BOOK REVIEW

THE FINITE ELEMENT METHOD IN THE STATIC AND DYNAMIC DEFORMATION AND CONSOLIDATION OF POROUS MEDIA. SECOND EDITION. by R. W. Lewis and B. A. Schrefler, Wiley, Chichester, 1998. ISBN 0-471-92809-7. GB£75.00.

The authors' first text on this subject, *The Finite Element Method in the Deformation and Consolidation of Porous Media*, was published some 10 years ago, and rapidly established itself as a standard reference work. The second edition, which has now been produced, will undoubtedly be welcomed by many readers of the first edition. Obviously, the second edition's publication is designed to accommodate the expansion in research and practical applications of these types of problems.

This edition is divided into 14 chapters running to some 492 pages in total. The new chapter headings are (i) Introduction, (ii) Mechanics of Saturated and Partially Saturated Porous Media, (iii) Numerical Solution for Isothermal Consolidation, (iv) Solid Phase Constitutive Relationships, Variable Permeabilities and Solution Procedures, (v) Verification of Elastic and Elastoplastic Consolidation Programmes, (vi) Modelling Subsidence: Numerical Aspects and Problems of Regional Scale, (vii) Modelling Subsidence: Case Studies, (viii) Modelling Three-Phase Flow in Deforming Saturated Oil Reservoirs, (ix) Fractured Reservoir Simulation, (x) Heat and Fluid Flow in Deforming Porous Media, (xi) Secondary Consolidation Creep in Solids, (xii) Soil Structure Interaction, (xiii) Back Analysis in Consolidation, (xiv) Large Strain Quasi-static and Dynamic Soil Behaviour. It can, therefore, be seen quite clearly that a very comprehensive range of aspects of the problem is covered.

Professors Lewis and Schrefler are very well-known researchers in numerical analysis work in general, and in porous media problems in particular. They need little introduction. Similarly, most readers will be well aware that this very comprehensive textbook represents the outcome of their research work in this particular area. Both have been active researchers for many years and have developed and explored many aspects of this problem.

This edition has been extensively updated compared with the first. New features include (i) the derivation of the governing equations in a general form using both averaging methods (hybrid mixture theory) and an engineering approach, (ii) numerical solutions for fully and partially saturated consolidation, (iii) subsidence analysis including far-field boundary conditions, (iv) new case studies, (v) petroleum reservations simulations, (vi) heat and mass transfer in partially saturated porous media with consideration of phase change, (vii) large strain fully and partially saturated soil dynamics problems, and (viii) back analysis for consolidation problems. The reader is provided with access to a finite element code for the problems considered, obtainable via a network of the Italian Research Council (COMES).

As the title of the book suggests, the focus of attention is on the finite element solutions of these problems. The presentation of the theoretical formulation, the derivation of the governing equations, the numerical solutions, the results achieved and the solution techniques adopted are described in great detail.

The second edition should prove to be as valuable a reference work as the first for those with both a research and a practical interest in the solution of these problems. The advances achieved since the publication of the first version have been considerable and the publication of an updated version is both timely and welcome. I feel confident that this second edition will serve as a valuable reference text for workers in this area for many years to come.

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