



Time-Domain Inverse Scattering Techniques for Use in Microwave Imaging

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing an improved method for estimating the average dielectric properties of breast tissue.

Overview

Microwave-based imaging methods, which exploit the contrast in dielectric properties between normal and malignant tissue, offer a promising alternative to ultrasound and X-ray techniques for imaging breast tissue. Malignant tissue is most accurately detected and localized when the processing algorithms include the average properties of the actual, heterogeneous breast tissue, which vary from patient to patient; however, current techniques for solving the equations to estimate these properties suffer from nonlinearity and ill-posedness of the full inverse scattering problem.

The Invention

UW-Madison researchers have developed an improved method for estimating the average dielectric properties of breast tissue. The method, an extension of a time-domain inverse scattering technique, greatly reduces the number of unknown parameters in the inverse scattering problem. This allows the average properties of the breast tissue to be more readily estimated for each patient, increasing the accuracy of malignant tissue detection and localization. Simulation studies have shown that this method results in significantly improved detection of malignant tissue.

Applications

- Detecting malignant breast tissue

Key Benefits

- Greatly reduces the number of unknown parameters, reducing computational requirements and decreasing the level of ill-conditioning inherent in the inverse problem
- Much less sensitive to noise than other approaches
- Can obtain a solution where conventional inverse scattering methods fail
- Applicable to other subsurface microwave imaging problems, including land mine detection

Additional Information

For More Information About the Inventors

- [Susan Hagness](#)

Tech Fields

- [Medical Imaging : Other diagnostic imaging](#)

For current licensing status, please contact Jeanine Burmania at jeanine@warf.org or 608-960-9846