Programming the Boundary Element Method. An Introduction for Engineers

Description: Providing an easy introduction to the boundary element method, this book is ideal for any reader wishing to work in this field or use this method for the solution of engineering problems. From the beginning, the emphasis is on the implementation of the method into computer programs which can be used to solve real problems. The book covers two-and-three-dimensional linear and non-linear analysis in potential flow (heat flow and seepage) and static elasticity. Several computer programs are listed in the book and may be downloaded free of charge via the Internet. They include programs and subroutines for:

* 2-D analysis of potential problems using the Trefftz method

* 2-D and 3-D linear analysis of potential and static elasticity problems using isoparametric elements (single and multiple regions)

* implementation of non-linear problems

* coupling to finite elements

The programs (written in FORTRAN 90) are well documented, and can be employed by the user to gain experience with the method through the solution of small test examples. Furthermore, readers may use them as a starting point for developing their own boundary element package. In addition, exercises are included in most chapters involving the use of the programs with answers given in an Appendix, and a number of interesting industrial applications in the areas of mechanical, civil and geotechnical engineering are presented.

Contents: Preface.
Acknowledgements.
Preliminaries.
Programming.
Discretisation and Interpolation.
Material Modelling and Fundamental Solutions.
Boundary Integral Equations.
Boundary Element Methods –
Numerical Implementation.
Assembly and Solution.
Postprocessing.
Test Examples.
Multiple Regions.
Edges and Corners.
Body Forces.
Non-Linear Problems.
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