Contents

Acoustic, Electromagnetic and Elastic Field Equations Pertinent to Scattering Problems
V.V. VARADAN and V.K. VARADAN 3

PART 1 T-MATRIX APPROACH; SINGLE SCATTERING

General Introduction to the Extended Boundary Condition
R.H.T. BATES 21

Elastic Wave Scattering
V.V. VARADAN 33

Survey of T-matrix Methods
P.C. WATERMAN 61

Surface Currents and 'Near' Zone Fields
V.N. BRINGI and T.A. SELIGA 79

Scattering by an Elastic Obstacle in a Fluid and a Smooth Elastic Obstacle
A. BÖSTROM 91

PART 2 T-MATRIX APPROACH; MULTIPLE SCATTERING

Multiple Scattering of Acoustic, Electromagnetic and Elastic Waves
V.K. VARADAN 103

The T-matrix Approach to Scattering from Buried Inhomogeneities
S. STRÖM and G. KRISTENSSON 135

Scattering from Perfect Conductors and Layered Dielectrics using both Incoming and Outgoing Wave Functions
A. HIZAL 169

Scattering and Absorption by Homogeneous and Layered Dielectrics
P.W. BARBER 191

The T-matrix Method for Scattering by an Obstacle in a Waveguide
A. BÖSTROM 211

On the Multiple Scattering of Waves from Obstacles with Solid-Fluid Interfaces
B. PETERSON, V.V. VARADAN and V.K. VARADAN 225

PART 3 COMPUTATIONAL ASPECTS OF T-MATRIX. COMPARISON WITH OTHER METHODS

The Fredholm Integral Equation Method and Comparison with T-Matrix Approach
A.R. HOLT 255

Methods of Overcoming Numerical Instabilities Associated with the T-matrix Method
D.J.N. WALL 269

Method of Optimal Truncation : A new T-matrix Approach to Elastic Wave Scattering
W.M. VISSCHER 287

PART 4 MOMENT METHODS

Application of the Combined-Source Formulation to a Conducting Body of Revolution
R.F. HARRINGTON and J.R. MAUTZ 305

Accuracy Tests and Iterative Procedures for High Frequency Asymptotic Solutions - A Spectral Domain Approach
R. MITTRA and M. TEW 323

PART 5 GEOMETRICAL THEORY OF DIFFRACTION

Application of Ray Theory to Diffraction of Elastic Waves by Cracks
J.D. ACHENBACH, A.K. GAUTESEN and H. McMAKEN 355

The Uniform Geometrical Theory of Diffraction and its Application to Electromagnetic Radiation and Scattering
R.G. KOUYOUMJIAN, P.H. PATHAK and W.D. BURNSIDE 373

PART 6 RESONANCES AND SINGULARITY EXPANSIONS

Resonance Scattering Predictions and Measurements
L.R. DRAGONETTE and L. FLAX 401

Resonances in Acoustic and Elastic Wave Scattering
G.C. GAUNAURD AND H. ÜBERALL 413

The Singularity and Eigenmode Expansion Methods with Application to Equivalent Circuits and Related Topics
C.E. BAUM and B.K. SINGARAJU 431

A Critique of the Singularity Expansion and Eigenmode Expansion Methods
C.L. DOLPH, V. KOMKOV and R.A. SCOTT 453

Estimation of the Complex Natural Resonances from a Class of Sub-Surface Targets
L.C. CHAN, D.L. MOFFATT and L. PETERS, JR. 463

PART 7 FINITE ELEMENT METHOD

Recent Developments of the Unimoment Method
K.K. MEI, J.F. HUNKA and S.K. CHANG 485

Boundary Layer and Finite Element Techniques Applied to Wave Problems
C.C. MEI 507

PART 8 MULTIPLE SCATTERING THEORIES

Multiple Scattering Theory and the Self-Consistent Imbedding Approximation
J. KORRINGA 529

Electromagnetic Wave Scattering by Small Bodies of an Arbitrary Shape
A.G. RAMM 537

Multiple Scattering from Gratings of Compliant Tubes in Fluid and in a Viscoelastic Layer Immersed in Fluid
R.P. RADLINSKI 547

Stochastic Variational Formulations of Electromagnetic Wave Scattering
R.H. ANDREO and J.A. KRILL 565

PART 9 EXPERIMENTAL METHODS AND INVERSE SCATTERING ANALYSES

Comparison between Experimental and Computational Results for Elastic Wave Scattering
R.K. ELSLEY, J.M. RICHARDSON, R.B. THOMPSON and B.R. TITTMANN 571

Inversion of Crack Scattering Data in the High-Frequency Domain
J.D. ACHENBACH, A. NORRIS and K. VISWANATHAN 591

Inversion of Ultrasonic Scattering Data
J.H. ROSE, R.K. ELSLEY, B.R. TITTMANN, V.V. VARADAN and V.K. VARADAN... 605

Inverse Scattering as a Target Identification Problem
A.A. KSIENSKI and H. LIN 615

Approximate Image Reconstruction from Transient Signature
J.D. YOUNG 631

PART 10 SPECIAL TOPICS

Integral Representation Techniques for Calculating Modes of Coupled Electromagnetic Dielectric Guides
L. EYGES 657

A Scattering Model for Detection of Tunnels Using Video Pulse Radar Systems
G.A. BURRELL, T.H. RICHMOND, L. PETERS and H.B. TRAN 667

SUMMARY OF PANEL DISCUSSIONS 685

SUBJECT INDEX 689