management; data management systems and applications; GIS based site characterization and geohazard analysis; neural networks modeling for geohazards assessment in probability and risk; behavior and analysis; soil and rock engineering; safety and risk management; soil profile and deep foundation construction; large scale computations and simulations; probabilistic modeling and design; multi-scale earthquake modeling; blast effects on below-grade walls and underground structures; modeling of complex deep foundation systems; engineered earth structures; numerical modeling and analysis for pavement system; multinational organizations: International Geotechnical Committee, Geotechnical Commission of the Council of Europe, International Geotechnical Society, etc.; project management; oil spill modeling and mitigation; marine geotechnics; geotechnical education and training; imaging based quantification; and 3-D visualization.This dissertation describes the development of a new multi-directional direct simple shear testing device, the Texas A & M Multi-directional Direct Simple Shear (TAMU-MDSS), for testing marine soil samples under conditions, which simulate, at the element level, the field condition of a submarine structure and an experimental large scale foundation system. The test results are very informative in characterizing soil response under cyclic loading, interpretation of the experimental results and numerical simulations. The technique presented in this book will help to partly fill this technical gap by proposing a methodological approach and calculation methods to take account of the effects of cyclic loading conditions. The work is divided into four major components: 1) Equipment Development: Design and construction of a prototype multi-directional direct simple shear testing device (TAMU-MDSS) that addresses the limitations of previous devices. 2) Support systems: selection of control software, development of data acquisition system and design of the test facility. 3) Experimental Testing: testing marine soils under complex loading conditions, and provides high quality laboratory data for use in constitutive and finite element model development for analysis of submarine slopes. One-volume library of instant geotechnical and foundation data Now for the first time ever, geotechnical, foundation, and civil engineering geologists/articleswriters, planners, and construction managers can quickly find information they must refer to every working day. In one compact, a rock-solid resource to train and educate the next generation of practitioners. Chiang Mai province is located in northern part of Thailand, wherein low to medium earthquake can occur. Therefore, this research aims to present an assessment of dynamic properties of Chiang Mai sand using cyclic direct simple shear test. Two of the most important parameters of dynamic properties in any dynamic analysis related to soils are shear modulus and damping ratio. The monotonically direct shear apparatus, which is developed at Norwegian Geotechnical Institute by Bjerrem and Landva, is modified to cyclic direct simple shear so as to be able to determine dynamic properties of Chiang Mai sand. Drained (constant normal stress) tests are carried out with saturated sand sample reconstituted by water pluviation method, which can reproduce close to the in-situ fabric of natural sand deposits. Vertical stress and frequency are varied to observe their effect on sand dynamic properties. It can be concluded from the testing results that sand modulus and damping values mainly depend on vertical stress. Shear modulus decreases with increasing shear strain amplitude. Oppositely, it increases with increasing vertical stress. The value of hysteretic damping, with increasing shear strain amplitude is a constant, when damping ratio decreases with increasing amplitude. The shear modulus and damping ratio values of present study are compared with previous investigations are found to be in fair agreement. All in all, this research is the first work focused on dynamic properties of Chiang Mai sand, which gives great distribution to the calculation of ground response during an earthquake. It also facilitates the following researchers to conduct further research on cyclic soil response in Chiang Mai as well as other locations. The technique presented in this book was followed by LEP-Asia that included assessment of a generalized scaling law and culminated in a workshop in Osaka, Japan in March 2019. LEP-2020, ongoing, and its next step, is addressed for testing the capabilities of simulation platforms for real soil-structure interaction analyses of retaining walls involving a liquefiable soil. A workshop is planned at RPI, USA in 2020.