NEW ZEALAND GEOTECHNICAL SOCIETY INC

A Collaborating Technical Society of The Institution of Professional Engineers New Zealand

Auckland Branch Presentation
Thursday 20th February 2020
University of Auckland
Conference Centre Lecture Theatre
22 Symonds Street, Auckland
Refreshments: 5.30pm
Presentation: 6.00pm
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Seismic Earth Pressures on Retaining Walls Based on SSI Principals

Presented by Professor Jonathan P. Stewart

Prof. Civil Engineering, UCLA

During earthquake ground shaking, earth pressures on retaining structures can cyclically increase and decrease as a result of inertial forces applied to the walls and kinematic interactions between stiff wall elements and surrounding soil. The current state of practice is based on a limit analysis approach in which a pseudostatic inertial force is applied to a soil wedge behind the wall. This approach is a poor analogy for either inertial or kinematic wall–soil interaction, and not surprisingly, it is frequently unable to satisfactorily capture experimental observations.

The kinematic component of interaction varies strongly with the ratio of wavelength to wall height (λ/H) and relative wall-soil flexibility, among other factors. An analysis framework that captures these effects has been developed that can be applied rigorously (full response history) or in a relatively simplified manner (peak response estimated from ground motion intensity measures). The procedure has limiting assumptions, but its verification against more exact solutions and its validation against test data will be presented. The simplified approach is provided in a Resource Paper that was recently approved by the United States Building Seismic Safety Council for publication with the National Earthquake Hazards Reduction Program (NERHR) Provisions and Commentary.

Jonathan P. Stewart, Professor and Chair of the Civil and Environmental Engineering Department. Jonathan's primary research interests are in geotechnical earthquake engineering and engineering seismology, with emphases on seismic soil-structure interaction, earthquake ground motion characterization, seismic performance of levees and other embankments, and seismic ground failure. His research has included case history studies of the seismic field performance of infrastructure in California, Taiwan, Turkey, Japan, Greece, Italy, and India.