Short Papers

Analysis of Transient Interaction of Electromagnetic Pulse with an Air Layer in a Dielectric Medium Using Wavelet-Based Implicit TDIE Formulation

Yair Shifman and Yehuda Leviatan

***Abstract*—The interaction of transient electromagnetic pulse with an air layer in a dielectric medium is formulated in terms of a time-domain integral equation and solved numerically via the method of moments. Previous related works pointed to the inherent inadequacy of the marching-on-in-time method in this case, but suggested no remedy. This paper explains why an implicit modeling scheme would work effectively in this case. It is also noted that the use of an implicit scheme would normally involve a solution of a very large and dense matrix equation. To alleviate this drawback of the implicit scheme, the use of a wavelet-based impedance-matrix-compression technique, which has facilitated in the very recent past solutions of time-domain problems with greater efficiency, is described.**

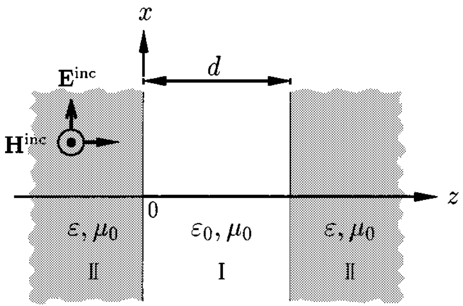

Fig. 1. Scattering of electromagnetic plane wave by an air layer (I) in a dielectric medium (II).