Abstracts

The Frequency-Domain Transmission Line Matrix Method--A New Concept

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A new frequency-domain TLM method is presented for the frequency selective s-matrix computation of 3- D waveguide discontinuities. The new approach combines the flexibility of the conventional TLM method with the computational efficiency of frequency-domain methods. The basis for this new technique is a novel excitation of an impulse train of sinusoidally modulated magnitude. At any time step, this excitation retains the form of an impulse while its envelop contains the information of the structure at the modulation frequency. Utilizing the diakoptics technique in conjunction with the new concept of the intrinsic scattering matrix, which relates the reflected and incident impulses at the exterior branches of any discontinuity structure, the original electromagnetic field problem is simplified into a matrix algebra problem, allowing the use of linear algebra tools to further enhance the computational efficiency of the algorithm. A variety of structures have been analyzed in order to check the accuracy of this new approach and excellent agreement has been observed in all cases. S-parameters for CPW air-bridges including finite thickness and conductivity of the metallizations are computed. For the first time in literature, also the effect of superconductor air-bridges is analyzed.

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