Abstracts

Numerical Solution of Transmission Line Problems by a Network Model Decomposition Method Based on Polygon Discretization

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In formulating the network models for field equations, it is usually assumed that the region to be analyzed is covered by two orthogonal systems of equally spaced lines, forming a mesh system over the whole region. Apparently such a formulation lacks the advantages of the finite-element method, where the elements can be concentrated or dispersed where needed. In this paper, a polygon discretization technique is introduced to establish a network model which is suitable for both TEM transmission lines and hollow waveguides, and then a diakoptic algorithm for the analysis of the network model is developed. The algorithm is referred to as network model decomposition, and it can be used to calculate the characteristic impedance of an arbitrarily shaped TEM transmission line and the cutoff wavenumbers of a hollow waveguide of arbitrary section. Numerical results are also presented as a demonstration of the validity of the method.

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