Book review

Particulate discrete element modelling. A geomechanics perspective. C. O'Sullivan. Abingdon: Spon Press, 2011. 561 pp. ISBN 978-0-415-49036-8, £80

The purpose of this book is to provide a concise point of reference and an introductory text to potential users on the topic of particulate discrete-element modelling (DEM). The book covers the basic background information that allows scientists and engineers in the area of geomechanics to develop the understanding to successfully complete DEM analyses and to interpret the results. Comparing this to the two other recent texts with similar titles (Radjai & Dubois, 2011; Munjiza *et al.*, 2012), this book is unique in the market, not only because it is the only introductory text of DEM written with so much practical advice for users, but also because of its unique attention to the audience in the area of geomechanics.

The book has 13 chapters. They guide the reader, starting from the formulations governing the motions of particles, introducing the various finite-difference time-integration schemes, and the numerical considerations of, for example, energy and damping of a particulate system (Chapter 2). A detailed collection of the popular approaches of modelling the contact behaviour (Chapter 3) and the various sample preparation techniques (Chapter 7) are considered crucial references to any user of the particulate DEM. The next chapters cover how the particles are modelled and how the boundary conditions are prepared; these include the modelling of particle shapes and particle crushing (Chapter 4), and the consideration of rigid, periodic and membrane boundaries, and so on (Chapter 5). There is also an introduction to

fluid–particle coupled analyses (Chapter 6). The following three chapters guide the reader on the various ways for graphical and quantitative interpretation of stresses, strains and fabric (Chapters 8–10). Most of the example studies are based on the interpretations of element behaviour obtained from virtual numerical experiments, such as shear box testing and triaxial testing. Towards the end of the book, general guidance suitable to any DEM code is provided (Chapter 11), together with a collection of all the major literature showing various applications of DEM in the area of geomechanics and its future potential (Chapters 12 and 13).

In general, the author has been very careful in introducing all the background information necessary for the understanding and development of DEM analyses. Useful tips and suggestions have been given throughout the book based on the author's experience. This is therefore an excellent reference textbook for a graduate course on DEM; it is also an excellent self-study reference for an individual graduate student or engineer who plans to carry out DEM. This book provides an interesting and comprehensive introduction to the topic, and also includes the up-to-date references most suitable to researchers and practitioners in the field of geotechnical engineering.

REFERENCES

- Munjiza, A., Knight, E. & Rougier, E. (2012). *Computational mechanics of discontinua*. Chichester, UK: Wiley.
Radjai, F. & Dubois, F. (eds) (2011). *Discrete-element modelling of granular materials*. London, UK: Wiley.

Y. P. (Helen) Cheng
University College London, UK