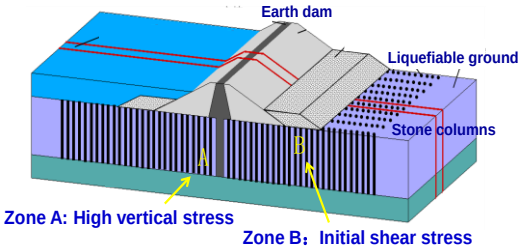
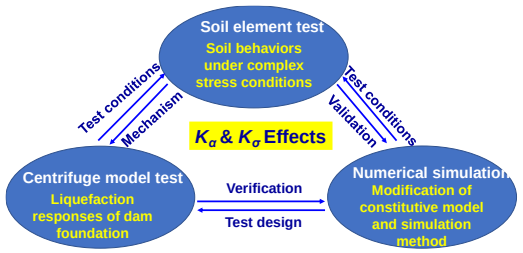
Special Session:

Liquefaction Experiments and Analysis Projects –Lesson Learned from LEAP-Asia-2025



Boundary Value Problem of Earth Dam



Liquefaction Experiment and Analysis Project

Candidate participants in LEAP-Asia-2025

CHIEF at Zhejiang University

Organisers

Prof. Yan-Guo Zhou; Zhejiang University, P. R. China (qzking@zju.edu.cn)

Yan-Guo Zhou is a Professor at Institute of Geotechnical Engineering, Center for Hypergravity Experiment and Interdisciplinary Research, Zhejiang University. His research spans soil dynamics and geotechnical earthquake engineering with emphasis on soil liquefaction, soil testing and foundation engineering with emphasis on soil disturbance, and hypergravity experiment by centrifuge modelling. He is actively involved in committees like ISSMGE TC104 and TC304, and board of the Seismological Society of China. He has been dedicating himself to some key programs such as the Major National Science and Technology Infrastructure Project (CHIEF) and the Liquefaction Experiments and Analysis Projects (LEAP), to address the challenges in centrifuge modelling of soil liquefaction, seismic performance of earth dams and other important geotechnical topics relevant to earthquake loadings.

Prof. Kyohei Ueda; Kyoto University, Japan (ueda.kyohei.2v@kyoto-u.ac.jp)

Kyohei Ueda is an Associate Professor at the Disaster Prevention Research Institute, Kyoto University. His research interests include geotechnical earthquake engineering and soil dynamics. He has conducted effective stress analyses and centrifuge model tests to investigate the complex seismic behavior of soil–structure systems, including liquefaction. His recent work also focuses on the dynamic responses of partially saturated, cohesive, and inherently anisotropic soils.

Prof. Rui Wang; Tsinghua University, P. R. China (wangrui_05@mail.tsinghua.edu.cn)

Rui is a Research Professor at Tsinghua University. He received his Ph.D. from Tsinghua University in 2014. His research mainly focuses on geotechnical earthquake engineering and soil liquefaction. He is the recipient of the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE) TC203 Young Researcher Award and ISSMGE Bright Spark Lecture Award. He is also a recipient of the National Science Fund for Distinguished Young Scholars and the Excellent Young Scientists Fund Program from the National Nature Science Foundation of China. Currently, he serves as the secretary general for the Chinese Institution of Soil Mechanics and Geotechnical Engineering (CISMGE) and the secretary for TC210 of ISSMGE.

Prof. Majid T. Manzari; George Washington University, USA (manzari@gwu.edu)

Majid Manzari is Department Chair and Professor of Civil and Environmental Engineering, have received worldwide attention as the premier research program on validation of geotechnical analysis. His Earthquake Engineering and Structures Lab conducts advanced experimental and computational research in earthquake engineering, fatigue and fracture of engineering materials, geomechanics, and geotechnical engineering. Current projects include: multiscale meshfree modeling of geostructures containing liquefiable soils, seismic response of nuclear fuel assemblies, fatigue of aluminum weldments, and development of efficient and robust techniques for implementation of elastoplastic models of engineering materials. He was co-leader of the Liquefaction Experiments and Analysis Projects (LEAP) in the last decade.

Prof. Mourad Zeghal; Rensselaer Polytechnic Institute, USA (zeghal@rpi.edu)

Dr. Mourad Zeghal is Professor of Civil and Environmental Engineering at Rensselaer Polytechnic Institute. He conducted research projects with over US$15 million in funding and has more than 200 publications. Dr. Zeghal's research focuses primarily on geohazards, including earthquakes and floods. His work includes micro- and multi-scale modeling and simulation in geomechanics, along with experimental data mining and machine learning. Over the last decade he was co-leader of the Liquefaction Experiments and Analysis Projects, LEAP. He was guest editor of the LEAP special issues published in Soil Dynamics and Earthquake Engineering.

Prof. Gopal Madabhushi; University of Cambridge, UK (mspg1@cam.ac.uk)

Gopal Madabhushi leads a research group on geotechnical earthquake engineering. He has wide-ranging interests in this field from post earthquake field investigations to experimental and numerical investigations of liquefaction induced failure mechanisms of civil engineering structures. He served as the chairman of EEFIT that operates under the auspices of Institution of Structural Engineers, London and continues as the member of the Missions Expert Group. He is a member of the Research and Education sub-committee of SECED. He is also a member of the Technical Committee TC2 of ISSMGE. He is the Associate Editor of the Journal of Geotechnical Earthquake Engineering and serves as the Editorial Board member of Geo-mechanics Engineering (GAE) Journal.

Session Description

The Liquefaction Experiment and Analysis Projects (LEAP) is an international research collaboration involving researchers from the US, UK, Japan, China, and other countries. LEAP is an experimental and numerical simulation campaign to assess the capabilities of existing constitutive models and numerical tools for liquefaction analysis using laboratory tests and centrifuge experiments. Over the past decade, more than 80 centrifuge experiments and 200 element tests were conducted to investigate the seismic response of critical civil infrastructure systems in the presence of soil liquefaction.

The latest phase of this campaign, LEAP-Asia-2025, organized by Zhejiang University, Tsinghua University, Kyoto University, The George Washington University, Rensselaer Polytechnic Institute, and other esteemed universities and institutions throughout the world, will conduct centrifuge model tests of embankments/earth dams on liquefiable ground to investigate the effects of overburden stress and initial static shear stress on the liquefaction response. These tests are complemented by soil element tests and numerical simulations to assess and improve the reliability of constitutive models and numerical simulation approaches.

This special session will mainly present and discuss the latest results and insights from LEAP-Asia-2025. The focus will be on integrating findings from experimental and numerical studies to better understand soil behaviour under complex loading conditions and to improve predictive capabilities for geotechnical earthquake engineering applications. Topics include, but are not limited to:

(1) Dynamic centrifuge model tests of embankments/earth dams on liquefiable ground;

(2) Reproducibility and standardization of centrifuge model experiments;

(3) Influences of overburden stress and initial static shear stress on soil liquefaction;

(4) Calibration and validation of soil constitutive models for numerical simulation of soil liquefaction;

(5) Ground improvement for liquefaction mitigation of embankments and earth dams.

The session encourages participation from researchers involved in experimental geotechnics, numerical modeling, and the development of mitigation strategies, fostering collaboration and knowledge exchange within the LEAP teams and beyond.