

ScholarWorks@UMass Amherst

MASTERS THESES 1911 - FEBRUARY 2014

Off-campus UMass Amherst users: To download campus access theses, please use the following link to [log into our proxy server](#) with your UMass Amherst user name and password.

Non-UMass Amherst users: Please talk to your librarian about requesting this thesis through interlibrary loan.

Theses that have an embargo placed on them will not be available to anyone until the embargo expires.

Title

The Measurement of Internal Temperature Anomalies in the Body Using Microwave Radiometry and Anatomical Information: Inference Methods and Error Models

Authors

Tamara V. Sobers, *University of Massachusetts Amherst* Follow

Document Type

Open Access

Degree Program

Electrical & Computer Engineering

Degree Type

Master of Science in Electrical and Computer Engineering (M.S.E.C.E.)

Year Degree Awarded

2012

Month Degree Awarded

May

Keywords

Microwave Radiometry, Temperature Anomaly, Detection, Medical

Abstract

The ability to observe temperature variations inside the human body may help in detecting the presence of medical anomalies. Abnormal changes in physiological parameters (such as metabolic and blood perfusion rates) cause localized tissue temperature change. If the anatomical information of an observed tissue region is known, then a nominal temperature profile can be created using the nominal physiological parameters. Temperature-varying radiation emitted from the human body can be captured using microwave radiometry and compared to the expected radiation from nominal temperature profiles to detect anomalies. Microwave radiometry is a passive system with the ability to capture radiation from tissue up to several centimeters deep into the body. Our proposed method is to use microwave radiometry in conjunction with another imaging modality (such as ultrasound) that can provide the anatomical information needed to generate nominal profiles and improve detection of temperature anomalies. An inference framework is developed for using the nominal temperature profiles and radiometric weighting functions obtained from electromagnetic simulation software, to detect and estimate the location of temperature anomalies. The effects on inference performance of random and systematic deviations from nominal tissue parameter values in normal tissue are discussed and analyzed.

First Advisor

Patrick A. Kelly

[Download](#)

DOWNLOADS

Since August 23, 2012

Included in

[Biomedical Commons](#) , [Electromagnetics and Photonics Commons](#) , [Signal Processing Commons](#)

Share

COinS