

1. Record Nr.	UNINA9910484051003321
Autore	Schuster Thomas <1971->
Titolo	The method of approximate inverse : theory and applications // Thomas Schuster
Pubbl/distr/stampa	Berlin, Germany ; ; New York, New York : , : Springer, , [2007] ©2007
ISBN	1-280-85346-8 9786610853465 3-540-71227-5
Edizione	[1st ed. 2007.]
Descrizione fisica	1 online resource (XIV, 202 p. 35 illus.)
Collana	Lecture notes in mathematics ; ; 1906
Classificazione	31.76 MAT 150f MED 385f PHY 013f SI 850
Disciplina	515.357
Soggetti	Inverse problems (Differential equations) Tomography
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Revised habilitation - Universitat des Saarlandes, Saarbrucken, 2004.
Nota di bibliografia	Includes bibliographical references (pages [189]-195).
Nota di contenuto	Inverse and Semi-discrete Problems -- Ill-posed problems and regularization methods -- Approximate inverse in L 2-spaces -- Approximate inverse in Hilbert spaces -- Approximate inverse in distribution spaces -- Conclusion and perspectives -- Application to 3D Doppler Tomography -- A semi-discrete setup for Doppler tomography -- Solving the semi-discrete problem -- Convergence and stability -- Approaches for defect correction -- Conclusion and perspectives -- Application to the spherical mean operator -- The spherical mean operator -- Design of a mollifier -- Computation of reconstruction kernels -- Numerical experiments -- Conclusion and perspectives -- Further Applications -- Approximate inverse and X-ray diffractometry -- A filtered backprojection algorithm -- Computation of reconstruction kernels in 3D computerized tomography -- Conclusion and perspectives.

Inverse problems arise whenever one tries to calculate a required quantity from given measurements of a second quantity that is associated to the first one. Besides medical imaging and non-destructive testing, inverse problems also play an increasing role in other disciplines such as industrial and financial mathematics. Hence, there is a need for stable and efficient solvers. The book is concerned with the method of approximate inverse which is a regularization technique for stably solving inverse problems in various settings such as L^2 -spaces, Hilbert spaces or spaces of distributions. The performance and functionality of the method is demonstrated on several examples from medical imaging and non-destructive testing such as computerized tomography, Doppler tomography, SONAR, X-ray diffractometry and thermoacoustic computerized tomography. The book addresses graduate students and researchers interested in the numerical analysis of inverse problems and regularization techniques or in efficient solvers for the applications mentioned above.
