

The 14th Sun Jun Lecture, Tongji University

**A Unified Critical State Model for Geomaterials with
an Application to Tunnelling**

by

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10:00-11:30, Monday, 27 May 2019

(同济大学土木大楼 A101 会议室)

This Lecture is prepared in honour of Professor Sun Jun for his outstanding contributions to geotechnical engineering, particularly in the field of tunnelling and underground excavation. As a result, I have chosen a topic that closely relates to his seminal contributions over a long and distinguished career. This lecture is concerned with the application of the critical state concept to modelling geomaterials and the analysis of tunnelling or underground excavation in geomaterials. In particular, the development of a unified critical state model for geomaterials is described briefly, followed by an application to cavity contraction problems and tunnelling in soils.



Professor Hai-Sui Yu is Professor of Geotechnical Engineering and Deputy Vice-Chancellor at the University of Leeds from 2016 and was elected a Fellow of the Royal Academy of Engineering in 2011. Professor Yu worked at the University of Newcastle, Australia from 1990-2000 before taking up the foundation Professorship of Geotechnical Engineering at the University of Nottingham in 2001, where he founded the Nottingham Centre for Geomechanics. He also served as Head of the School of Civil Engineering, Dean of the Faculty of Engineering, and Pro-Vice-Chancellor there. He obtained his M.Sc. degree in Rock Mechanics from Imperial College in 1987, and D.Phil. in Soil Mechanics from the University of Oxford in 1990. In recognition of his outstanding contributions to theoretical geomechanics, Professor Yu was awarded a higher doctorate (D.Sc.) in 2000 by the University of Newcastle, Australia.

Professor Yu's main research activities have focused on theoretical and computational geomechanics, constitutive modelling, in-situ soil testing, and pavement & railway geotechnics. Professor Yu is very active in professional activities and services and is the founding Editor-in-Chief of *Geomechanics and Geoengineering*. He has been awarded many international medals and prizes for his outstanding research work, which include the **British Geotechnical Association Medal** for 2015, the **Outstanding Contributions Medal** of the International Association for Computer Methods and Advances in Geomechanics (IACMAG) in 2014, the **Chandra Desai Medal** of IACMAG in 2008, the **first James K Mitchell Lecture** of the International Society for Soil Mechanics and Geotechnical Engineering in 2004, Shamsheer Prakash Foundation's **Research Award** in 2003, the Institution of Civil Engineers' highest research paper award, the **Telford Medal**, in 2000, and Australian Geomechanics Society's **Trollope Medal** in 1998.