Abstracts

Microwave tomography of lossy objects from monostatic measurements

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This paper addresses the problem of microwave tomographic imaging from far-field monostatic measurements. In the first-order Born approximation, a simple Fourier relationship exists between the measured data and dielectric contrast of the object under test. For a lossy object, the contrast function depends on frequency, and this prevents monostatic data from being used directly since multifrequency probing radiation must be used to get sufficient information. To overcome this difficulty, we propose a data preprocessing strategy that eliminates frequency from the function to be reconstructed. The Fourier data obtained through preprocessing could be immediately inverted to give a bandpass estimate of the unknown function. Despite the drawbacks inherent in this approach, in small-scale tomographic applications, the space region occupied by the object under test, as well as the sign of the unknown function, are normally known. This extra information allows us to apply a projected Landweber algorithm to uniquely reconstruct the unknown, thus avoiding the above-mentioned drawbacks. We outline the preprocessing and reconstruction techniques adopted, and show some preliminary results from experimental and simulated data.

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