Abstracts

A Treatment for Boundary Singularities in Finite Difference Solutions of Laplace's Equation (Correspondence)

K.B. Whiting. "A Treatment for Boundary Singularities in Finite Difference Solutions of Laplace's Equation (Correspondence)." 1968 Transactions on Microwave Theory and Techniques 16.10 (Oct. 1968 [T-MTT]): 889-891.

Several recent papers have dealt with the derivation of TEM mode transmission-line parameters by finite difference methods using a digital computer. The accuracy of the solution obtained for Laplace’s equation can be generally improved by mesh refinement to an extent limited by mesh and iteration errors. Mesh errors will be accentuated by the presence of singularities in the region under consideration. In the immediate neighborhood of a singularity, Taylor’s theorem no longer applies, and therefore the finite difference approximation will be invalid. Important boundary singularities occur in practice at the reentrant corners on the inner conductor of a rectangular coaxial line and at the edges of the thin strip used in "triplate" transmission line and microstrip. Most of the existing techniques, used in hand calculations, are unsatisfactory for overcoming this difficulty and in general workers have either ignored the singularity or omitted the meshes bordering it.

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