Abstracts

A frequency-varying method for simultaneous measurement of complex permittivity and permeability with an open-ended coaxial probe

Shoujun Wang, Maode Niu and Deming Xu. "A frequency-varying method for simultaneous measurement of complex permittivity and permeability with an open-ended coaxial probe." 1998 Transactions on Microwave Theory and Techniques 46.12 (Dec. 1998, Part I [T-MTT]): 2145-2147.

To measure the complex permittivity and permeability of materials simultaneously with an open-ended coaxial probe, one needs at least two independent reflections. Based on the fact that frequency is an independent variable for the probe's reflection coefficient, a new concept, namely the frequency-varying method (FVM), which achieves the independent reflections via changing frequency, has been proposed. Since the electromagnetic (EM) properties of materials themselves are functions of frequency, the FVM introduces interpolation techniques into the process of extracting EM parameters from multiple reflection coefficients. The successful experimental results on radar-absorbing coatings show the feasibility and good prospects of the FVM for characterizing EM properties of materials in situ. Compared with the thickness-varying method (TVM), which makes two measurements with two samples of different thicknesses, the FVM needs only one frequency-swept reflection measurement, thus simplifying and speeding up the measurement process, and improving accuracy and repeatability. Furthermore, the FVM has the ready capability to be extended to multiple-parameter measurements, and we may also find potential applications in other fields.

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