

Preface

The phenomenon of the wave-seabed interaction has attracted extreme attention among coastal and geotechnical engineers in recent years. Lots of research activities in the area have been carried out by numerous groups in the world. Understanding of mechanisms and processes of the wave-seabed interaction problem is particularly important for marine geotechnical engineers involved in the design of foundation around marine infrastructures. The aim of this book is to provide readers a comprehensive theoretical background for the wave-induced soil response in marine sediments covering various aspects.

This book consists of ten chapters. The first two chapters give background of the research topic, recent advances and possible future research agenda in the area. These chapters provide junior researchers and someone who starts moving into this discipline an overall picture of the research topic and a starting point for postgraduate students. Chapters 3 and 4 present detailed mathematical formulations for the wave-induced soil response, including pore pressure, effective stresses and soil displacements, and seabed instability such as shear failure and liquefaction. These two chapters provide practical engineers a simple and effective analytical tool for the wave-induced seabed instability around marine infrastructures. Chapter 5 presents analytical and numerical models for the seabed response with variable soil characteristics and cross-anisotropic soil behavior. In Chaps. 6 and 7, dynamic soil behavior and Coulomb-damping effects are considered and the applicable ranges of dynamic models are clarified. Then, random wave-induced seabed response in marine sediments with two commonly used wave spectra is explored in Chap. 8. Chapter 9 presents the analytical solution of the wave-induced pore pressure accumulation (pore pressure build-up) and a simplified formula for engineering practice is suggested. Chapter 10 clarifies the process of the wave-induced post-liquefaction (progressive liquefaction).

The first draft of this book was the lecture note I used for the short course delivered at Institute of Mechanics, Chinese Academy of Sciences, Beijing China in 2004. The course was designed for postgraduate students and junior researchers. Part of contents presented in this book have been delivered for several undergradu-

ate and postgraduate courses at different universities in Australia and UK, including Griffith University, University of Sydney and University of Dundee.

Numerous co-workers have made significant contributions to part of materials included in this book. These include: Professor B.R. Seymour (The University of British Columbia, Canada), Professor J.R.C. Hsu (The University of Western Australia), Professors C.P. Tsai and Y.S. Lin (National Chung-Hsing University, Taiwan), Professor T.L. Lee (Leader University, Taiwan) and Professor K. Zen (Kyushu University, Japan) and others.

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