Abstracts

Causality and waveguide circuit theory

D.F. Williams and B.K. Alpert. "Causality and waveguide circuit theory." 2001 Transactions on Microwave Theory and Techniques 49.4 (Apr. 2001, Part I [T-MTT]): 615-623.

We develop a new causal power-normalized waveguide equivalent-circuit theory that, unlike its predecessors, results in network parameters usable in both the frequency and time domains in a broad class of waveguides. Enforcing simultaneity of the voltages, currents, and fields and a power normalization fixes all of the parameters of the new theory within a single normalization factor, including both the magnitude and phase of the characteristic impedance of the waveguide. Enforcing simultaneity also ensures that the theory's voltages and currents do not start before their excitation, and that the network parameters of passive devices are causal, a necessary condition for stable time-domain simulations.

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