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# Book Reviews

**Boundary Elements: An Introductory Course,** by C. A. Brebbia and J. Dominguez. McGraw-Hill, New York, 1989. 293 pages.

## REVIEWED BY J. L. TASSOULAS[1]

During the last 15 years, the boundary integral equation method, also known widely as the "boundary element method" (hereafter referred to as the "method") has seen increasing use in a variety of engineering problems. The present book is an introduction to the subject. Both C. A. Brebbia and J. Dominguez have been active in teaching and research on the method.

In a brief introduction, the authors enumerate the main advantages of the method over the (more) popular finite element method. The (biased) comparison of the two methods points out that mesh generation is easier when using boundary elements, demonstrates, by means of an example, the superior performance of the method in problems involving stress concentrations and claims that the use of boundary elements is the only practical approach towards the solution of problems posed on infinite domains. Concluding the introduction, it is stated that the objective of the book is "to provide a simple and up-to-date introduction to the method" so as to help increase its popularity among engineers. There is also a suggestion that the method be taught at both the undergraduate and graduate levels. The book is, however, intended for use in a first course on the method.

Chapter 1 introduces the method as a weighted-residual technique. The discussion is based on boundary value problems in one dimension. Other weighted-residual techniques are outlined as well. Also, the Poisson equation in two dimensions is processed as a weighted residual so as to establish the analogy between one and more than one dimensions.

The formulation of boundary elements for problems governed by the Laplace and Poisson equations is presented in detail in Chapter 2. Constant, linear quadratic, and higher-order elements are described for two-dimensional problems. A number of computer programs are included so as to demonstrate the implementation of the elements. The use of "discontinuous" elements is suggested to overcome difficulties that may arise at boundary corners. This is followed by a quick look at boundary elements for three-dimensional problems, while the use of boundary element subregions and the formulation of axisymmetric boundary elements are discussed briefly.

Boundary elements for elastostatics are considered in Chapters 3 and 4. Two computer programs are supplied: one with constant elements and another with quadratic elements, both for two-dimensional problems. Examples of use of the programs are included while other problems to which the programs can be applied are suggested as exercises.

Finally, in Chapter 5, other topics are covered rather superficially: coupling of boundary elements with finite elements, boundary elements for fracture mechanics, and the use of the method in steady-state elastodynamics.

References are given after each chapter and in Appendix C. The interested reader will be able to locate the rest of the literature on the method through these references.

The book appears to fulfill its promise of a "simple and up-to-date introduction to the method." Perhaps, missing from the book are even brief discussions of the use of the method in other types of problems of engineering interest; e.g., eigenvalue problems, transient dynamics problems, and continuum mechanics problems involving various nonlinearities. The reader may think that the absence of some of these topics from the book suggests that the method is not particularly suitable for such problems. In any case, for the purposes of an introductory course on the method, the book is worth consideration.

**The Fokker-Planck Equation: Methods of Solution and Application,** 2nd ed., by H. Risken. Springer-Verlag, New York.

## REVIEWED BY T. K. CAUGHEY[2]

This is the second edition (in paperback) of the author's excellent 1984 book on the Fokker-Planck Equation, applications, and methods of solution. With the exception of the correction of some misprints in the first edition and the addition of a short review of recent developments, the book is essentially unchanged from the first edition. Professor Risken has made substantial contributions to the application and solution of the Fokker-Planck Equation in laser physics, diffusion in periodic potentials, and other noise-related areas, and has written an excellent survey of such methods. The first edition has been very well received, and the new paperback edition should reach an even wider audience.

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