Book review

Centrifuge Modelling for Civil Engineers

Gopal Madabhushi. CRC Press; Boca Raton, FL, USA, 2015, ISBN 978-0-415-66824-8, £35.00 Hardback, £16.00 e-book, 292 pp.

Centrifuge modelling has been gaining popularity in solving complex geotechnical engineering challenges over the past few decades, mainly due to its ability to produce representative measurements and outcomes as in the field. This is especially useful in circumstances where unusual or extreme loading conditions are expected without the need for thorough understanding of well-established constitutive models for the soil in the study.

Modern geotechnical centrifuge modelling was established by Emeritus Professor Andrew Schofield, who created the Philip Turner beam centrifuge facility at the University of Cambridge in the mid-1970s. The author, who is the current Director of the Schofield Centre, has summarised his experience of over 25 years and the wealth of knowledge in this specialist area accumulated at that institution into this book. Traditionally imparted exclusively for institutions with research centres of excellence in centrifuge modelling, this book makes this knowledge and know-how of modern geotechnical centrifuge modelling technology readily accessible to the wider civil engineering community.

The book begins with an outline of the current and growing complexity of geotechnical engineering and the role of centrifuge modelling in solving

these challenges in a performance-based design approach. The need and complementarity of both centrifuge and numerical modelling are also discussed. Subsequently, a brief revision of basic mechanics adopted in centrifuge modelling is covered in Chapter 3. Chapter 4 introduces the basic underpinning principles of centrifuge modelling, detailing the derivation of scaling laws between a prototype and a centrifuge model. Chapter 5 discusses the various types of centrifuges and their suitability for various geotechnical problems. Some errors and limitations of centrifuge modelling are described in Chapter 6, before introducing various specialist equipment and instrumentation commonly deployed in centrifuge tests in Chapters 7 and 8. Chapter 9 discusses data acquisition systems and signal processing, essential to extract vital results from centrifuge tests with different levels of sophistication of noise filtering. Last but not least, Chapters 10 to 14 cover various applications of centrifuge modelling, such as shallow footings, retaining walls, pile foundations, modelling construction sequences, and dynamic centrifuge modelling in great detail, including how these centrifuge tests were carried out and the main outcome of these tests.

With a generous number of 14 topical chapters in 292 pages, the book is extremely good value and graduate students would find it an essential reference when embarking on their centrifuge modelling research. Practicing engineers who wish to learn about centrifuge modelling or who are about to launch into solving complex geotechnical problems would find this book readable and informative. Certainly, a worthwhile investment in my opinion.

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