

NZGS Geomechanics Lecture 2019

Presented by Dr Misko Cubrinovski

The subject of this lecture are three important aspects in the engineering assessment of soil liquefaction, i.e. material characterization of liquefiable soils, in-situ state characterization of soils, and system response of liquefiable deposits. These aspects in the assessment are especially important in the evaluation of liquefiable soils other than uniform clean sands, such as silts, silty sands with non-plastic or low-plasticity fines, gravel-sand-silt mixtures, and interbedded deposits composed of liquefiable and non-liquefiable soils.

Background of simplified liquefaction assessment procedures will be first discussed with emphasis on key assumptions adopted in the evaluation. Results from comprehensive field investigations, laboratory studies, advanced numerical analyses and observations from recent New Zealand earthquakes will then be used to demonstrate response characteristics of actual soil deposits, and challenges encountered in their engineering evaluation. Important aspects in the liquefaction evaluation of gravel-sand-silt mixtures, benefits of the use of state concept interpretation (critical state framework) in the assessment, and system response effects of liquefiable deposits will be discussed somewhat in detail.

Soil liquefaction during earthquakes is a very complex problem imposing numerous challenges in the engineering assessment. A large number of influencing factors are always in play resulting in a unique combination of contributions, for a given site and earthquake excitation. Unweaving this complexity and identifying key factors that govern the liquefaction response and associated damage should therefore be the principal target in the engineering assessment of liquefaction. The lecture highlights significant and unique contributions that rigorous geotechnical analysis and interpretation can provide in this assessment.



Misko Cubrinovski is Professor of Geotechnical and Earthquake Engineering in the Department of Civil and Natural Resources Engineering, University of Canterbury, Christchurch. He holds a BSc degree in Civil Engineering, MSc degree in Earthquake Engineering, and a PhD degree in Geotechnical Engineering (from the University of Tokyo, 1993). His career involves 36 years of work in the academia and the profession including seven years in Macedonia, 15 years in Japan, and 14 years in New Zealand.



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His research interests and expertise are in geotechnical earthquake engineering and in particular problems associated with soil liquefaction, seismic response of earth structures and soil-structure interaction. Misko has authored or co-authored over 350 technical publications, and has worked as a geotechnical specialist and advisor on over 50 significant engineering projects. His honours include the 2019 Ralph B. Peck Award (American Society of Civil Engineers, ASCE), 2016 Norman Medal (ASCE), 2014 Outstanding Paper Award (ASCE), 2014 Outstanding Paper Award (EERI), Director's Award of Taisei Corporation (Tokyo, Japan), and several awards from NZGS and NZSEE. Misko is a Faculty Member of the international postgraduate programme in Earthquake Engineering at the Rose School, Pavia, Italy, and Fellow of the University of Tokyo.