Transient Analysis of EM Pulse Penetration Into a Conducting Layer Using Wavelet-Based Implicit TDIE and Iterative IMC Technique

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***Abstract*—The penetration of a wide-band electromagnetic pulse into a conducting layer is formulated in terms of an implicit time-domain integral equation and cast into matrix form via the method of moments. Though such a wide-band problem indeed calls for a time-domain solution, one may argue that the frequency-dependent attenuation of the field penetrating the conductor could suggest a frequency-domain approach that would greatly reduce the number of unknowns. The proposed via media is to use spatio-temporal wavelet functions instead of the standard pulse basis. Owing to their multiresolution property, both in the spatial and temporal domains, these functions can span the field propagating inwardly with substantially fewer terms. The reduction in the number of basis functions used is effected by the impedance matrix compression technique, which automatically omits the basis functions whose coefficients would be insignificant due to the attenuation. Reducing the number of basis functions renders the matrix equation much smaller and the overall solution far more efficient.**

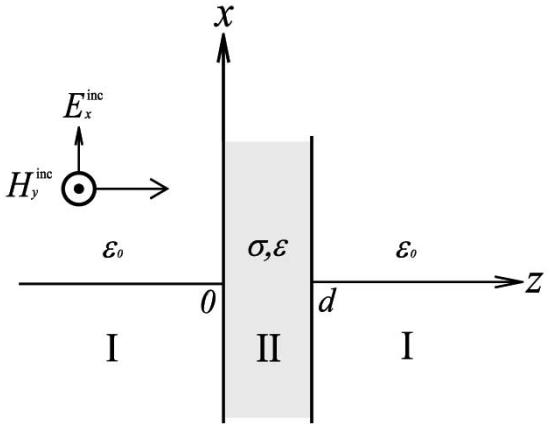

Fig. 1. Interaction of EM plane wave with a conducting layer (region II).