BOOK REVIEWS

BOUNDARY ELEMENT METHODS IN SOLID MECHANICS, by S. L. Crouch and A. M. Starfield, George Allen and Unwin.

This book is an interesting and useful addition to the growing number of publications on the Boundary Element Method. In contrast to other publications on the topic, the authors confine their discussion to stress analysis problems, particularly those related to geomechanics and mining engineering. Worked examples are spread liberally through the book. It begins with a review of the theory of elasticity and introduces the concept of the integral equation method with a good discussion of the Flamant problem (normal distributed load on the half space). Chapter 4 deals with the fictitious stress method and introduces numerical procedures, influence coefficients, interior and exterior problems, treatment of symmetry etc. The chapter concludes with a discussion of the program TWOFS which is included in Appendix A. Chapter 5 introduces the displacement discontinuity method and Chapter 6, the direct boundary integral formulation. Both these chapters give an adequate treatment of the theory with clear descriptions of the neccessary steps for converting the mathematics to the practical computer applications. Improvements and extensions are given in Chapter 7. Here it is a pity that a treatment of the isoparametric formulation by Lachat and Watson is not included, with a more adequate discussion of three dimensional problems. Useful topics such as bonded half-plane solutions, and anisotropic elasticity are discussed in good detail. The book concludes with a chapter devoted to applications in rock mechanics and geological engineering. The examples given are largely related to stresses around underground openings, for which the effects of both stratified material and joints are included. These examples should be of value to the design engineer wishing to implement the boundary element method. Here also is an important discussion of the analysis of tabular ore body problems solved using the displacement discontinuity method. The two computer programs given in the appendices should be useful to those wishing to get started in the Boundary Element Method. The program TWOFS was mentioned previously. The second program TWOBI is a direct boundary formulation of the two dimensional problem.

The book started out in Chapter 2 to introduce the index notation. It is a pity that the matrix–tensor notation was not continued throughout the book. This would have led to briefer expressions for the equations and perhaps a better understanding thereof.

In summary, this is a very readable book that will find a prominent place on the shelf of both the student and the practising engineer whose interests lie in geomechanics.

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FEMSA 84 PROCEEDINGS, obtainable from: National Institute for Aeronautics and Systems Technology, CSIR, P.O. Box 395, Pretoria 0001, South Africa.

This volume contains the proceedings of the FEMSA 84 finite element conference held in Pretoria, South Africa, in January 1984. It is an annual conference which is held at three different venues on a rotational basis. In addition to being a forum for the South African finite element community, overseas specialists are invited to present papers on selected topics. Past guest speakers have been Dr. K. J. Bathe, Prof. J. T. Oden and Dr. D. R. S. Owen. This year Prof. T. B. Belytschko, Prof. R. H. Gallagher and Dr. H. D. Hibbit delivered papers dealing with spurious modes and locking in plate elements, elastic instability analysis and non-linear pressure vessel and piping analyses, respectively.

Apart from the invited speakers, papers were presented by representatives from universities, research organizations and industry dealing with a wide variety of problems as applied in the structural, mechanical and geotechnical fields.

A brief list of some of the papers presented follows: numerical solution of non-linear equations with many parameters, refined beam column design, reinforced concrete models for seismic response, structural reliability, use of non-local, non-linear friction laws in contact problems, elastic-plastic/viscoplastic models in geotechnical problems, computer aided design of elevated water towers, analysis of a mine winder drum, simulation of a rigid body multi-axle road vehicle, an overview of a finite element code developed for non-linear analysis in structural and geotechnical problems, accuracy and stability aspects of strong coupling in transient fluid–structure interaction problems, wave diffraction around breakwaters, microwave engineering design.

These proceedings give a good overview of the development and application of finite elements in South Africa.

Price: R55·00.