Strategy for Tunnels - Report of the Austrian Working Group	Markus Brandtner & Wulf Schubert
3.00PM	<i>Coffee/tea break</i>	
3.30PM	Current Rock Engineering Practice in EC7	John Harrison
4.15PM	Facilitated Discussion - Site Investigations and Monitoring	Alfred Fasching
5.00PM	End of Day 2 Programme	

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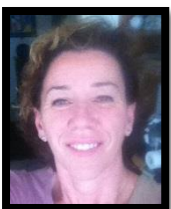
## SPEAKERS' BIOS



**Markus BRANDTNER** obtained his engineering degree from Secondary Technical College for Subsurface Engineering (HTL Saalfelden/Austria). He started his career at IGT Consulting Engineers in Salzburg in 1977 as a structural engineer. Since 2008 he has been Head of Department for Numerical Modelling and Structural Engineering. With more than 30 years of experience in numerical methods, especially in the field of the Finite Element Method, Markus was and is working on projects in Austria and abroad: Airport Link, Brisbane, Australia; Istanbul Strait Road Tube Crossing Project, Istanbul, Turkey; Crossrail London, GB, CAT III checker; Austrian Federal Railways, Semmering Base Tunnel, numerical analyses in fault zones; Tauern tunnel, Austria; Tunnel Lambach, Austria and many more. He is also a member of professional associations and the author of numerous publications.



**Alfred FASCHING** graduated in Engineering Geology from the Graz University in 1987 (MSc) and received his PhD from Graz University of Technology in 2000. Alfred has more than 25 years of international experience in engineering geological and geotechnical consulting services for underground works. He has been a professional engineer for 20 years and the managing director of 3G Gruppe Geotechnik Graz ZT GmbH for 20 years. Alfred has worked for many different kinds of projects, such as infrastructure, hydro power, irrigation, mining, underground storage in all different geological and climatic environments as well in large cities. He has experience in the design of underground investigation programs, ground modelling, rock mass characterization and consulting services during construction for projects in soft ground as well as hard, squeezing and bursting rock. Up to now Alfred has been involved in Tunnels projects with a length of individual tunnels up to 62 km and cavern projects with cross sections up to 2000 m<sup>2</sup>. He is active in several working groups of the ITA and Austrian Society for Geomechanics.



**Anna Maria FERRERO** is an associate professor in Geotechnics at the Earth Science department of the Turin University since October 2012. She was a professor at Parma University from 2002-2012, and a researcher in geotechnics at the Politecnico di Torino from 1992-2002. She has been in charge of the Slope Stability course for the degree of Civil and Environmental Engineering since 1995. She obtained her PhD from the Politecnico di Torino in 1993 and the Diploma of Imperial College of London in Rock Mechanics in 1995. She co-operated in several UE projects for the development of rock mechanics numerical models using different numerical tools such as the Finite Element Method and the Finite Difference for continuous medium and the Distinct Element Method for discontinuous medium. She is member of the president committee of the Italian geotechnical association since 2011 and member of the president committee of the geo resources and environmental association since 2010.



**Bak Kong LOW** obtained his BS and MS degrees in civil engineering from the Massachusetts Institute of Technology (MIT) in 1979, and PhD degree from the University of California at Berkeley in 1985. He is a Fellow of the American Society of Civil Engineers, a registered professional engineer of Malaysia, and an editorial board member of Computers and Geotechnics. Apart from his long teaching and research career at NTU, Prof. LOW also conducted research while on sabbatical leaves at HKUST (September-December 1996), University of Texas at Austin (January-April 1997), and Norwegian Geotechnical Institute (May-August 2006). His research interests include reliability-based design in geotechnical engineering, soil and rock slope stability, underground rock engineering, and engineering ground improvement. His publications can be found at <http://www.ntu.edu.sg/home/cbklow/>.

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**John HARRISON** joined the University of Toronto in October 2010 from Imperial College, UK, as the Keck Chair of Engineering Rock Mechanics and Associate Chair, Undergrad (Lassonde Mineral Engineering Program). He is a Chartered Civil Engineer, and holds both Masters and Doctoral degrees in Engineering Rock Mechanics. After graduating in Civil Engineering in 1979, he spent seven years in the civil engineering industry, both in the UK and overseas, working for both contractors and consulting engineers. His main research interests are in the unpredictability of the properties of fractured rock masses, particularly with regard to rock engineering design. Since 2011 he has been the convenor of a pan-European group of experts that is investigating the future development of rock engineering design within the European geotechnical engineering design code Eurocode 7, and is the Chairman of the ISRM Commission on the Evolution of Eurocode 7 for the period 2015-2019. He has published many scientific papers, books and book chapters, and regularly acts as a consultant to the civil, mining and petroleum engineering sectors.



**Bjørn NILSEN** received his Master and PhD degrees from the Norwegian Institute of Technology (NTH). Since 1985 he has been Professor of engineering geology at NTNU, the Norwegian University of Science and Technology, interrupted by 2 years as visiting professor at Colorado School of Mines in the US. Before joining the University he had 10 years of experience from consulting and mining industry. He has extensive experience on various aspects of rock engineering, including site investigation, planning and design, stability analyses and construction control. He has been acting as Expert advisor of several large projects in Norway and abroad and is covering a wide area with main current projects on subsea tunnelling, engineering geological aspects of mechanical excavation, hydropower tunnelling and rock slope stability analysis. In 2010-2011 he was member of the committee appointed by the Norwegian national group of ISRM for preparing recommendations on the use of Eurocode 7 for rock engineering planning and design. He is Former President of the Norwegian Tunnelling Society (NFF), and is also Chairman of the Scientific Committee for the upcoming ITA World Tunnel Congress in Bergen, Norway in 2017.



**Kok-Kwang PHOON** is Distinguished Professor and Head of the Department of Civil and Environmental Engineering, National University of Singapore. He is a Professional Engineer in Singapore and past President of the Geotechnical Society of Singapore. His main research interests include statistical characterization of geotechnical parameters and reliability-based design in geotechnical engineering. He is the recipient of numerous research awards, including the highest and most prestigious technical paper award bestowed by the American Society of Civil Engineers (ASCE), the Norman Medal in 2005 and the highest research award bestowed by the National University of Singapore, the Outstanding Researcher Award in 2010. He is the Founding Editor of Georisk and Chair of TC304 (Engineering practice of risk assessment and management) in the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE). He was former Chair of ASCE Geo-Institute Risk Assessment and Management Committee. He is Fellow of ASCE and Fellow of the Academy of Engineering Singapore.

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## SPEAKERS' BIOS



**Wulf SCHUBERT** graduated as a civil engineer from Graz University of Technology. He received his PhD from the Mining University Leoben. He has been working for 12 years for an international consulting company on a large number of projects, mainly tunnels for roads, railways and metros, caverns, mines, and slopes around the world as designer, Engineer, and consultant. Since 1992 he is head of the Institute for Rock Mechanics and Tunnelling at the Graz University of Technology. The focus of his research is on tunnelling in poor and faulted ground, ground characterization and monitoring. He has authored more than 200 papers, and supervised around 100 Master and PhD theses. Wulf has held a number of short courses on tunnelling in many countries. In co-operation with the Mining University Leoben a post graduate course in tunnelling has been established, which is very well received. He is member of several working groups in the ITA and ISRM, and the Austrian Society for Geomechanics. He is past Vice President of the ISRM and currently president of the Austrian Society for Geomechanics. As partner in the international consulting company 3G Gruppe Geotechnik Graz he is active in consulting on national and international projects.



**Andrea SEGALINI** achieved his Master of Science in Civil Engineering in 1995, at the University of Parma. In the same year, he acquired the Professional Engineering License and he's part of the Board of Engineers of the Parma province since 1996. In 1998 he achieved his PhD in Environmental Geo-Engineering at the Technical School of Turin. In the year 2000 he was awarded a four year research grant at the Department of Civil Engineering of the University of Parma. He was Adjoined Professor at the Faculty of Architecture of the University of Parma from 2003 to 2007, and Adjoined Professor at the Faculty of Engineering from 2005 to 2008. He became a Researcher in the scientific sector of Engineering Geology from 2007 until 2014 and received the title of Associate Professor of Engineering Geology in 2013. From 2014, he's in charge of the courses of Technical Geology and Slope Stability A and Rock Mechanics and Tunneling at the Department of Civil and Environmental Engineering and Architecture, as well as, of Geotechnics and Rock Mechanics at the Dept. of Physic and Earth Science of the University of Parma. His main research interests are focused on Rock Mechanics and Slope Stability fields.



**Yingxin ZHOU** is a Head Engineering (Underground Facilities) with the Defence Science & Technology Agency and Adjunct Associate Professor at the Nanyang Technological University. He has extensive experience in research, engineering, and teaching in the area of engineering geology, rock mechanics and rock engineering, planning and development of underground space. He has been involved in several major rock engineering projects in Singapore and provides technical advice to various government agencies on matters related to rock engineering and underground space use. He lectures regularly at NTU, NUS, and IES for undergraduate and post-graduate studies and industry-based training. Dr Zhou is the Vice President of the Associated research Centers for the Urban Underground Space. He was the founding President of the Society for Rock Mechanics & Engineering Geology Singapore and founding committee member of the Tunnelling and Underground Construction Society Singapore. Dr Zhou is a member of the Editorial Board for the International Journal of Tunnelling & Underground Space Technology, He has more than 100 technical publications and six edited books and conference proceedings.