Abstracts

Time-Domain Oscillographic Microwave Network Analysis Using Frequency-Domain Data

M.E. Hines and H.E. Stinehelfer, Sr.. "Time-Domain Oscillographic Microwave Network Analysis Using Frequency-Domain Data." 1974 Transactions on Microwave Theory and Techniques 22.3 (Mar. 1974 [T-MTT] (Special Issue on Computer-Oriented Microwave Practices)): 276-282.

Oscillographic plots of various time-domain responses of microwave networks are generated by computer simulation, based upon measurements taken in the frequency domain. Frequency-response data are obtained with a computer-controlled automatic network analyzer, this information is processed in an associated computer, and selected time-domain responses are plotted immediately on an x-y recorder. Voltage versus time responses have been simulated for various excitations includlng impulse, step, and pulse-modulated RF waves. When impedance data are used, the plots are interpretable as from a time-domain reflectometer with high precision, high sensitivity, and high resolving power. As an oscillograph the rise time may be as short as 0.04 ns. In transmission 70 dB or more loss can be tolerated. In reflection measurements, the results are interpretable for discrete discontinuities with 40 dB or more return loss, and with separations on the order of 1 cm in space. In certain types of circuits, time-domain data can be used to reconstruct the frequency-domain response data in an approximate manner for separate parts of a network without separate measurements. In this manner, the interference of generator, load, and transducer mismatches can be substantially reduced.

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