



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

*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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