1.	Record Nr.	UNISA996418200503316
	Autore	Richter Mathias
	Titolo	Inverse problems : basics, theory and applications in geophysics / / Mathias Richter
	Pubbl/distr/stampa	Cham, Switzerland : , : Birkhaìuser, , [2020] Â©2020
	ISBN	3-030-59317-7
	Edizione	[Second edition.]
	Descrizione fisica	1 online resource (XIV, 273 p. 57 illus., 43 illus. in color.)
	Collana	Lecture Notes in Geosystems Mathematics and Computing, , 2512-3211
	Disciplina	515.357
	Soggetti	Inverse problems (Differential equations) Geophysics - Mathematics Earth sciences
	Lingua di pubblicazione	Inglese
	Formato	Materiale a stampa
	Livello bibliografico	Monografia
	Nota di contenuto	Characterization of Inverse Problems -- Discretization of Inverse Problems -- Regularization of Linear Inverse Problems -- Regularization of Nonlinear Inverse Problems -- Appendix A. Results from Linear Algebra -- Appendix B. Function Spaces -- Appendix C. The Fourier Transform -- Appendix D. Regularization Property of CGNE -- Appendix E. Existence and Uniqueness Theorems for Waveform Inversion.
	Sommario/riassunto	This textbook is an introduction to the subject of inverse problems with an emphasis on practical solution methods and applications from geophysics. The treatment is mathematically rigorous, relying on calculus and linear algebra only; familiarity with more advanced mathematical theories like functional analysis is not required. Containing up-to-date methods, this book will provide readers with the tools necessary to compute regularized solutions of inverse problems. A variety of practical examples from geophysics are used to motivate the presentation of abstract mathematical ideas, thus assuring an accessible approach. Beginning with four examples of inverse problems, the opening chapter establishes core concepts, such as formalizing these problems as equations in vector spaces and addressing the key issue of ill-posedness. Chapter Two then moves on

to the discretization of inverse problems, which is a prerequisite for solving them on computers. Readers will be well-prepared for the final chapters that present regularized solutions of inverse problems in finite-dimensional spaces, with Chapter Three covering linear problems and Chapter Four studying nonlinear problems. Model problems reflecting scenarios of practical interest in the geosciences, such as inverse gravimetry and full waveform inversion, are fully worked out throughout the book. They are used as test cases to illustrate all single steps of solving inverse problems, up to numerical computations. Five appendices include the mathematical foundations needed to fully understand the material. This second edition expands upon the first, particularly regarding its up-to-date treatment of nonlinear problems. Following the author's approach, readers will understand the relevant theory and methodology needed to pursue more complex applications. Inverse Problems is ideal for graduate students and researchers interested in geophysics and geosciences.