

WILEY / ENGINEERING / ELECTRICAL & ELECTRONICS ENGINEERING / ELECTROMAGNETIC THEORY / GENERAL ELECTROMAGNETIC THEORY /

Localized Waves



Localized Waves

[Hugo E. Hernández-Figueroa](#) (Editor), [Michel Zamboni-Rached](#) (Editor), [Erasmus Recami](#) (Editor)

ISBN: 978-0-470-10885-7

Hardcover

382 pages

December 2007

US \$120.00  [Add to Cart](#)

This price is valid for Brazil. [Change location](#) to view local pricing and availability.

Description

Table of Contents

1. Localized Waves: A Historical And Scientific Introduction (Erasmus Recami, Michel Zamboni-Rached, and Hugo E. Hernández-Figueroa).

1.1 A General Introduction.

1.1.1 Preliminary Remarks.

1.2 A More Detailed Introduction.

1.2.1 The Localized Solutions.

1.3 A Historical (Theoretical and Experimental) Perspective.

1.3.1 Introduction.

1.3.2 Historical Recollections: Theory.

1.3.2.1 The Particular X-Shaped Field Associated With a Superluminal Charge.

1.3.3 A Glance at the Experimental State-Of-The-Art.

References.

2. Structure of The Nondiffracting Waves And Some Interesting Applications (Michel Zamboni-Rached, Erasmus Recami, and Hugo E. Hernández-Figueroa).

2.1 Introduction.

2.2 Spectral Structure of The Localized Waves And The Generalized Bidirectional Decomposition.

2.2.1 The Generalized Bidirectional Decomposition.

2.2.1.1 Closed Analytical Expressions Describing Some Ideal Nondiffracting Pulses.

2.2.1.2 Finite Energy Nondiffracting Pulses.

2.3 Space-Time Focusing Of X-Shaped Pulses.

2.3.1 Focusing Effects By Using Ordinary X-Waves.

2.4 Chirped Optical X-Type Pulses In Material Media.

2.4.1 An Example: Chirped Optical X-Typed Pulse In Bulk Fused Silica.

2.5 Modeling The Shape Of Stationary Wave Fields: Frozen.

Waves.

2.5.1 Stationary Wave Fields With Arbitrary Longitudinal Shape In Lossless Media, Obtained By Superposing Equal-Frequency Bessel Beams.

2.5.1.1 Increasing The Control On The Transverse Shape By Using Higher-Order Bessel Beams.

2.5.2 Stationary Wave Fields With Arbitrary Longitudinal Shape In Absorbing Media: Extending The Method.

2.5.2.1 Some Examples.

References.

3. Two Hybrid Spectral Representations and Their Applications To The Derivations Of Finite Energy Localized Waves And Pulsed Beams (Ioannis M. Besieris and Amr M. Shaarawi).

3.1 Introduction.

3.2 An Overview Of The Bidirectional And Superluminal.

Spectral Representations.

3.2.1 The Bidirectional Spectral Representation.

3.2.2 Superluminal Spectral Representation.

3.3 The Hybrid Spectral Representation And Its Application To.

The Derivation Of Finite Energy X-Shaped Localized Waves.

3.3.1 The Hybrid Spectral Representation.

3.3.2 (3+1)-D Focus X Wave.

3.3.3 (3+1)-D Finite-Energy X-Shaped Localized Waves.

3.4 Modified Hybrid Spectral Representation And Its.

Application To The Derivation Of Finite-Energy Pulsed Beams.

3.4.1 The Modified Hybrid Spectral Representation.

3.4.2 (3+1)-D Splash Modes And Focused Pulsed Beams.

3.5 Conclusions.

References.

4. Ultrasonic Imaging With Limited-Diffraction Beams (Jian-yu Lu).

4.1 INTRODUCTION.

4.2 Fundamentals Of Limited Diffraction Beams.

4.3 Applications Of Limited Diffraction Beams.

4.4 Conclusion.

References.

5. Propagation-Invariant Fields: Rotationally Periodic And Anisotropic Nondiffracting Waves (Janne Salo And Ari T. Friberg).

5.1 Introduction.

5.1.1 Brief Overview Of Propagation-Invariant Fields.

5.1.2 Scope Of This Article.

5.2 Rotationally Periodic Waves.

5.2.1 Fourier Representation of general RPWs.

5.2.2 Special propagation symmetries.

5.2.3 Monochromatic waves.

5.2.4 Pulsed single-mode waves.

5.2.4.1 Superluminal single-mode wave.

5.2.4.2 Subluminal single-mode wave.

5.2.4.3 Luminal single-mode wave.

5.2.5 Discussion.

5.3 Nondiffracting Waves In Anisotropic Crystals.

5.3.1 Representation Of Anisotropic Nondiffracting Waves.

5.3.2 Effects due to anisotropy.

5.3.3 Acoustic generation of NDWs.

5.3.4 Discussion.

5.4 CONCLUSIONS.

References.

6. Bessel-X Waves Propagation (Daniela Mugnai and I. Mochi).

1.1 Introduction.

1.2 Optical Tunneling: Frustrated Total Reflection.

1.2.1 Bessel beam propagation into a layer: normal incidence.

1.2.1.1 Scalar treatment.

1.2.1.2 A vectorial approach.

1.2.2 Oblique incidence.

1.3 Free Propagation.

1.3.1 Phase, group, and signal velocity: scalar approximation.

1.3.2 Energy localization and energy velocity: a vectorial treatment.

1.3.2.1 A first approach.

1.3.2.2 Another, more rigorous, treatment of the problem.

1.4 Space-Time And Superluminal Propagation References.

7. Linear-Optical Generation Of Localized Waves (Kaido Reivelt and Peeter Saari).

7.1 Introduction.

7.2 On Definition Of LW's.

7.3 The Principle Of Optical Generation Of LW's.

7.4 Finite Energy Approximations Of LW's.

7.5 On The Physical Nature Of Propagation-Invariance Of Pulsed Wave Fields.

7.6 THE EXPERIMENTS.

7.6.1 LW's in interferometric experiments.

7.6.2 Experiment on optical Bessel-X pulses.

7.6.2.1 Setup.

7.6.2.2 Results of the experiment.

7.6.3 Experiment on optical LW's.

7.6.3.2 Setup.

7.6.3.3 Results of the experiment.

7.7 Concluding Remarks.

References.

8. Optical Wave-Modes: Localized And Propagation-Invariant Wave-Packets In Optically Transparent, Dispersive Media (Miguel A. Porras, Paolo Di Trapani, and Wei Hu).

8.1 Introduction.

8.2 Localized And Stationary Wave-Modes Within The Svea.

8.2.1 Dispersion Curves Within The Svea.

8.2.2 Impulse-Response Wave-Modes.

8.3 Classification Of Wave-Modes Of Finite Bandwidth.

8.3.1 Phase-Mismatch-Dominated Case: Pulsed Bessel Beam Type Modes.

8.3.2 Group-Velocity-Mismatch-Dominated Case: Envelope Focus Wave Modes.

8.3.3 Group-Velocity-Dispersion-Dominated Case: Envelope X And Envelope O Type Modes.

8.3.3.1 Normal Group Velocity Dispersion: Envelope X Waves.

8.3.3.2 Anomalous Group Velocity Dispersion: Envelope O Waves.

8.4 Wave-Modes With Ultra-Broad Bandwidth.

8.4.1 Classification of SEWA dispersion curves.

8.4.1.1 Distorted X-like and O-like wave-modes.

8.4.1.2 Fish-like and single-branch wave-modes.

8.5 About The Effective Frequency, Wave Number And Phase.

Velocity Of Wave-Modes.

8.6 Comparison Between Exact, Sewa And Svea Wave-Modes.

8.7 Conclusion.

References.

9. Nonlinear X Waves(Claudio Conti and Stefano Trillo).

9.1 Introduction.

9.2 The NLX Model.

9.3 Envelope Linear X-Waves.

9.3.1 X-Wave Expansion And Finite Energy Solutions.

9.4 Conical Emission And X-Wave Instability.

9.5 The Nonlinear X-Wave Expansion.

9.5.1 Some Examples.

9.5.2 Proof.

9.5.3 Evidences.

9.6 Numerical Solutions For Nonlinear X-Waves.

9.6.1 Bestiary Of Solutions.

9.7 Coupled X-Wave Theory.

9.7.1 Fundamental X-Wave/Fundamental Solution.

9.7.2 Splitting And Replenishment In Kerr Media As An Higher Order Solution.

9.8 A Brief Review Of Experiments.

9.8.1 Angular dispersion.

9.8.2 Nonlinear X-waves in Quadratic media.

9.8.3 X-waves in self-focusing of ultra-short pulses in Kerr media.

9.9 Conclusions And Developments.

References.

10. Diffraction-Free Subwavelength-Beam Optics On Nanometer Scale (Sergei V. Kukhlevsky).

10.1 Introduction.

10.2 Natural Spatial And Temporal Broadening Of Light Waves.

10.3 Diffraction-Free Optics In The Overwavelength Domain.

10.4 Diffraction-Free Subwavelength-Beam Optics At.

Nanometer Scale.

10.5 Summary And Conclusions.

Appendix.

References.

11. Self-Reconstruction Of Pulsed Optical X-Waves (Ruediger Grunwald, Uwe Neumann, Uwe Griebner, Günter Steinmeyer, Gero Stibenz, Martin Bock, and Volker Kebbel).

11.1 Introduction.

11.2 Small-Angle Bessel-Like Waves And X-Pulses.

11.3 Self-Reconstruction Of Pulsed Bessel-Like X-Waves.

11.4 Nondiffracting Images.

11.5 Self Reconstruction Of Truncated Ultrabroadband Bessel-Gauss Beams.

11.6 Concluding Remarks.

References.

12. Localization And Wannier Wave Packets In Photonic Crystals Without Defects (Stefano Longhi And Davide Janner).

12.1 Introduction.

12.2 Diffraction And Localization Of Monochromatic Waves In.

Photonic Crystals.

12.2.1 Basic Equations.

12.2.2 Localized Waves.

12.3 Spatio-Temporal Wave Localization In Photonic Crystals.

12.3.1 Wannier Function Technique.

12.3.2 Undistorted Propagating Waves In 2d And 3d Photonic Crystals.

12.4 Conclusions.

References.

13. Spatially Localized Vortex Structures (Zdenek Bouchal, Radek Celechovsky and Grover A. Swartzlander).

13.1 Introduction.

13.2 Single And Composite Optical Vortices.

13.3 Basic Concepts Of Nondiffracting Beams.

13.4 Energetics Of Nondiffracting Vortex Beams.

13.5 Vortex Arrays And Mixed Vortex Fields.

13.6 Pseudo-Nondiffracting Vortex Fields.

13.7 Experiments.

13.8 Applications And Perspectives.

References.