Abstracts

Precise Calculations and Measurements on the Complex Dielectric Constant of Lossy Materials Using TM/sub 010/ Cavity Perturbation Techniques

S. Li, C. Akyel and R.G. Bosisio. "Precise Calculations and Measurements on the Complex Dielectric Constant of Lossy Materials Using TM/sub 010/ Cavity Perturbation Techniques." 1981 Transactions on Microwave Theory and Techniques 29.10 (Oct. 1981 [T-MTT]): 1041-1048.

An exact field theory solution for the cylindrical TM/sub 010/ cavity with a coaxial lossy dielectric cylinder is given. The error in the calculated field solutions is estimated to be less than 1 percent of the true values. Correction for the cavity holes used to introduce the sample is taken into account. The exact solution shows that the real part of the permittivity (epsilon') is a complex function of both the frequency shift and the change in the loaded Q-factor (Q/sub L/). On the other hand the imaginary part (epsilon") is nearly proportional to delta(1/Q/sub L/) and it has different slopes for varying frequencies. By means of active cavity techniques already reported, experimental measurements on epslion' and epsilon" taken at 2.2 GHz on a number of materials (water, teflon, n-proponal, methanol, etc.) agree with published data within 1 percent even when rising large samples.

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