Abstracts

Nondestructive Measurements of Complex Tensor Permittivity of Anisotropic Materials Using a Waveguide Probe System

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A nondestructive measurement of electromagnetic (EM) properties of anisotropic materials using an open-ended waveguide probe has been conducted. Two coupled electric field integral equations (EFIE's) for the aperture electric field are derived and solved numerically by employing the method of moments (MoM). After the determination of the aperture electric field, the reflection coefficient of the incident wave can be expressed in terms of the EM parameters of the material. Then, the EM parameters of the material layer can be inversely determined if the reflection coefficient of the incident wave is experimentally measured. A series of experiments has been conducted using the waveguide probe system constructed at MSU electromagnetic laboratory. The inverse results of the EM properties of various materials are presented. Finally, the effects of material parameters on the probe input admittance that cause problems in the measurement are analyzed.

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