Abstracts

Edge element modeling of 3D interconnection structures

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In this paper, we apply the local potential concept to construct a functional for the finite element method (FEM) with 3D structures. The corresponding boundary conditions at the planes of incidence and transmittance for hybrid modes are derived. These conditions take into account both the transverse and longitudinal field components of the propagating signals. Employing these boundary conditions, in conjunction with the absorbing boundary conditions (ABC) and/or the boundary conditions of the first and third kind, a 3D asymmetrical functional is implemented as a hybrid vector edge element method. Numerical examples are presented for air bridges and lossy transmission lines, connected by a through-hole via. The equivalent frequency dependent circuit parameters are then extracted from the field solutions. Laboratory measurements and data comparison with previous published results strongly support the newly developed theoretical work.

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