Inverse problems are of interest and importance across many branches of physics, mathematics, engineering and medical imaging. In this text, the foundations of imaging and wavefield inversion are presented in a clear and systematic way. The necessary theory is gradually developed throughout the book, progressing from simple wave-equation-based models to vector wave models. By combining theory with numerous MATLAB-based examples, the author promotes a complete understanding of the material and establishes a basis for real-world applications.

Key topics of discussion include the derivation of solutions to source radiation and scattering problems using Green-function techniques and eigenfunction expansions; the propagation and scattering of waves in homogeneous and inhomogeneous backgrounds; and the concepts of field time reversal and field back propagation and the key role that they play in imaging and inverse scattering.

Bridging the gap between mathematics and physics, this multidisciplinary book will appeal to graduate students working in established areas of inverse scattering and to researchers developing new computational imaging modalities. Additional resources, including solutions to end-of-chapter problems and MATLAB codes for all the examples presented in the book, are available online at www.cambridge.org/9780521119740.

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