

Plane-Wave Theory of Time-Domain Fields: Near-Field Scanning Applications

By Thorkild B. Hansen, Arthur D. Yaghjian

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"This invaluable book provides a comprehensive framework for the formulation and solution of numerous problems involving the radiation, reception, propagation, and scattering of electromagnetic and acoustic waves. Filled with original derivations and theorems, it includes the first rigorous development of plane-wave expansions for time-domain electromagnetic and acoustic fields.

For the past 35 years, near-field measurement techniques have been confined to the frequency domain. Now, with the publication of this book, probe-corrected near-field measurement techniques have been extended to ultra-wide-band, short-pulse transmitting and receiving antennas and transducers.


By combining unencumbered straightforward derivations with in-depth expositions of prerequisite material, the authors have created an invaluable resource for research scientists and engineers in electromagnetics and acoustics, and a definitive reference on plane-wave expansions and near-field measurements.

Featured topics include:

- * An introduction to the basic electromagnetic and acoustic field equations
- * A rigorous development of time-domain and frequency-domain plane-wave representations
- * The formulation of time-domain, frequency-domain, and static planar near-field measurement techniques with and without probe-correction
- * Sampling theorems and computation schemes for time-domain and frequency-domain fields
- * Analytic-signal formulas that simplify the formulation and analysis of transient fields
- * Wave phenomena, such as "electromagnetic missiles" encountered only in the time domain
- * Definitive force and power relations for electromagnetic and acoustic fields and sources."

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Editorial Review

From the Back Cover

Electrical Engineering Plane-Wave Theory of Time-Domain Fields Near-Field Scanning Applications A volume in the IEEE Press Series on Electromagnetic Wave Theory Donald G. Dudley, Series Editor Plane-Wave Theory of Time-Domain Fields provides a comprehensive framework for the formulation and solution of numerous problems involving the radiation, reception, propagation, and scattering of electromagnetic and acoustic waves. Green's function and plane-wave spectrum representations in both the time and frequency domains are systematically derived and effectively applied to the decomposition and analysis of transient and time-harmonic fields. With the publication of this book, probe-corrected near-field measurement techniques, which have previously been confined to the frequency domain, have been extended to ultra-wideband, short-pulse antennas and transducers. Featured topics include:

- Fundamental theorems in electromagnetics and acoustics
- A rigorous development of time-domain and frequency-domain plane-wave representations
- Probe-corrected planar near-field scanning for time-domain and frequency-domain fields
- Sampling theorems and computation schemes for time-domain and frequency-domain fields
- The application of plane-wave theory to static electric and magnetic fields
- Analytic-signal formulas that simplify the formulation and analysis of transient fields
- Wave phenomena, such as "electromagnetic missiles" encountered only in the time domain
- Definitive force and power relations for electromagnetic and acoustic fields and sources

By combining unencumbered straightforward derivations with in-depth expositions of prerequisite material, the authors have created an invaluable resource for research scientists and engineers in electromagnetics and acoustics, and a definitive reference on plane-wave expansions and near-field measurements. About the IEEE Press Series on Electromagnetic Wave Theory The IEEE Press Series on Electromagnetic Wave Theory offers outstanding coverage of the field. It consists of new titles of contemporary interest, as well as reprintings and revisions of recognized classics by established authors and researchers. Emphasis is on works of long-term archival significance in electromagnetic waves and applications. Designed specifically for graduate students, researchers and practicing engineers, the series provides affordable volumes that explore and explain electromagnetic waves beyond the undergraduate level.

About the Author

About the Authors...

Thorkild B. Hansen has worked for the past 10 years on research problems in electromagnetics and acoustics. Within high-frequency diffraction theory, he has developed methods for calculating scattering from corners, narrow grooves, and shadow boundaries. Dr. Hansen has also formulated planar and spherical near-field scanning techniques in the time domain, and derived exact beam representations that are alternatives to the classical multipole expansions. His recent work includes forward and inverse scattering problems for ground-penetrating and subsurface radars.

Arthur D. Yaghjian's research at the National Institute of Standards and Technology, at the Air Force Research Laboratory, and most recently as an independent consultant in electromagnetics, has led to the development of exact, numerical, and high-frequency methods for predicting and measuring the near and far fields of antennas and scatterers. He has contributed to the determination of electromagnetic fields in continuous media and to the formulation of classical equations of motion of charged particles.

Users Review

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Daniel Ellis:

Book is to be different per grade. Book for children right up until adult are different content. As we know that book is very important normally. The book Plane-Wave Theory of Time-Domain Fields: Near-Field Scanning Applications was making you to know about other knowledge and of course you can take more information. It is extremely advantages for you. The reserve Plane-Wave Theory of Time-Domain Fields: Near-Field Scanning Applications is not only giving you considerably more new information but also to get your friend when you truly feel bored. You can spend your personal spend time to read your reserve. Try to make relationship together with the book Plane-Wave Theory of Time-Domain Fields: Near-Field Scanning Applications. You never experience lose out for everything when you read some books.

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