Abstracts

Comparison of Quasi-Static and Exact Electromagnetic Fields from a Horizontal Electric Dipole Above a Lossy Dielectric Backed by an Imperfect Ground Plane

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In most microstrip transmission lines, analysis is made assuming that a quasi-TEM mode exists and propagates down the line. The primary objective of this paper is to obtain the region of validity of this assumption. The second objective of this paper is to derive the expressions for the fields for a horizontal electric dipole over a lossy dielectric medium backed by an imperfect ground plane. It is shown that, to a first approximation, fields at the air-dielectric interface are independent of the ground plane conductivity. Since we are interested in coupling between lines, our interest is in the computation of the fields primarily at the air-dielectric interface. Finally, numerical results are presented to show where the quasi-static approximations deviate from the exact solution for a given microstrip geometry as the frequency of operation or the observation point is changed.

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