Abstracts

Global modeling strategies for the analysis of high-frequency integrated circuits

P. Ciampolini, L. Roselli, G. Stopponi and R. Sorrentiono. "Global modeling strategies for the analysis of high-frequency integrated circuits." 1999 Transactions on Microwave Theory and Techniques 47.6 (Jun. 1999, Part II [T-MTT]): 950-955.

In this paper, a simulator based on a global electromagnetic model is presented, suited for the analysis of HF integrated and hybrid electronic circuits. The model is based on the self-consistent solution of Maxwell's equation and of semiconductor transport equations, exploiting a generalized finite-difference time-domain (FDTD) scheme. The tool is, therefore, capable of accounting, on a distributed basis, for actual interactions between wave propagation and charge transport, anti is capable of providing a physically based picture of traveling-wave semiconductor devices. The implementation is such that more conventional algorithms (e.g. lumped-element FDTD or plain FDTD) can be regarded as a subset of the global scheme itself. This makes it possible to intermix different physical models, featuring different degrees of physical accuracy and computational efficiency, within the same simulation environment. Main features of such an environment are described by means of the simulation of a simple 76-GHz distributed switch.

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