Abstracts

Extending the Two-Dimensional FDTD Method to Hybrid Electromagnetic Systems with Active and Passive Lumped Elements

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This paper extends the finite-difference time-domain (FDTD) method to include distributed electromagnetic systems with lumped elements (a hybrid system) and voltage and current sources. FDTD equations that include nonlinear elements like diodes and transistors are derived. Calculation of driving-point impedance is described. Comparison of FDTD calculated results with analytical results for several two-dimensional transmission-line configurations illustrate the accuracy of the method. FDTD results for a transistor model and a diode are compared with SPICE calculations. The extended FDTD method should prove useful in the design and analysis of complicated distributed systems with various active, passive, linear and nonlinear lumped electrical components.

❑ Return to main document.