

Book reviews

Earthquakes. B. A. Bolt. New York: W. H. Freeman, 4th edn, 1999. [366 pp] ISBN 0 7167 3396 X. [£22.95]

The latest edition of this book confirms its status as *the* basic reference on the subject of earthquakes and seismology. Professor Bolt's book provides an excellent introduction to the subject both for the casually interested reader and for the non-specialist professional who is faced with problems related to earthquake effects on engineering projects. Although not a manual of earthquake engineering, this book does offer the reader a very sound foundation in the subject, and the necessary background to consult more advanced texts. The newly added list of World Wide Web addresses enhances the usefulness of the book as an introduction for the practising engineer wishing to become familiarized with seismology and earthquake-resistant design.

Earthquakes has two strengths that have contributed to its reputation, which will be further enhanced by the additions and changes made in this fourth edition. These strengths are the style of presentation and the breadth of coverage on the subject of earthquakes. Professor Bolt has written a text that is eminently readable, neither overwhelming for the reader who is new to the subject nor tedious for those familiar with seismology or earthquake engineering. The book achieves a perfect balance of science, history, argument, advice and anecdote, supported by excellent illustrations. Field observations of the effects of earthquakes around the world, including superb photographs (many of them in colour), feature very strongly and include major historical earthquakes that became landmarks in the evolution of seismology and earthquake engineering, as well as recent events such as the 1995 Northridge (USA), 1995 Kobe (Japan) and 1997 Umbria-Marche (Italy) earthquakes.

In terms of breadth of coverage, *Earthquakes* introduces the reader to the generation of seismic events (including a completely new chapter on plate tectonics), the measurement and characterization of earthquakes, and the effects of earthquakes on the natural and built environments. The subject of earthquake prediction is treated in a rational and objective manner, although disappointingly the controversial VAN method is not mentioned. The mitigation of seismic risk is covered at many different levels, including simple measures to protect homes and their contents in earthquake country, earthquake insurance, seismic building codes and retrofit of buildings and lifelines.

Geotechnical aspects of seismology and earthquake engineering are covered in Professor Bolt's book, but not in great detail. Amplification of seismic shaking by soil layers is discussed, particularly with reference to earthquakes such as the 1985 Mexican event in which this phenomenon played such a marked role in the level of destruction. Earthquake-triggered landslides and soil liquefaction are also presented through case histories. The limited attention given to these topics is not due to oversight or relegation of their importance, but rather reflects the fact that the book is very much a general introduction to earthquakes and their effects. Inevitably, in presenting the many facets of such a broad subject, detail on particular issues is sacrificed in favour of comprehensive coverage.

Whether one's interest in earthquakes is due simply to curiosity or driven by the need to respond to professional challenges, there is no better starting point than this book.

—J. Bommer

Karl Terzaghi: the engineer as artist. R. E. Goodman. Reston, VA: American Society of Civil Engineers, 1999. 340 pp. ISBN 0 7844 0364 3. [£35.00]

This very well written book gives us a glimpse of the story of Terzaghi's development, both personal and professional, which has remained unexplored by most people. The author

obtained his material from reading Terzaghi's publications, hundreds of unpublished reports, thousands of private letters, and 82 volumes of previously private personal diaries.

The book presents Terzaghi's views on the balance between theory and practical knowledge, the development of the observational method, and the application of it. The most valuable feature is not the technical details of what was done but the way Terzaghi approached the problems. This might be found in some published case studies but can rarely be found in textbooks. The author has offered insights from his own journal. The book is very well written, exciting and gripping. This reviewer could not put it down, and constantly wanted to know what was going to happen next.

Terzaghi's life traversed two world wars as well as a time of turbulence between the two wars. The book portrays a strong personality, who employed a direct approach towards opposition. However, the book also reveals his fun-loving nature, his interesting lectures, his views about life, and a lot of quotable statements. He had an insatiable thirst for knowledge, and he was still learning when he died at the age of 80.

Many lessons and issues that are still relevant today are recounted. We can learn from his careful analysis of data, his detailed reporting, his frustration at the lack of site investigation, and his emphasis on the effect of geological formation. We may not be able to demand the amount of site investigation he required, but it helps to know that his view is on our side.

We learn that he viewed research as a 'walking stick'. He suggested that one should have a good grasp of theory but be aware of its limitations. He showed that experimental work could be successful without the use of expensive equipment.

No doubt we are given a partial view of the man. Though the emphasis is on his success, the book also reports a few times when he was mistaken.

The book certainly portrays him as 'the engineer as artist'. It is unlikely that a present-day engineer would be able to gather the vast range of field experience that Terzaghi had, so these recollections of his practical knowledge are invaluable. His overview remarks on soil mechanics should always ring in our ears. At the current price, *The engineer as artist* is a bargain, and a lot of copies should find their ways to the shelves of geotechnical engineers.

A. H. C. CHAN

Mechanics of granular materials: an introduction. M. Oda and K. Iwashita (eds). Rotterdam: Balkema, 1999. 383 pp. ISBN 90 5410 461 9 (hbk); 90 5410 462 7 (student edition). [£30.00]

This book consists of state-of-the-art reports by 35 internationally recognized authorities on the mechanics of granular materials, and covers the whole range of interests related to granular materials. It was the product of collaboration within technical committee TC-13 of the International Society for Soil Mechanics and Geotechnical Engineering. A few of the members of TC-13 and more than half of the Japanese working committee members contributed to the volume.

Of the 35 authors, 18 are from Japan and the USA and Europe have seven each. This does not come as a surprise given the level of interest in Japan on this topic.

The book contains five chapters: 'Fundamentals for mechanics of granular materials', 'Continuum theory for granular materials', 'Discrete element approaches', 'New findings from experimental studies', and 'Rapid flow of granular materials'. Each chapter has at least two editors, and within each chapter, different authorship can be found for each subsection. For instance, within section 4.3 ('Recent developments in experimental methodology') the five subsections have a total of seven

different authors and co-authors. Nevertheless, the book is still highly readable, though one has to adjust to some changes in the meaning of symbols between sections and subsections.

According to the editors, the topics were selected to be useful for those who are interested in the fundamental aspects of particulate mechanics, such as micro-mechanical constitutive modelling of materials and the micro-mechanisms of progressive failure. A wide range of material has been covered in 383 pages and this is definitely not the introductory textbook that the title implies.

Nevertheless, the book fulfils its main objective of being a primary reference source on the various topics in granular materials. The up-to-date reference list is a valuable resource

both for graduate students embarking on research and for experienced researchers seeking relevant information on a certain topic. However, this book would not be a good starting point for someone wishing to program the various methods mentioned, as there is no space for such implementation details.

The brevity of the book and the different competing theories found in different chapters could confuse the readers. However, if the reader can separate the viewpoints of the different authors, most of the subsections can be understood in a straightforward manner. This book is cheaper and more organized than a conference proceedings, and it is recommended for those who are really interested in the subject matter.

—A. H. C. Chan