



# Microwave Imaging

By Matteo Pastorino

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**Microwave Imaging** By Matteo Pastorino

**An introduction to the most relevant theoretical and algorithmic aspects of modern microwave imaging approaches**

Microwave imaging—a technique used in sensing a given scene by means of interrogating microwaves—has recently proven its usefulness in providing excellent diagnostic capabilities in several areas, including civil and industrial engineering, nondestructive testing and evaluation, geophysical prospecting, and biomedical engineering.

*Microwave Imaging* offers comprehensive descriptions of the most important techniques so far proposed for short-range microwave imaging—including reconstruction procedures and imaging systems and apparatus—enabling the reader to use microwaves for diagnostic purposes in a wide range of applications. This hands-on resource features:

- A review of the electromagnetic inverse scattering problem formulation, written from an engineering perspective and with notations
- The most effective reconstruction techniques based on diffracted waves, including time- and frequency-domain methods, as well as deterministic and stochastic space-domain procedures
- Currently proposed imaging apparatus, aimed at fast and accurate measurements of the scattered field data
- Insight on near field probes, microwave axial tomographs, and microwave cameras and scanners
- A discussion of practical applications with detailed descriptions and discussions of several specific examples (e.g., materials evaluation, crack detection, inspection of civil and industrial structures, subsurface detection, and medical applications)
- A look at emerging techniques and future trends

*Microwave Imaging* is a practical resource for engineers, scientists, researchers, and professors in the fields of civil and industrial engineering, nondestructive testing and evaluation, geophysical prospecting, and biomedical engineering.

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#### About the Author

**MATTEO PASTORINO**, PhD, is a Professor of Electromagnetic Fields and the Director of the Department of Biophysical and Electronic Engineering, University of Genoa, Italy. He teaches the university courses in electromagnetic fields and remote sensing and electromagnetic propagation. Professor Pastorino's main research interests are in the field of microwave and millimeter wave imaging, direct and inverse scattering problems, industrial and medical applications, smart antennas, and analytical and numerical methods in electromagnetism. He is the coauthor of more than 350 papers in international journals and proceedings of conferences.

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