

Unraveling the Secrets of Electromagnetic Inverse Scattering: Discover Computational Methods Backed By IEEE Press!

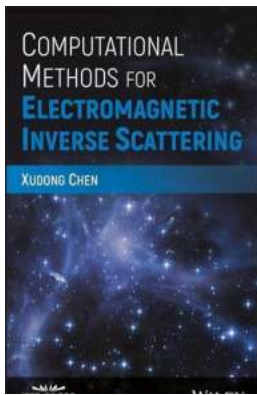
Have you ever wondered how scientists are able to infer information about objects that cannot be directly observed? The field of electromagnetic inverse scattering holds the key to unraveling this mystery. In this comprehensive guide, we will explore the cutting-edge computational methods used in electromagnetic inverse scattering as meticulously documented by the revered IEEE Press.

The Significance of Electromagnetic Inverse Scattering

Electromagnetic inverse scattering is a field of research that relies on formulating mathematical models to retrieve valuable information about unknown objects by studying the scattered electromagnetic waves that interact with them. By understanding the principles and mathematics behind this process, scientists can gather crucial insights across various domains, such as medical imaging, non-destructive testing, remote sensing, and more.

What Are Computational Methods For Electromagnetic Inverse Scattering?

In order to solve the complex mathematical problems arising from electromagnetic inverse scattering, scientists have developed powerful computational methods. These methods form the backbone of research and enable the efficient reconstruction of object shapes, material properties, and other hidden characteristics by analyzing the scattered wave patterns.



Computational Methods for Electromagnetic Inverse Scattering (IEEE Press)

by Francisco Jiménez (1st Edition, Kindle Edition)

★★★★☆ 4.9 out of 5

Language : English
File size : 14530 KB
Text-to-Speech : Enabled
Screen Reader : Supported
Enhanced typesetting : Enabled
Word Wise : Enabled
Print length : 213 pages



The Role of IEEE Press

IEEE Press, a renowned and trusted name in scientific and engineering literature, has been at the forefront of documenting breakthrough research in computational methods for electromagnetic inverse scattering. Their publications have empowered researchers and engineers worldwide with the knowledge required to push the boundaries of this field.

Exploring Computational Methods:

1. Generalized Born Approximation

The Generalized Born Approximation (GBA) is a widely used computational method that simplifies the reconstruction problem by making specific assumptions about the nature of scattering objects. It allows researchers to extract valuable information with less computational complexity, making it an efficient tool for solving inverse scattering problems.

2. Full-Waveform Inversion

Full-Waveform Inversion (FWI) is a powerful computational method that seeks to reconstruct the unknown objects by iteratively matching the observed scattered waveforms with the synthetic ones generated by a numerical model. FWI offers superior imaging resolution, but its computational demands can make it computationally intensive.

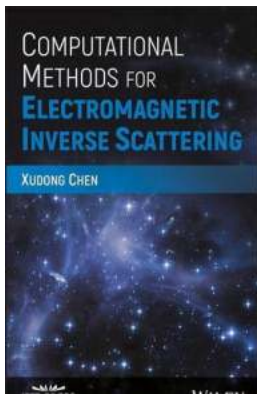
3. Genetic Algorithms

Genetic Algorithms (GA) offer a novel approach to solving electromagnetic inverse scattering problems. Inspired by Darwinian evolution, GA employs natural selection and genetic crossover to iteratively refine the estimated solutions. This method is particularly effective when the underlying mathematical model is unknown or insufficiently defined.

4. Particle Swarm Optimization

Particle Swarm Optimization (PSO) is a computational method that mimics the behavior of a swarm of particles searching for the optimal solution in a high-dimensional search space. In electromagnetic inverse scattering, PSO can efficiently find solutions even in the presence of noise or uncertainties.

Computational methods for electromagnetic inverse scattering play a vital role in extracting valuable information about unknown objects from scattered electromagnetic waves. Through the documentation efforts of IEEE Press, these methods have been made accessible to researchers and engineers worldwide, accelerating developments in fields like medical imaging, remote sensing, and non-destructive testing. By staying up-to-date with the latest computational techniques, researchers can continue to push the boundaries of our understanding and uncover the secrets hidden in electromagnetic waves.



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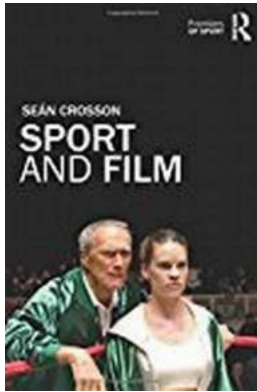
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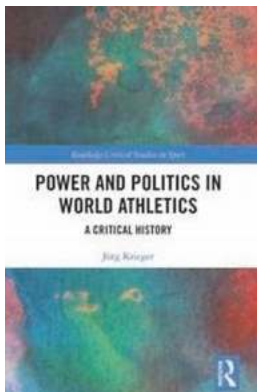
A comprehensive and updated overview of the theory, algorithms and applications of for electromagnetic inverse scattering problems

- Offers the recent and most important advances in inverse scattering grounded in fundamental theory, algorithms and practical engineering applications
- Covers the latest, most relevant inverse scattering techniques like signal subspace methods, time reversal, linear sampling, qualitative methods, compressive sensing, and noniterative methods
- Emphasizes theory, mathematical derivation and physical insights of various inverse scattering problems
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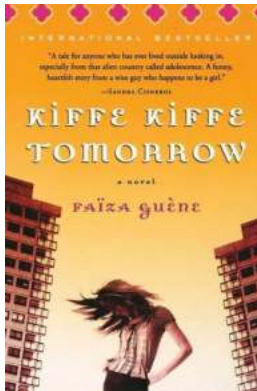
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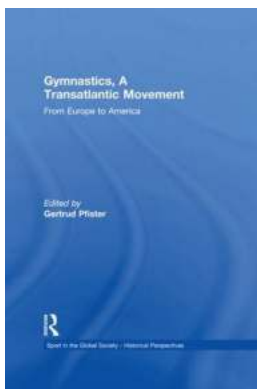
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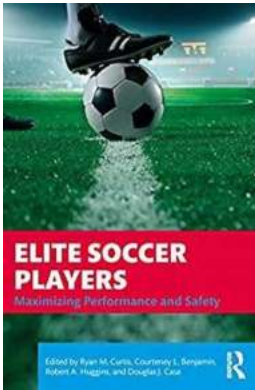
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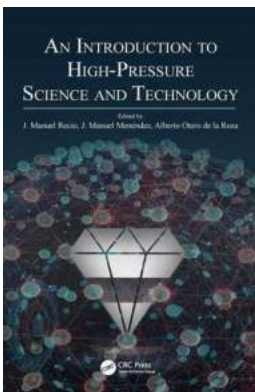
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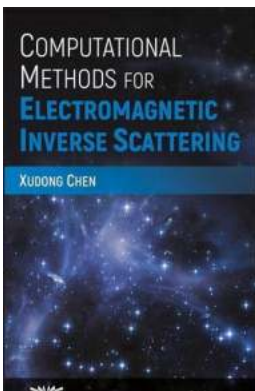
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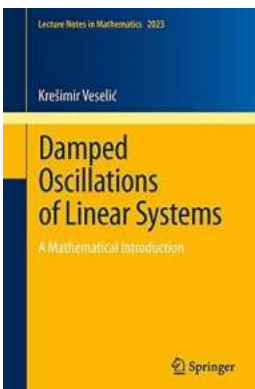
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