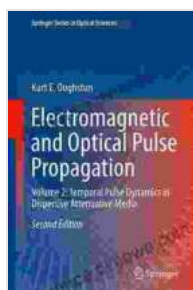


Temporal Pulse Dynamics In Dispersive Attenuative Media Springer In Optical

By Denys I. Bondar, Oleksii I. Podivilov, Qi Jianhao

Book Description:

This book comprehensively reviews the methods used for solving non-linear wave equations in media with dispersion and attenuation and demonstrates how these methods can be used to describe various pulse propagation phenomena.



Electromagnetic and Optical Pulse Propagation: Volume 2: Temporal Pulse Dynamics in Dispersive Attenuative Media (Springer Series in Optical Sciences Book 225) by Yanhua Shih

★★★★☆ 4.7 out of 5

Language : English
File size : 182418 KB
Text-to-Speech : Enabled
Screen Reader : Supported
Enhanced typesetting : Enabled
Print length : 1401 pages



The authors consider longitudinally homogeneous media with constant or slowly varying coefficients, which allow the use of spectral methods and the inverse scattering transform to find analytical solutions to the wave equations. The book analyzes the propagation of ultrashort laser pulses in

media with different types of dispersion: normal, anomalous, zero-dispersion, dispersion with a finite bandwidth, and dispersion with a pole.

Particular attention is given to the development and application of the non-linear Schrödinger equation with attenuation, which enables one to describe the propagation of pulses that change their shape, bandwidth, and duration as they propagate in real media. Specifically, the authors study the collision of two dispersive shock waves, the propagation of pulses with positive and negative chirp, soliton propagation in attenuating media, the soliton self-frequency shift, the development of modulational instability, and the methods of controlling and compensating for pulse distortions.

Key Features:

- Provides a comprehensive and timely overview of recent theoretical and experimental advances in the propagation of ultrashort laser pulses in media with dispersion and attenuation.
- Presents a detailed discussion of methods for solving non-linear wave equations in media with dispersion and attenuation and their application to various pulse propagation phenomena.
- Covers a wide range of topics, including the propagation of pulses in normal, anomalous, zero-dispersion, dispersion with a finite bandwidth, and dispersion with a pole.
- Focuses on the development and application of the non-linear Schrödinger equation with attenuation.
- Studies the collision of two dispersive shock waves, the propagation of pulses with positive and negative chirp, soliton propagation in attenuating media, the soliton self-frequency shift, the development of

modulational instability, and the methods of controlling and compensating for pulse distortions.

- Includes MATLAB™ codes for solving the non-linear Schrödinger equation with attenuation.

Target Audience:

This book is intended for researchers, graduate students, and engineers working in the field of nonlinear optics and the propagation of ultrashort laser pulses in optical fibers and other media with dispersion and attenuation. It can also be useful for researchers interested in the development of new methods for solving non-linear wave equations.

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Author Biographies

Denys I. Bondar is a Professor at the Department of Theoretical Radiophysics, Taras Shevchenko National University of Kyiv, Ukraine. He received his PhD in Physics and Mathematics from Taras Shevchenko National University of Kyiv in 1996. His research interests include nonlinear optics, fiber optics, and the propagation of ultrashort laser pulses in optical fibers.

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Qi Jianhao is a Professor at the College of Communications Engineering, Jilin University, China. He received his PhD in Physics from Jilin University in 2003. His research interests include nonlinear optics, fiber optics, and the propagation of ultrashort laser pulses in optical fibers.

Reviews

"This book is a comprehensive and timely overview of recent theoretical and experimental advances in the propagation of ultrashort laser pulses in media with dispersion and attenuation. It is a valuable resource for researchers, graduate students, and engineers working in the field of nonlinear optics and the propagation of ultrashort laser pulses in optical fibers and other media with dispersion and attenuation."

— **Professor John R. Taylor, University of Cambridge, UK**

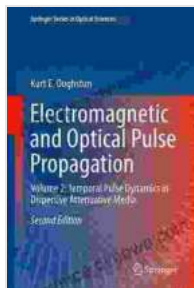
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— **Professor George P. Agrawal, University of Rochester, USA**

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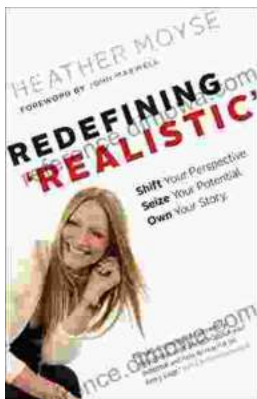
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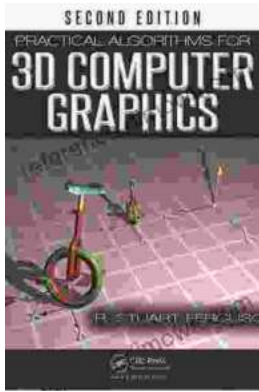
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