Abstracts

Transient analysis of microwave active circuits based on time-domain characteristic models

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A modular method is presented to speed up transient simulation of microwave active circuits which consist of linear components and active devices that are often nonlinear. Firstly, the linear components and active devices are individually characterized by time-domain characteristic models (TDCM's) and lumped equivalent circuits, respectively, to reduce the computer memory. Then, based on deconvolution, the TDCM's of linear components are synthesized from the terminal voltages and currents of step voltage excitation, which are simulated by the finite-difference time-domain (FDTD) method. Finally, transient analysis of a one-dimensional (1-D) discrete-time system is applied to obtain the terminal responses of the microwave active circuits, in which a larger sampled step is chosen to reduce the simulation time. This method is employed to two realistic circuits to validate its efficiency and accuracy. The results are in good agreement with the time-consuming direct FDTD simulation of entire circuits.

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