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Dipartimento di
Ingegneria Civile,
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DIPARTIMENTO
DI ECCELLENZA
— MUR —
2023-2027

Ph.D.ICEAA

**Ph.D. Program in Civil, Building Construction and
Environmental Engineering**

Coordinator: Prof. Marcello Di Risio

Findings from Recent Earthquakes

Seminar series

Tues, June 4th, 2024

9:00 to 10:30 am (GMT+2)

Online seminar - live streaming at:

<https://www.youtube.com/@univaqlive/live>

**Liquefaction assessment
methodologies for reclaimed land**

Prof Misko Cubrinovski

Dr Ribu Dhakal

University of Canterbury, New Zealand

The 2016 Mw7.8 Kaikōura earthquake caused widespread liquefaction of reclaimed fills at the port of Wellington, New Zealand (CentrePort), which is of significant interest for geotechnical engineers from a New Zealand and international perspective. Simplified assessment of liquefaction triggering and its associated consequences are commonly evaluated using methods based on case histories predominantly on naturally-deposited clean sand and non-plastic silty sand deposits. There are few case histories involving reclaimed land composed of the wide range of soils present at CentrePort, which include gravelly fills constructed by end-dumping and fine-grained hydraulic fills with varying fines content and plasticity. The gravelly fills provide an opportunity to investigate various aspects of liquefaction evaluation of gravel-sand silt mixtures including the applicability of state-of-the-practice simplified and advanced assessment procedures.



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The hydraulic fills are also of significant interest as they relate to a range of issues around the effects of fines and their plasticity on the liquefaction resistance. Thus, there is wealth of scientific and practical engineering information available for study of the CentrePort fills for further scrutiny on the accuracy of existing simplified methods when applied to the gravelly and fine-grained reclamations. This study utilizes results from laboratory testing and comprehensive in-situ site investigation, including over 100 Cone Penetration Tests, to scrutinise the applicability of widely used state-of-the-practice simplified CPT-based liquefaction triggering and settlement evaluation methodologies on the reclamation fills at CentrePort. Some results from advanced dynamic effective stress analyses are also shared to illustrate additional insights one can gain from the analyses, as compared to the simplified approach. Similarities and differences with the Kobe Port Island case history (1995 Kobe Earthquake, Japan) are brought to attention with specific reference to “inherited vulnerabilities” associated with reclaimed land.

About the Speakers



Misko Cubrinovski is Professor of Geotechnical and Earthquake Engineering at the University of Canterbury, Christchurch, New Zealand. His research focuses on problems associated with soil liquefaction, seismic response of earth structures, and soil-structure interaction. Cubrinovski has authored or co-authored over 350 technical publications and has worked as expert advisor on over 50 significant engineering projects. He had a leadership role in the research efforts supporting the recovery following the 2010-2011 Christchurch earthquakes. His honours include the Ishihara Lecture Award, Ralph B. Peck Award, Norman Medal, University of Canterbury Research Medal, and NZ Geomechanics Lecture Award. Cubrinovski is Fellow of the University of Tokyo and is the immediate past chair of TC203 (ISSMGE).

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Ribu graduated from the University of Canterbury with a Bachelor of Engineering with Honors, finishing his undergraduate studies in 2017. He completed his PhD at the University of Canterbury in 2022 with a research focus on liquefaction of reclaimed land using simplified and advanced analyses. He has authored several peer-reviewed technical articles and is now a postdoctoral research fellow studying the use of laboratory test data and advanced numerical modelling for liquefaction assessment of reclaimed soils and port infrastructure. His research interest is in geotechnical engineering focusing on challenges related to seismic design and assessment.

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For any inquiries, please email the Seminar Coordinator at anna.chiaradonna1@univaq.it