The Boundary Element Method Applications In Solids And

Structures Volume 2

First book on the fast multipole BEM, bringing together classical theory in BEM formulations and

the fast multipole method.

This work presents a thorough treatment of boundary element methods (BEM) for solving strongly elliptic boundary integral equations obtained from boundary reduction of elliptic boundary value

problems in $\mathbb{R}^3$. The book is self-contained, the prerequisites on elliptic partial differential and integral equations being presented in Chapters 2 and 3. The main focus is on the development, analysis, and

implementation of Galerkin boundary element methods, which is one of the most flexible and robust numerical discretization methods for integral equations. For the efficient realization of the Galerkin BEM, it is essential to

replace time-consuming steps in the numerical solution process with fast algorithms. In Chapters 5-9 these methods are developed, analyzed, and formulated in an algorithmic way.

This volume contains eight state of

the art contributions on mathematical aspects and applications of fast boundary element methods in engineering and industry. This covers the analysis and numerics of boundary integral equations by using

differential forms, preconditioning of hp boundary element methods, the application of fast boundary element methods for solving challenging problems in magnetostatics, the simulation of micro electro mechanical systems,

and for contact problems in solid mechanics. Other contributions are on recent results on boundary element methods for the solution of transient problems. This book is addressed to researchers, graduate students and practitioners working

on and using boundary element methods. All contributions also show the great achievements of interdisciplinary research between mathematicians and engineers, with direct applications in engineering and industry.

Fundamentals and Applications

Mathematical Aspects and Applications

Volume 1: Basic Principles and Applications

Treatment of Boundary Value, Transmission and Contact

Problems

Industrial Applications of the Boundary Element Method

Disk includes versions of BETIS and SERBA programs and input and output files corresponding to the

examples that appear in the book.
This thorough yet understandable introduction to the boundary element method presents an attractive alternative to the finite

element method. It not only explains the theory but also presents the implementation of the theory into computer code, the code in FORTRAN 95 can be freely downloaded. The book also addresses the

issue of efficiently using parallel processing hardware in order to considerably speed up the computations for large systems. The applications range from problems of heat and fluid

flow to static and dynamic elasto-plastic problems in continuum mechanics.
The boundary element method (BEM) is a modern numerical technique, which has enjoyed increasing

popularity over the last two decades, and is now an established alternative to traditional computational methods of engineering analysis. The main advantage of the BEM is its unique

ability to provide a complete solution in terms of boundary values only, with substantial savings in modelling effort. This two-volume book set is designed to provide the readers with a comprehensive

and up-to-date account of the boundary element method and its application to solving engineering problems. Each volume is a self-contained book including a substantial amount of material not

previously covered by other text books on the subject. Volume 1 covers applications to heat transfer, acoustics, electrochemistry and fluid mechanics problems, while volume 2 concentrates on

solids and structures, describing applications to elasticity, plasticity, elastodynamics, fracture mechanics and contact analysis. The early chapters are designed as a teaching

text for final year undergraduate courses. Both volumes reflect the experience of the authors over a period of more than twenty years of boundary element research. This

volume, Applications in Solids and Structures, provides a comprehensive presentation of the BEM from fundamentals to advanced engineering applications and encompasses: Elasticity for

2D, 3D and Plates and Shells
Non-linear, Transient and Thermal Stress Analysis
Crack Growth and Multi-body Contact Mechanics
Sensitivity Analysis and Optimisation
Analysis of Assembled

Structures. An important feature of this book is the in-depth presentation of BEM formulations in all the above fields, including detailed discussions of the basic theory, numerical algorithms

and where possible simple examples are included, as well as test results for practical engineering applications of the method. Although most of the methods presented are the latest

developments in the field, the author has included some simple techniques, which are helpful in understanding the computer implementation of BEM. Another notable feature is the comprehensive

presentation of a new generation of boundary elements known as the Dual Boundary Element Method. Written by an internationally recognised authority in the field, this is essential reading

for postgraduates, researchers and practitioners in Aerospace, Mechanical and Civil Engineering and Applied Mathematics.

Introduction to Boundary Elements

Advanced Boundary Element Methods
Theory and Applications in Engineering
Fast Multipole Boundary Element Method
Symmetric Galerkin Boundary

Element Method

The boundary element method (BEM) is a modern numerical techniquewhich has enjoyed increasing popularity over the last two decades,and is now an established alternative to traditional

computationalmethods of engineering analysis. The main advantage of the BEM isits unique ability to provide a complete solution in terms ofboundary values only, with substantial savings in modelling effort. This two-volume book set is

designed to provide the readers with acomprehensive and up-to-date account of the boundary element methodand its application to solving engineering problems. Each volume isa self-contained book including a substantial amount of materialnot

previously covered by other text books on the subject. Volume 1covers applications to heat transfer, acoustics, electrochemistryand fluid mechanics problems, while volume 2 concentrates on solidsand structures, describing applications to elasticity,

plasticity,elastodynamics, fracture mechanics and contact analysis. The earlychapters are designed as a teaching text for final yearundergraduate courses. Both volumes reflect the experience of theauthors over a period of more

than twenty years of boundary element research. This volume, Applications in Thermo-Fluids and Acoustics, provides acomprehensive presentation of the BEM from fundamentals to advancedengineering applications and encompasses: Steady

and transient heat transfer Potential and viscous fluid flows Frequency and time-domain acoustics Corrosion and other electrochemical problems. A unique feature of this book is an in-depth presentation of BEMformulations in all the above

fields, including detaileddiscussions of the basic theory, numerical algorithms and practicalengineering applications of the method. Written by an internationally recognised authority in the field,this is essential reading for postgraduates,

researchers andpractitioners in civil, mechanical and chemical engineering andapplied mathematics.

Starting from a clear, concise introduction, the powerful finite element and boundary element methods of engineering are developed

for application to quantum mechanics. The reader is led through illustrative examples displaying the strengths of these methods using application to fundamental quantum mechanical problems and to the design/simulation of quantum

nanoscale devices.

This is a course in boundary element methods for the absolute beginners. Basic concepts are carefully explained through the use of progressively more complicated boundary value problems in

engineering and physical sciences. The readers are assumed to have prior basic knowledge of vector calculus (covering topics such as line, surface and volume integrals and the various integral theorems), ordinary and partial differential equations,

complex variables, and computer programming. Electronic ebook edition available at Powells.com. Click on Powells logo to the left. Applications in Solids and Structures Boundary Element Techniques Boundary Element Analysis in

Computational Fracture Mechanics

Fast Boundary Element Methods in Engineering and Industrial Applications

A Beginner's Course in Boundary Element Methods

This book is devoted to the

mathematical analysis of the numerical solution of boundary integral equations treating boundary value, transmission and contact problems arising in elasticity, acoustic and electromagnetic scattering.

It serves as the mathematical foundation of the boundary element methods (BEM) both for static and dynamic problems. The book presents a systematic approach to the variational methods for boundary

integral equations including the treatment with variational inequalities for contact problems. It also features adaptive BEM, hp-version BEM, coupling of finite and boundary element methods - efficient

computational tools that have become extremely popular in applications. Familiarizing readers with tools like Mellin transformation and pseudodifferential operators as well as convex and

nonsmooth analysis for variational inequalities, it concisely presents efficient, state-of-the-art boundary element approximations and points to up-to-date research. The authors are well known for

their fundamental work on boundary elements and related topics, and this book is a major contribution to the modern theory of the BEM (especially for error controlled adaptive methods and for unilateral contact

and dynamic problems) and is a valuable resource for applied mathematicians, engineers, scientists and graduate students.

The boundary element method is an extremely versatile and powerful tool of

computational mechanics which has already become a popular alternative to the well established finite element method. This book presents a comprehensive and up-to-date treatise on the boundary element method

(BEM) in its applications to various fields of continuum mechanics such as: elastostatics, elastodynamics, thermoelasticity, micropolar elasticity, elastoplasticity,

viscoelasticity, theory of plates and stress analysis by hybrid methods. The fundamental solution of governing differential equations, integral representations of the displacement and temperature

fields, regularized integral representations of the stress field and heat flux, boundary integral equations and boundary integro-differential equations are derived. Besides the mathematical foundations of

the boundary integral method, the book deals with practical applications of this method. Most of the applications concentrate mainly on the computational problems of fracture mechanics. The method has

been found to be very efficient in stress-intensity factor computations. Also included are developments made by the authors in the boundary integral formulation of thermoelasticity, micropolar

elasticity, viscoelasticity, plate theory, hybrid method in elasticity and solution of crack problems. The solution of boundary-value problems of thermoelasticity and micropolar thermoelasticity is

formulated for the first time as the solution of pure boundary problems. A new unified formulation of general crack problems is presented by integro-differential equations. Symmetric Galerkin Boundary

Element Method presents an introduction as well as recent developments of this accurate, powerful, and versatile method. The formulation possesses the attractive feature of producing a symmetric

coefficient matrix. In addition, the Galerkin approximation allows standard continuous elements to be used for evaluation of hypersingular integrals. FEATURES • Written in a form suitable for a graduate

level textbook as well as a self-learning tutorial in the field. • Covers applications in two-dimensional and three-dimensional problems of potential theory and elasticity. Additional basic

topics involve axisymmetry, multi-zone and interface formulations. More advanced topics include fluid flow (wave breaking over a sloping beach), non-homogeneous media, functionally graded

materials (FGMs), anisotropic elasticity, error estimation, adaptivity, and fracture mechanics. • Presents integral equations as a basis for the formulation of general symmetric Galerkin

boundary element methods and their corresponding numerical implementation. • Designed to convey effective unified procedures for the treatment of singular and hypersingular integrals that naturally arise in the

method. Symbolic codes using Maple® for singular-type integrations are provided and discussed in detail. • The user-friendly adaptive computer code BEAN (Boundary Element ANalysis), fully written in Matlab®, is

available as a companion to the text. The complete source code, including the graphical user-interface (GUI), can be downloaded from the web site http://www.ghpaulino.com/SGBEM_book. The source code can be used

as the basis for building new applications, and should also function as an effective teaching tool. To facilitate the use of BEAN, a video tutorial and a library of practical examples are provided.

Boundary Element Methods

Theory and Programming

The Boundary Element Method, Volume 2

Boundary Elements: Theory and Applications

The Boundary Element Method

The Boundary Element Method is a

simple, efficient and cost effective computational technique which provides numerical solutions - for objects of any shap- for a wide range of scientific and engineering problems. In dealing with the development of the mathematics of

the Boundary Element Method the aim has been at every stage, only to present new material when sufficient experience and practice of simpler material has been gained. Since the usual background of many readers will be of

differential equations, the connection of differential equations with integral equations is explained in Chapter 1, together with analytical and numerical methods of solution. This information on integral equations provides a base

for the work of subsequent chapters. The mathematical formulation of boundary integral equations for potential problems - derived from the more familiar Laplace partial differential equation which governs many important

physical problems - is set out in Chapter 2. It should be noted here that this initial formulation of the boundary integral equations reduces the dimensionality of the problem. In the key Chapter 3, the essentials of the Boundary Element

Method are presented. This first presentation of the Boundary Element Method is in its simplest and most approachable form - two dimensional, with the shape of the boundary approximated by straight lines and the functions

approximated by constants over each of the straight lines.

As the Boundary Element Method develops into a tool of engineering analysis more effort is dedicated to studying new applications and solving different problems. This

book contains chapters on the basic principles of the technique, time dependent problems, fluid mechanics, hydraulics, geomechanics and plate bending. The number of non-linear and time dependent problems which have

become amenable to solution using boundary elements have induced many researchers to investigate in depth the basis of the method. Chapter 0 of this book presents an ap proach based on weighted residual and error approximations,

which permits easy construction of the governing boundary integral equations. Chapter I reviews the theoretical aspects of integral equation formulations with emphasis in their mathematical aspects. The analysis of time

dependent problems is presented in Chap. 2 which describes the time and space dependent integral formulation of heat conduction problems and then proposes a numerical procedure and time marching algorithm. Chapter 3

reviews the application of boundary elements for fracture mechanics analysis in the presence of thermal stresses. The chapter presents numerical results and the considerations on numerical accuracy are of interest to analysts

as well as practising engineers. The Boundary Integral Equation (BIE) method has occupied me to various degrees for the past twenty-two years. The attraction of BIE analysis has been its unique combination of mathematics and

practical application. The EIE method is unforgiving in its requirement for mathe matical care and its requirement for diligence in creating effective numerical algorithms. The EIE method has the ability to provide critical inSight

into the mathematics that underlie one of the most powerful and useful modeling approximations ever devised--elasticity. The method has even revealed important new insights into the nature of crack tip plastic strain distributions. I believe

that EIE modeling of physical problems is one of the remaining opportunities for challenging and fruitful research by those willing to apply sound mathematical discipline coupled with phys ical insight and a desire to relate the

two in new ways. The monograph that follows is the summation of many of the successes of that twenty-two years, supported by the ideas and synergisms that come from working with individuals who share a common interest in

engineering mathematics and their application. The focus of the monograph is on the application of EIE modeling to one of the most important of the solid mechanics disciplines--fracture mechanics. The monograph is not a trea tise on

fracture mechanics, as there are many others who are far more qualified than I to expound on that topic.

Applications of the Boundary Element Method in the Analysis of a Plate with a Repair

Boundary Element Methods for Engineers and Scientists

Theory and Applications For Engineers and Scientists

Boundary Element Analysis

This volume contains eleven contributions on boundary

integral equation and boundary element methods. Beside some historical and more analytical aspects in the formulation and analysis of boundary integral equations, modern fast boundary element methods are

also described and analyzed from a mathematical point of view. In addition, the book presents engineering and industrial applications that show the ability of boundary element methods to solve challenging problems from

different fields.

The Boundary Element Method for Engineers and Scientists: Theory and Applications is a detailed introduction to the principles and use of boundary element method

(BEM), enabling this versatile and powerful computational tool to be employed for engineering analysis and design. In this book, Dr. Katsikadelis presents the underlying principles and explains how

the BEM equations are formed and numerically solved using only the mathematics and mechanics to which readers will have been exposed during undergraduate studies. All concepts are illustrated with worked

examples and problems, helping to put theory into practice and to familiarize the reader with BEM programming through the use of code and programs listed in the book and also available in electronic form

on the book’s companion website. Offers an accessible guide to BEM principles and numerical implementation, with worked examples and detailed discussion of practical applications This second

edition features three new chapters, including coverage of the dual reciprocity method (DRM) and analog equation method (AEM), with their application to complicated problems, including time dependent and

non-linear problems, as well as problems described by fractional differential equations Companion website includes source code of all computer programs developed in the book for the solution of a broad range of real-

life engineering problems

The boundary element method (BEM) is a modern numerical technique, which has enjoyed increasing popularity over the last two decades, and is now an established alternative to traditional

computational methods of engineering analysis. The main advantage of the BEM is its unique ability to provide a complete solution in terms of boundary values only, with substantial savings in modelling effort.

This two volume book set is designed to provide the readers with a comprehensive and up-to-date account of the boundary element method and its application to solving engineering problems. Each volume is a

self-contained book including a substantial amount of material not previously covered by other text books on the subject. Volume 1 covers applications to heat transfer, acoustics, electrochemistry and fluid

mechanics problems, while volume 2 concentrates on solids and structures, describing applications to elasticity, plasticity, elastodynamics, fracture mechanics and contact analysis. The early chapters

are designed as a teaching text for final year undergraduate courses. Both volumes reflect the experience of the authors over a period of more than twenty years of boundary element research.

Industrial applications
The Boundary Element Method with Programming
Boundary Element Method
Developments in Boundary Element Methods: Applications to time-dependent and time harmonic

problems

Developments in Boundary Element Methods

Boundary Element Method for Plate Analysis offers one of the first systematic and detailed treatments of

the application of BEM to plate analysis and design. Aiming to fill in the knowledge gaps left by contributed volumes on the topic and increase the accessibility of the

extensive journal literature covering BEM applied to plates, author John T. Katsikadelis draws heavily on his pioneering work in the field to provide a complete introduction to

theory and application. Beginning with a chapter of preliminary mathematical background to make the book a self-contained resource, Katsikadelis moves on to cover the

application of BEM to basic thin plate problems and more advanced problems. Each chapter contains several examples described in detail and closes with problems to solve.

Presenting the BEM as an efficient computational method for practical plate analysis and design, Boundary Element Method for Plate Analysis is a valuable reference for

researchers, students and engineers working with BEM and plate challenges within mechanical, civil, aerospace and marine engineering. One of the first resources dedicated to

boundary element analysis of plates, offering a systematic and accessible introductory to theory and application Authored by a leading figure in the field whose pioneering work has

led to the development of BEM as an efficient computational method for practical plate analysis and design Includes mathematical background, examples and problems in

one self-contained resource Boundary Element Analysis: Theory and Programming introduces the theory behind the boundary element method and its computer applications. The

author uses Cartesian tensor notation throughout the book and includes the steps involved in deriving many of the equations. The text includes computer programs in Fortran 77 for

elastostatic, plate bending, and free and forced vibration problems with detailed descriptions of the code.

The Boundary Element Method for Engineers and

ScientistsTheory and ApplicationsAcademic Press Applications in Thermo-Fluids and Acoustics Stress Analysis by Boundary Element Methods Natural Boundary Integral

Method and Its Applications
Finite Element and Boundary Element Applications in Quantum Mechanics
Developments in Boundary Element Methods:

Industrial applications of boundary element methods

The Boundary Element Method, or BEM, is a powerful numerical analysis tool with particular advantages over other analytical methods. With

research in this area increasing rapidly and more uses for the method appearing, this timely book provides a full chronological review of all techniques that have been proposed so far, covering not

only the fundamentals of the BEM but also a wealth of information on related computational analysis techniques and formulations, and their applications in engineering, physics and

mathematics. An indispensable handbook and source of inspiration for researchers and professionals in these fields, this book is also an ideal textbook for graduate engineering students.

The fast multipole method is one of the most important algorithms in computing developed in the 20th century. Along with the fast multipole method, the boundary element method (BEM) has also

emerged as a powerful method for modeling large-scale problems. BEM models with millions of unknowns on the boundary can now be solved on desktop computers using the fast multipole BEM. This is

the first book on the fast multipole BEM, which brings together the classical theories in BEM formulations and the recent development of the fast multipole method. Two- and three-dimensional potential,

elastostatic, Stokes flow, and acoustic wave problems are covered, supplemented with exercise problems and computer source codes. Applications in modeling nanocomposite materials, bio-

materials, fuel cells, acoustic waves, and image-based simulations are demonstrated to show the potential of the fast multipole BEM. Enables students, researchers, and engineers to learn the BEM and

fast multipole method from a single source.
Nine detailed survey chapters by different authors present a number of applications of BEMs.
Advanced applications of the

boundary element method to the analysis of polymers
Principles and Applications

The Boundary Element Method,
The Boundary Element Method
The Boundary Element Method,

Volume 1

to Boundary Elements Theory and Applications With 194 Figures Springer-Verlag Berlin Heidelberg New York London Paris Tokyo Hong Kong Dr.-Ing. Friedel Hartmann University of Dortmund Department of Civil Engineering 4600 Dortmund 50 FRG

ISBN-13: 978-3-642-48875-7 e-ISBN-13: 978-3-642-48873-3 001: 10.1007/978-3-642-48873-3 Library of Congress Cataloging-in-Publication Data Hartmann, F. (Friedel) Introduction to boundary elements: theory and applications/Friedel Hartmann. ISBN-13: 978-3-642-48875-7 1.

Boundary value problems. I. Title.
TA347.B69H371989 515.3'5--dc19
89-4160 This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on

microfilms or in other ways, and storage in data banks. Duplication of this publication or parts thereof is only permitted under the provision of the German Copyright Law of September 9,1965, in its version of June 24,1985, and a copyright fee must always be paid. Violations fall under the prosecution act

of the German Copyright Law. © Springer-Verlag Berlin Heidelberg 1989 Softcover reprint of the hardcover 1 st edition 1989 The use of registered names, trademarks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws

and regulations and therefore free for general use.

Boundary element methods are very important for solving boundary value problems in PDEs. Many boundary value problems of partial differential equations can be reduced into boundary integral equations by the natural boundary

reduction. In this book the natural boundary integral method, suggested and developed by Feng and Yu, is introduced systematically. It is quite different from popular boundary element methods and has many distinctive advantages. The variational principle is conserved after the natural boundary reduction, and

some useful properties are also preserved faithfully. Moreover, it can be applied directly and naturally in the coupling method and the domain decomposition method of finite and boundary elements. Most of the material in this book has only appeared in the author's previous papers. Compared with its Chinese edition

(Science Press, Beijing, 1993), many new research results such as the domain decomposition methods based on the natural boundary reduction are added. The Boundary Element Methods (BEM) has become one of the most efficient tools for solving various kinds of problems in engineering science. The International

Association for Boundary Element Methods (IABEM) was established in order to promote and facilitate the exchange of scientific ideas related to the theory and applications of boundary element methods. The aim of this symposium is to provide a forum for researchers in boundary element methods

and boundary-integral formulations in general to present contemporary concepts and techniques leading to the advancement of capabilities and understanding of this com putational methodology. The topics covered in this symposium include mathematical and computational aspects, applications to

solid mechanics, fluid mechanics, acoustics, electromagnetics, heat transfer, optimization, control, inverse problems and other interdisciplinary problems. Papers deal ing with the coupling of the boundary element method with other computational methods are also included. The editors hope that this

volume presents some innovative techniques and useful knowl edge for the development of the boundary element methods. February, 1992 S. Kobayashi N. Nishimura Contents Abe, K. Applications in Sound and Vibration Topics in Boundary Element Research The Boundary Element Method for

Engineers and Scientists

An Introductory Course with Advanced Topics

The Boundary Element Method for Plate Analysis

The author's ambition for this publication was to make BEM

accessible to the student as well as to the professional engineer. For this reason, his main task was to organize and present the material in such a way so that the book becomes "user-friendly" and easy to comprehend, taking into

account only the mathematics and mechanics to which students have been exposed during their undergraduate studies. This effort led to an innovative, in many aspects, way of presenting BEM, including the derivation of

fundamental solutions, the integral representation of the solutions and the boundary integral equations for various governing differential equations in a simple way minimizing a recourse to mathematics with

which the student is not familiar. The indicial and tensorial notations, though they facilitate the author's work and allow to borrow ready to use expressions from the literature, have been avoided in the present book.

Nevertheless, all the necessary preliminary mathematical concepts have been included in order to make the book complete and self-sufficient. Throughout the book, every concept is followed by example problems, which have

been worked out in detail and with all the necessary clarifications. Furthermore, each chapter of the book is enriched with problems-to-solve. These problems serve a threefold purpose. Some of them are simple and aim at applying

and better understanding the presented theory, some others are more difficult and aim at extending the theory to special cases requiring a deeper understanding of the concepts, and others are small projects

which serve the purpose of familiarizing the student with BEM programming and the programs contained in the CD-ROM. The latter class of problems is very important as it helps students to comprehend the usefulness and

effectiveness of the method by solving real-life engineering problems. Through these problems students realize that the BEM is a powerful computational tool and not an alternative theoretical approach for dealing

with physical problems. My experience in teaching BEM shows that this is the students' most favorite type of problems. They are delighted to solve them, since they integrate their knowledge and make them feel

confident in mastering BEM. The CD-ROM which accompanies the book contains the source codes of all the computer programs developed in the book, so that the student or the engineer can use them for the solution of a broad

class of problems. Among them are general potential problems, problems of torsion, thermal conductivity, deflection of membranes and plates, flow of incompressible fluids, flow through porous media, in isotropic

or anisotropic, homogeneous or composite bodies, as well as plane elastostatic problems in simply or multiply connected domains. As one can readily find out from the variety of the applications, the book is useful for

engineers of all disciplines. The author is hopeful that the present book will introduce the reader to BEM in an easy, smooth and pleasant way and also contribute to its dissemination as a modern robust computational tool for

solving engineering problems. Significant developments in the boundary element method during the last two decades have made it a powerful alternative to the domain-type numerical methods of solution such as the finite

element method. The advances made in the BEM are more or less due to the innovation of efficient computational techniques by introducing boundary elements for discretization of the boundary integral equations resulting from

the so-called direct formulation. BEM has therefore become an efficient tool for optimal design and other inverse problems. These proceedings include discussion of the applications of BEM in mechanical engineering

and the principles that have developed to make it an increasingly useful method of problem solving.
Over the past decades, the Boundary Element Method has emerged as a ver satile and

powerful tool for the solution of engineering problems, presenting in many cases an alternative to the more widely used Finite Element Method. As with any numerical method, the engineer or scientist who applies it to a

practical problem needs to be acquainted with, and understand, its basic principles to be able to apply it correctly and be aware of its limitations. It is with this intention that we have endeavoured to write this book: to

give the student or practitioner an easy-to-understand introductory course to the method so as to enable him or her to apply it judiciously. As the title suggests, this book not only serves as an introductory course, but also cov

ers some advanced topics that we consider important for the researcher who needs to be up-to-date with new developments. This book is the result of our teaching experiences with the Boundary Element Method, along with

research and consulting activities carried out in the field. Its roots lie in a graduate course on the Boundary Element Method given by the authors at the university of Stuttgart. The experiences gained from teaching and the remarks

and questions of the students have contributed to shaping the 'Introductory course' (Chapters 1-8) to the needs of the stu dents without assuming a background in numerical methods in general or the Boundary Element Method in

particular.