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Nota di contenuto	Intro -- The Method of Fundamental Solutions: Theory and Applications -- Contents -- Preface -- Acknowledgements -- Introduction -- Historic Review -- Basic Algorithms -- Numerical Experiments -- Characteristics of the MFS -- Part I -- Dirichlet Problems -- Basic Algorithms of MFS -- Preliminary Lemmas -- Main Theorems -- Stability Analysis for Disk Domains -- Proof Methodology -- Neumann Problems -- Introduction -- Method of Fundamental Solutions -- Description of Algorithms -- Main Results of Analysis and Their Applications -- Stability Analysis of Disk Domains -- Stability Analysis for Bounded Simply-Connected Domains -- Trefftz Methods -- Collocation Trefftz Methods -- Error Estimates -- Concluding Remarks -- Other Boundary Problems -- Mixed Boundary Condition Problems -- Interior Boundary Conditions -- Annular Domains -- Combined Methods -- Combined Methods -- Variant Combinations of FS and PS -- Simplified Hybrid Combination -- Hybrid Plus Penalty Combination -- Indirect Combination -- Combinations of MFS with Other Domain Methods -- Combined with FEM -- Combined with FDM -- Combined with Radial Basis Functions -- Singularity Problems by Combination of MFS and MPS -- Source Nodes on Elliptic Pseudo-Boundaries -- Introduction -- Algorithms of MFS -- Error Analysis -- Preliminary

Lemmas -- Error Bounds -- Stability Analysis -- Selection of Pseudo-Boundaries -- Numerical Experiments -- Concluding Remarks -- Part II -- Helmholtz Equations in Simply-Connected Domains -- Introduction -- Algorithms -- Error Analysis for Bessel Functions -- Preliminary Lemmas -- Error Bounds with Small k -- Exploration of Bounded k -- Stability Analysis for Disk Domains -- Application to BKM -- Exterior Problems of Helmholtz Equation -- Introduction -- Standard MFS -- Basic Algorithms -- Brief Error Analysis.

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Removal Techniques Linked to Source Identification Problems --
Concluding Remarks -- Source Nodes on Pseudo Radial-Lines --
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Disk Domains -- Non-Disk Domains -- Concluding Remarks --
Epilogue -- References -- Glossary of Symbols -- Index.

Sommario/riassunto

The fundamental solutions (FS) satisfy the governing equations in a solution domain S , and then the numerical solutions can be found from the exterior and the interior boundary conditions on S . The resource nodes of FS are chosen outside S , distinctly from the case of the boundary element method (BEM). This method is called the method of fundamental solutions (MFS), which originated from Kupradze in 1963. The Laplace and the Helmholtz equations are studied in detail, and biharmonic equations and the Cauchy-Navier equation of linear elastostatics are also discussed. Moreover, better choices of source nodes are explored. The simplicity of numerical algorithms and high accuracy of numerical solutions are two remarkable advantages of the MFS. However, the ill-conditioning of the MFS is notorious, and the condition number (Cond) grows exponentially via the number of the unknowns used. In this book, the numerical algorithms are introduced and their characteristics are addressed. The main efforts are made to establish the theoretical analysis in errors and stability. The strict analysis (as well as choices of source nodes) in this book has provided the solid theoretical basis of the MFS, to grant it to become an effective and competent numerical method for partial differential equations (PDE). Based on some of our works published as journal papers, this book presents essential and important elements of the MFS. It is intended for researchers, graduated students, university students, computational experts, mathematicians and engineers.

2. Record Nr.	UNICAMPANIAVAN00278344
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