عنوان مقاله:

Plane Wave Diffraction Problem Analysis Using Microwave Technology and with Application for Breast Scanning

نویسنده:

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خلاصه مقاله:

This paper presents an analytical solution to the problem of non-invasively detecting an object in a medium using a microwave signal applied from the surface. This solution is based on the one and two-dimensional microwave inverse calculation methods. Since the dielectric properties of the object and the medium are different from each other, the backscattered electromagnetic waves can characterize the properties of the object and the medium. The impedance and reflection coefficients are calculated from the forward and backscattered signals as a function of the frequency. An analytical-numerical method is developed to analyze how an H-polarized plane wave is diffracting from two axisymmetric infinitely long strips located at the z-axis and have the same width. A straightforward solution to a problem difficult to solve is presented using hybrid analytical-numeric methods. Detecting tumors in breast tissue is one of the critical areas that the method will be effectively used. The solution is successfully applied to the breast tissue to detect the tumor inside it. Different scenarios are presented along with their numerical examples and radar cross-section data. From the insight obtained from these numerical examples, the scattering characteristics of the far-field are discussed to emphasize the contribution of the presented solution.

کلمات کلیدی:

Analytic, Breast Layers, Diffraction, Numeric, strip

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