Abstracts

Theoretical analysis and FDTD simulation of GaAs nonlinear transmission lines

Xudong Wang and R.J. Hwu. "Theoretical analysis and FDTD simulation of GaAs nonlinear transmission lines." 1999 Transactions on Microwave Theory and Techniques 47.7 (Jul. 1999, Part I [T-MTT]): 1083-1091.

The GaAs nonlinear transmission line (NLTL), a monolithic millimeter-wave integrated circuit consisting of a high-impedance transmission line loaded by reverse-biased Schottky diodes, is studied in detail in this paper. A distributed model of the NLTL is successfully developed through the use of the microwave network theory. This model is more accurate than the lumped-element model that has been widely used before. The application of the NLTL for picosecond pulse generation, including shock-wave formation, is explained in detail based on the distributed model. Finally, the finite-difference time-domain (FDTD) technique is used to simulate the NLTL's for the first time. The simulation results show good agreement with the experiment results, FDTD is more accurate than SPICE in the simulation of NLTL's.

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