

Book review

Soil Liquefaction: A Critical State Approach, 2nd edition

M. Jefferies and K. Been. CRC Press, Taylor & Francis, Boca Raton, FL, USA, 2016, ISBN 978-1-4822-1368-3, £102.00, 690 pp.

This is the second edition of a popular book on soil liquefaction, introducing a pragmatic and applicable approach for practising engineers, while also providing a well of research materials coupled with a copyright freeware for the academic audience and advanced users. The first edition (Taylor & Francis, 2006, 512 pp) was reviewed in *Géotechnique* vol. 58, issue 7. The structure of this edition remains similar to the first one, but the content in a number of the chapters has been substantially updated to include the additional wealth of research carried out over the past 10 years, particularly through the consideration of silts and sandy silts commonly encountered as mine tailings, and the removal of a few earlier arbitrary treatments. Moreover, this new edition delivers, impressively, three main enhancements: the treatment of cyclic mobility; the bridging steps from laboratory tests to finite-element analyses; and guidance that enables the gap between theory and practical application to be reduced with considerate use of the proposed framework and tools. Overall, as the first edition has done well in shifting the discussion and treatment of soil liquefaction away from the engineering geology view and rules of thumb, the second edition is reinforcing this direction.

The book's opening chapter sets the theme with an interesting review of past case studies and the historical development of ideas. The key

theoretical explanations are in chapters 2 and 3. Chapters 4 and 5 provide guidelines on the determination of state parameters from in situ tests and the appreciation of soil variability and characteristic states of natural sands. Chapter 6 presents post-liquefaction strength and undrained failure in monotonic shear. The new materials on cyclic mobility and the cyclic simple shear test are provided in chapter 7. The revised chapter 8 and new chapter 9 demonstrate the engineering approach adopted by the authors: 'if it does not compute, then you have nothing' (Turing, 1912–1954). The summary and remarks in the last chapter highlight the importance of treating soil liquefaction within an established framework of soil behaviour. The authors are to be congratulated on delivering the message that analyses and assessments should be based on a balance of theoretical framework, validated and verified software, and representative input data with due consideration to the variability of natural soil mechanical characteristics and the inclusion of sound engineering judgement. The appendices and references (220 pp) in this edition are substantial and comprehensive.

This reviewer has found this second edition to be a very good update. The book explains all key issues that an engineer needs to consider, from practical perspective to theoretical viewpoint. It also provides extensive references and database, together with the available freeware for more advanced study. The book is written in a smooth style, complemented by many useful figures and appendices. It is a pleasure to recommend this significantly updated edition to the readers of *Geotechnical Engineering*.

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