TBA

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Abstract

Trans-admittance scanner (TAS) is a device for breast cancer diagnosis based on numerous experimental findings that complex conductivities of breast tumors significantly differ from those of surrounding normal tissues. In TAS, we apply a sinusoidal voltage through a handheld electrode and place a scanning probe with zero voltage against the breast skin to make current travel through the breast. The scanning probe has an array of electrodes to measure exit currents (Neumann data) that provide a map of trans-admittance data over the breast surface. The inverse problem of TAS is to detect a suspicious abnormality underneath the breast skin from the measured Neumann data. Previous anomaly detection methods used a difference between measured Neumann data and reference Neumann data in the absence of anomaly. However, in practice, the reference data is not available and it's computation is not possible since the inhomogeneous complex conductivity of the background is unknown. To deal with this problem, we develop a multi-frequency TAS, in which a frequency difference of trans-admittance data measured at a certain moment is used for anomaly detection. We provide a mathematical framework of this multi-frequency TAS model and its feasibility.