Fixed-Point Algorithms for Inverse Problems in Science and Engineering (Springer Optimization and Its Applications)

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Fixed-Point Algorithms for Inverse Problems in Science and Engineering (Springer Optimization and Its Applications) From Springer

"Fixed-Point Algorithms for Inverse Problems in Science and Engineering" presents some of the most recent work from top-notch researchers studying projection and other first-order fixed-point algorithms in several areas of mathematics and the applied sciences. The material presented provides a survey of the state-of-the-art theory and practice in fixed-point algorithms, identifying emerging problems driven by applications, and discussing new approaches for solving these problems.

This book incorporates diverse perspectives from broad-ranging areas of research including, variational analysis, numerical linear algebra, biotechnology, materials science, computational solid-state physics, and chemistry.

Topics presented include:

Theory of Fixed-point algorithms: convex analysis, convex optimization, subdifferential calculus, nonsmooth analysis, proximal point methods, projection methods, resolvent and related fixed-point theoretic methods, and monotone operator theory.

Numerical analysis of fixed-point algorithms: choice of step lengths, of weights, of blocks for block-iterative and parallel methods, and of relaxation parameters; regularization of ill-posed problems; numerical comparison of various methods.

Areas of Applications: engineering (image and signal reconstruction and decompression problems), computer tomography and radiation treatment planning (convex feasibility problems), astronomy (adaptive optics), crystallography (molecular structure reconstruction), computational chemistry

(molecular structure simulation) and other areas.

Because of the variety of applications presented, this book can easily serve as a basis for new and innovated research and collaboration.

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Editorial Review

From the Back Cover

Fixed-Point Algorithms for Inverse Problems in Science and Engineering presents some of the most recent work from leading researchers in variational and numerical analysis. The contributions in this collection provide state-of-the-art theory and practice in first-order fixed-point algorithms, identify emerging problems driven by applications, and discuss new approaches for solving these problems.

This book is a compendium of topics explored at the Banff International Research Station "Interdisciplinary Workshop on Fixed-Point Algorithms for Inverse Problems in Science and Engineering" in November of 2009. The workshop included a broad range of research including variational analysis, numerical linear algebra, biotechnology, materials science, computational solid-state physics, and chemistry.

Key topics and features of this book include:

·   Theory of Fixed-point algorithms: variational analysis, convex analysis, convex and nonconvex optimization, subdifferential calculus, nonsmooth analysis, proximal point methods, projection methods, resolvent and related fixed-point theoretic methods, and monotone operator theory

·   Numerical analysis of fixed-point algorithms: choice of step lengths, of weights, of blocks for block-iterative and parallel methods, and of relaxation parameters; regularization of ill-posed problems; numerical comparison of various methods

·   Applications: Image and signal processing, antenna optimization, location problems

The wide scope of applications presented in this volume easily serve as a basis for new and innovative research and collaboration.

Users Review

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