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	Nota di contenuto	Front matter -- Preface -- Editor's Preface -- Contents -- Part I. Introduction -- Chapter 1. Inverse Problems of Mathematical Physics / Kabanikhin, S. I. -- Part II. Recent Advances in Regularization Theory and Methods -- Chapter 2. Using Parallel Computing for Solving Multidimensional Ill-posed Problems / Lukyanenko, D. V. / Yagola, A. G. -- Chapter 3. Regularization of Fredholm Integral Equations of the First Kind using Nyström Approximation / Nair, M. T. -- Chapter 4. Regularization of Numerical Differentiation: Methods and Applications / Xiao, T. Y. / Zhang, H. / Hao, L. L. -- Chapter 5. Numerical Analytic Continuation and Regularization / Fu, C. L. / Cheng, H. / Ma, Y. J. -- Chapter 6. An Optimal Perturbation Regularization Algorithm for Function Reconstruction and Its Applications / Li, G. S. -- Chapter 7. Filtering and Inverse Problems Solving / Zotov, L. V. / Panteleev, V. L. -- Part III. Optimal Inverse Design and Optimization Methods -- Chapter 8. Inverse Design of Alloys' Chemistry for Specified Thermo-Mechanical Properties by using Multi-objective Optimization /

Dulikravich, G. S. / Egorov, I. N. -- Chapter 9. Two Approaches to Reduce the Parameter Identification Errors / Xiang, Z. H. -- Chapter 10. A General Convergence Result for the BFGS Method / Dai, Y. H. -- Part IV. Recent Advances in Inverse Scattering -- Chapter 11. Uniqueness Results for Inverse Scattering Problems / Liu, X. D. / Zhang, B. -- Chapter 12. Shape Reconstruction of Inverse Medium Scattering for the Helmholtz Equation / Bao, G. / Li, P. J. -- Part V. Inverse Vibration, Data Processing and Imaging -- Chapter 13. Numerical Aspects of the Calculation of Molecular Force Fields from Experimental Data / Kuramshina, G. M. / Kochikov, I. V. / Stepanova, A. V. -- Chapter 14. Some Mathematical Problems in Biomedical Imaging / Liu, J. J. / Xu, H. L. -- Part VI Numerical Inversion in Geosciences -- Chapter 15. Numerical Methods for Solving Inverse Hyperbolic Problems / Kabanikhin, S. I. / Shishlenin, M. A. -- Chapter 16. Inversion Studies in Seismic Oceanography / Song, H. B. / Huang, X. H. / Pinheiro, L. M. / Song, Y. / Dong, C. Z. / Bai, Y. -- Chapter 17. Image Resolution Beyond the Classical Limit / Gelius, L. J. -- Chapter 18. Seismic Migration and Inversion / Wang, Y. F. / Li, Z. H. / Yang, C. C. -- Chapter 19. Seismic Wavefields Interpolation Based on Sparse Regularization and Compressive Sensing / Wang, Y. F. / Cao, J. J. / Sun, T. / Yang, C. C. -- Chapter 20. Some Researches on Quantitative Remote Sensing Inversion / Yang, H. -- Index

Sommario/riassunto	Nowadays inverse problems and applications in science and engineering represent an extremely active research field. The subjects are related to mathematics, physics, geophysics, geochemistry, oceanography, geography and remote sensing, astronomy, biomedicine, and other areas of applications. This monograph reports recent advances of inversion theory and recent developments with practical applications in frontiers of sciences, especially inverse design and novel computational methods for inverse problems. The practical applications include inverse scattering, chemistry, molecular spectra data processing, quantitative remote sensing inversion, seismic imaging, oceanography, and astronomical imaging. The book serves as a reference book and readers who do research in applied mathematics, engineering, geophysics, biomedicine, image processing, remote sensing, and environmental science will benefit from the contents since the book incorporates a background of using statistical and non-statistical methods, e.g., regularization and optimization techniques for solving practical inverse problems.