THE INCREASING ROLE OF SEISMIC MEASUREMENTS IN GEOTECHNICAL ENGINEERING

by

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Abstract

Geotechnical engineers are continually faced with the problem of characterizing soil and rock materials and systems in the field. Over the past 45 years, seismic (stress wave) measurements have been employed at an ever increasing rate to an increasing diversity of applications. This measurement technique was originally adapted from exploration geophysics and was originally used in soil dynamics and geotechnical earthquake engineering. However, today geotechnical engineers are employing seismic measurements in a wide range of both static and dynamic applications. In this presentation, a brief background on seismic measurements in the field as well as in the laboratory is presented. A number of example applications are presented, ranging from investigations of a tunnel, an earth dam, hard-to-sample soils such as gravels and cemented alluvium, and deeper profiling (> 100 m) in soil and rock. Recent advances in field measurements of nonlinear shear modulus and soil liquefaction are also briefly presented.

Biographical Sketch

Dr. Kenneth H. Stokoe, II is the holder of the Jennie C. and Milton T. Graves Chair in Engineering in the Civil, Architectural and Environmental Engineering Department at the University of Texas at Austin. He has been working in the areas of field seismic measurements, dynamic laboratory measurements, and dynamic soil-structure interaction for more than 40 years. He has been instrumental in developing several small-strain field methods for in-situ shear wave velocity measurements. He has also developed two types of resonant column systems that are used to evaluate dynamic soil and rock properties in the laboratory. Over the last ten years, Dr. Stokoe has led the development of large-scale mobile field equipment for dynamic loading of geotechnical systems, foundations and structures, an activity that has been funded by the National Science Foundation in the NEES (Network for Earthquake Engineering Simulation) program. The equipment has already led to the development of new testing methods to evaluate soil nonlinearity and liquefaction directly in the field. Dr. Stokoe has received several honors and awards, including election to the National Academy of Engineering, the Harold Mooney Award from the Society of Exploration Geophysicists, the C.A. Hogentogler Award from the American Society for Testing and Materials, and the H. Bolton Seed Medal and the Karl Terzaghi Distinguished Lecturer from the American Society of Civil Engineers.