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Title of the Theme Lecture
Influence of earthquake-induced excess pore water pressures on the seismic bearing capacity and performance of shallow foundations

Abstract
Earthquake-induced excess pore water pressures may produce significant strength and stiffness degradation in foundation soils. Accordingly, severe loss in the bearing capacity of shallow foundations can occur possibly leading to extensive damage in the superstructures. Then there is the need of simple, but rigorous, solutions to account for the effect of earthquake-induced pore pressures on seismic bearing capacity and performance of shallow foundations. This effect is examined using the method of characteristics and the Newmark analysis framework.

A seismic bearing capacity factor and the soil-foundation yield acceleration coefficient \( k_c \) were evaluated as a function of the excess pore pressure ratio \( \Delta u^* \).

Due to pore pressure build-up, \( k_c \) reduces during the ground motion. Accordingly, two threshold values, \( \Delta u^*_{d} \) and \( \Delta u^*_{f} \), of \( \Delta u^* \) were introduced representing, respectively, the excess pore pressure ratio above which permanent displacement of the foundation should be expected and the excess pore pressure ratio that produces a complete loss of the foundation bearing capacity. The combined use of \( \Delta u^*_{d} \) and \( \Delta u^*_{f} \) allows predicting the seismic performance of the soil-foundation system and choosing the proper approach for the displacement evaluation.

Bio
Ernesto Cascone graduated in Civil Engineering in 1991 at the University of Catania where he took his doctorate degree in 1996. During his doctoral studies he was guest researcher at the National Technical University of Athens. In 1998 he joined the University of Messina as a post-doctoral researcher. There he became Lecturer in 2005 and, since 2014, is Associate Professor of Geotechnical Engineering, teaching Soil Mechanics, Earthquake Geotechnical Engineering and Slope Stability.

His main research interests have focused on Earthquake Geotechnical Engineering and particularly on the seismic response and performance-based design of retaining walls, slopes, earth dams and footings and also on site response analysis and topographic effects on seismic ground motion. On these topics he has taken part in several research projects, has co-authored many scientific publications and delivered invited lectures in international conferences.