[**doi:** 10.1680/geot.2008.B.002]

Book review

Soil liquefaction – a critical state approach. M. Jefferies and K. Been. London and New York: Taylor & Francis, 2006. 512 pp. ISBN 978-0-4191-6170-7. £90

The phenomenon of earthquake induced liquefaction has given rise to many spectacular geotechnical failures, such the tilting and collapse of buildings in the 1964 Niigata earthquake, dam failures in the 1971 San Fernando earthquake and destruction of port facilities in the 1995 Kobe earthquake. Rightly so, these events have drawn the attention of academics and design engineers, as well as the media and the general public, due to their consequences both in terms of potential for loss of life and the impact on the economy of the local communities.

In the book the authors aim to demystify liquefaction, 'both in terms of the physics of soil behaviour and how it can be avoided in practice by good engineering'. They begin this process by reviewing not only earthquake induced liquefaction failures, but also static liquefaction failures such as the 1938 Fort Peck dam and the 1966 Aberfan liquefaction induced flow slides. In this way they argue that these events are all linked by a common process, and hence the need to look at the physical soil behaviour in terms of critical state principals, namely the state parameter approach. Although the state parameter approach was originally formulated around clean sands, the approach has been extended to include soils as diverse as loose sandy clays and loose silts, which often give the practicing engineer the biggest headache.

The book provides a good balance of information for the academic researcher as well as for the practising engineer. Following the review of past liquefaction effects, the authors discuss the liquefaction potential in terms of the state parameter, describe various constitutive models that can be used to model liquefaction and provide practical guidance as to how to determine the state parameter and hence liquefaction potential from in situ tests. The book includes extensive test data and detailed testing procedures, including a substantial section on the cone penetration test. The book then discusses the thorny issues of static liquefaction and post-liquefaction strength and concludes with a review and comparison with the Berkeley (Seed) approach.

In addition, relevant data from tests carried out by Golder Associates and open code software, copyrighted but provided as freeware, may be downloaded to use alongside the contents of the book at http://www.golder.com/default.asp?PID=921. This open door attitude should be commended and it will provide a useful resource for students, practising engineers and researchers.

This book is a welcome and timely addition to the existing literature on the subject and I would commend the text to any civil engineer with an interest in the subject.

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