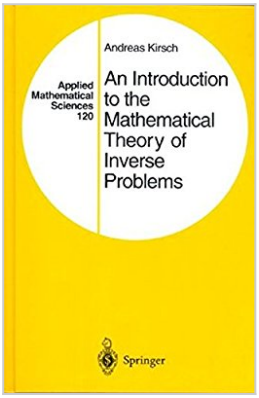

An Introduction to the Mathematical Theory of Inverse Problems (Applied Mathematical Sciences)

By Andreas Kirsch

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This book introduces the reader to the area of inverse problems. A relatively new branch of Applied Mathematics, the study of inverse problems is of vital interest to many areas of science and technology such as geophysical exploration, system identification, nondestructive testing and ultrasonic tomography.
The aim of this book is twofold: in the first part, the reader is exposed to the basic notions and difficulties encountered with ill-posed problems. Basic properties of regularization methods for linear ill-posed problems are studied by means of several simple analytical and numerical examples.
The second part of the book presents two special nonlinear inverse problems in detail - the inverse spectral problem and the inverse scattering problem. The corresponding direct problems are studied with respect to existence, uniqueness and continuous dependence on parameters. Then some theoretical results as well as numerical procedures for the inverse problems are discussed. The choice of material and its presentation in the book are new, thus making it particularly suitable for graduate students. Basic knowledge of real analysis is assumed.

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An Introduction to the Mathematical Theory of Inverse Problems (Applied Mathematical Sciences) By Andreas Kirsch Bibliography

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Editorial Review

Review

From the reviews of the second edition:

“Andreas Kirsch successfully wrote this book not only for mathematics students but also physics and engineering students. … I think that this book would work very nicely as a university textbook. … All sections of the books seemed sprinkled with the latest results, showing that there is a surprising amount of current research activity in this area. I recommend this book to anyone interested in inverse problems, and book’s index makes it a valuable reference volume for your book shelf.” (Collin Carbno, The Mathematical Association of America, January, 2012)

From the Back Cover

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The aim of this book is twofold: in the first part, the reader is exposed to the basic notions and difficulties encountered with ill-posed problems. Basic properties of regularization methods for linear ill-posed problems are studied by means of several simple analytical and numerical examples.

The second part of the book presents three special nonlinear inverse problems in detail - the inverse spectral problem, the inverse problem of electrical impedance tomography (EIT), and the inverse scattering problem.

The corresponding direct problems are studied with respect to existence, uniqueness and continuous dependence on parameters. Then some theoretical results as well as numerical procedures for the inverse problems are discussed.

In this new edition, the Factorization Method is included as one of the prominent members in this monograph. Since the Factorization Method is particularly simple for the problem of EIT and this field has attracted a lot of attention during the past decade a chapter on EIT has been added in this monograph.

The book is highly illustrated and contains many exercises. This together with the choice of material and its presentation in the book are new, thus making it particularly suitable for graduate students in mathematics and engineering.

About the Author
Andreas Kirsch is a Professor in the Department of Mathematics at Karlsruhe Institute of Technology.

Users Review

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