Book review

Risk and Reliability in Geotechnical Engineering

K. K. Phoon and J. Ching (eds). CRC Press, Taylor & Francis Group, Boca Raton, FL, USA, 2015, ISBN 978-1-4822-2721-5, £98.40, 624 pp.

The book *Risk and Reliability in Geotechnical Engineering* edited by K.K. Phoon and J. Ching was, originally, to be an update of the 2008 book *Reliability-based Design in Geotechnical Engineering – Computations and Applications* (edited by K. K. Phoon). The update turns out to be a completely new book, and is a 'must-read', not only for those interested in risk and reliability in geotechnical engineering, but also for the geotechnical practitioner. Reliability analysis represents one of the new developments in geotechnical practice, and the profession needs to adopt reliability approaches in order to move forward and to provide improved solutions for society.

Risk and Reliability in Geotechnical Engineering covers a very wide spectrum of geotechnical reliability analyses, from the statistical description of properties to a description of reliability methods, theory and examples of reliability-based design, and finally the implementation of reliability methods for decision-making. There are 15 strong chapters, providing a wealth of information and application examples. Compared to the 2008 book, the newer book provides an expanded number of topics. All contributions are of high quality, although a few of the chapters are perhaps on the theoretical side and may be difficult to follow. However, it is fair to say that 85% of the contributions in this new book are easily understandable by the practitioner. Most importantly, the book brings additional insight to the use of reliability methods in view of today's standards and codes. The book is a welcome addition and represents a recognition that geotechnical reliability is different and complementary to structural reliability.

The book provides contributions by a broad group of acknowledged authors from several countries and illustrates masterfully wide-ranging

applications with easily understandable examples. The applications include soil liquefaction, strip footings, embankments and dykes, dams, slopes, piles and site investigation. The applicability of Bayesian updating is also illustrated. Bayesian updating is a tool made for geotechnics, because geotechnical engineering is a science of experience, where evaluated experience is most often based on observations. Baecher and Christian describe the evolution of the geotechnical risk analysis in North American practice, which is a good primer for anyone wanting to learn about methods and the evolution of risk analysis in geotechnical engineering. The contribution by Orr on managing risk and achieving reliable geotechnical design using Eurocode 7 is most useful.

Even with the new and high-quality contributions in the 2015 book *Risk and Reliability in Geotechnical Engineering*, some of the chapters in the 2008 book are still important to read. In particular, the contributions by Wolfe (on levee systems) and Wu (on slopes) in 2008 should be combined with the new experience database contained in *Risk and Reliability in Geotechnical Engineering*. This new book is useful because it focuses on the needs of the practitioner and illustrates the added value of risk and reliability concepts in geotechnical engineering. It provides actual realistic practical guidance. This reviewer has found the book to be one of the most helpful in making risk and reliability easily understandable. As research evolves and societal and transparency requirements increase, more attention will need to be paid to reliability analysis in geotechnical engineering. The profession needs therefore to bring this new way of thinking into practice, as geotechnical design, uncertainties, hazard and risk become the subject of increasing codification, and to code harmonisation.

Risk and Reliability in Geotechnical Engineering succeeds in showing how to apply reliability-based design in geotechnical engineering. It is a highly recommended read for all.

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