Frequency Domain Analysis of Time Domain Reflectometry (TDR)Waveforms. (S01-huisman095738-Poster)

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Abstract:

Various measuring and analysis scenarios for the determination of frequency dependent dielectric permittivity were compared with the Shuffled Complex Evolution Metropolis algorithm (SCEM-UA), which finds optimal Debye model parameters and their confidence intervals. The analysis of numerically generated measurements with added instrumental noise showed that analysis of network analyzer measurements in the frequency domain potentially has the highest accuracy for determination of dielectric permittivity. Furthermore, the analysis of time domain reflectometry waveforms in the time domain was found to be more accurate than analysis of these waveforms in the frequency domain. Analysis of real network analyzer measurements in the time and frequency domain showed that both analysis scenarios allowed reasonably accurate estimates of the Debye parameters with the SCEM-UA algorithm, even when the true value of a parameter falls beyond the upper limit of the frequency bandwidth. Frequency domain analysis of ethanol measurements with different probes showed that results were susceptible to non-ideal probe behavior, which was larger for 3-wire probes than for 7-wire probes.

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Presentation Information:

Presentation Date: Tuesday, November 12, 2002
Presentation Time: 4:00-6:00 pm
Poster Board Number: 1606

Keywords:
time domain reflectometry, Frequency domain analysis, frequency-dependent permittivity