Book reviews

Support of Underground Excavations in Hard Rock. E. Hoek, P. K. Kaiser and W. F. Bawden. Rotterdam: A. A. Balkema, 1995, ISBN 90 5410 186 5. Hardback £35

It is now over fifteen years since Hoek and Brown's *Underground Excavations in Rock* pulled together the parallel disciplines of mining, geology and geotechnics, enabling the stability of mines and rock masses to be examined in a unified, albeit empirical, way. This new publication, the result of funding by the Mining Research Directorate of Canada, extends and updates the scope of the earlier work.

Chapter 1 is a general introduction to the challenges faced by designers of rock support systems and this is followed by a particularly valuable chapter on the application of statistical methods to design. In assessing acceptable probabilities, the authors describe a range of software packages that are available for the repetitive calculations necessary to experiment with different support systems. The software can be ordered using forms at the back of the book.

Chapters 3 to 6 present with clarity the derivation of engineering parameters from geological logging of cores or exposures, and the mainstream rock mass classification systems are described.

Chapter 7 contains a summary of in situ and induced stresses in rocks, but there is very little discussion of methods of measurement and the effects of re-orientation of stresses during mining.

Chapter 8 provides an update of the Hoek–Brown failure model and the remaining eight chapters take the reader through practical methods of calculating support requirements, together with a few case histories. Common support details are provided including rock bolts, dowels, shotcrete etc., although there is a lack of information on durability, corrosion protection and creep behaviour of rock support systems.

The reader expecting to find avenues into the support of soft rocks or substantial discussion of feedback systems, observational methods etc. will be disappointed. Nevertheless this book is a convenient and reasonably priced addition to rock mechanics' literature. It will appeal mostly to graduates and site engineers.

N. J. O'Riordan

International Handbook of Earthquake Engineering: Codes, programs and examples. M. Paz (editor). New York, Chapman & Hall, 1994. 545pp. Hardback, ISBN 0 412 98211 0. £65

The aim of the new Handbook, according to the editor, Mario Paz, is to meet a need expressed by various consulting engineers worldwide, for a reference source that enables them to understand, interpret and properly apply the provision of seismic codes globally. To this end Paz has collated summaries of seismic codes for earthquake resistant design of buildings from 34 selected countries in active seismic regions. Each summary follows a standard format and is prepared by practitioners from the country in question. The standard format covers the local seismic zoning (and in most cases a zoning map – a very useful feature for an initial assessment of relative seismicity of a particular site), a discussion of building classification, treatment of soil effects, base shear requirements and methods of analysis. Design examples are provided and, for 25 countries, computer programs specifically developed to implement the code requirements of that country, are discussed. The source code for these programs may be obtained from the editor.

The format of the handbook is in two parts with the code summaries comprising Part II, the main body of the report. Part I presents a useful introduction to how structural dynamics can be applied to earthquake resistant analysis and design. The concept of the response spectra is introduced together with information on how local conditions can modify its shape. Cross-references are given here to the various chapters in Part II of the handbook. In addition, the concept of the generation of the design spectra, using attenuation relationships, is introduced. A useful Appendix gives a short discussion of magnitude and intensity scales (a subject which causes almost more confusion than any other in earthquake engineering).

Prof Bertero, in his introduction to the Handbook, says he believes the book will be enthusiastically received by those in the field of earthquake engineering, and I am sure he is right. It is a well presented book, which, because of its explanatory material, adds considerably to the 'World List of Earthquake Resistant Regulations' (*Earthquake*

resistant regulations – a world list. International Association of Earthquake Engineering, Tokyo 1992), even though the countries covered are by and large the same. However, it is as well to bear in mind some aspects that the Handbook does not cover. Firstly, codes are never quite as straightforward to interpret as might at first sight appear, even with the assistance of the excellent authors the editor has assembled.

For example, the reader of the chapter on Egypt would not realise that there are actually two distinct official, and one unofficial, Egyptian seismic codes; as Elnashai (A. S. Elnashai. *Seismic risk and preparedness in Egypt*. In: Structures to withstand disasters, ed. D. Key, Thomas Telford, 1995) points out, this leads to some confusion.

As another example, the UBC is not the only important seismic code in the USA, and although the chapter's author refers to this, only the UBC requirements are discussed. Secondly, an important omission (currently shared by the World List referred to earlier) is a discussion of the recently published seismic Eurocode, EC8, Part 5 of which deals specifically with the requirements for design of foundations and earth retaining structures.

Probably to have included even some of these points would have led to an overlong and unwieldy book. The aim of the editor is clearly met. The material that is presented is excellent, and the Handbook is highly recommended.

J. S. R. Ramsey