# Abstracts

## On the modeling of highly nonlinear circuits using total-variation-decreasing finite-difference schemes

*W. Thiel and W. Menzel. "On the modeling of highly nonlinear circuits using total-variation-decreasing finite-difference schemes." 2001 Transactions on Microwave Theory and Techniques 49.9 (Sep. 2001 [T-MTT] (Mini-Special Issue on the 2001 IEEE Radio Frequency Integrated Circuit (RFIC) Symposium)): 1620-1625.*

This paper presents the modeling of highly nonlinear circuits using a total-variation-decreasing (TVD) difference scheme developed for the simulation of problems involving shock phenomena. In contrast to the commonly used leapfrog scheme, a second-order accurate TVD method based on the Lax-Wendroff scheme is applied to one-dimensional nonlinear transient electromagnetic-wave problems. Furthermore, for the analysis of transmission-line-based networks, an adapted inclusion of nonlinear lumped elements in such a TVD scheme is proposed. As an example, both the scattered signals of a linear transmission line loaded with a nonlinear lumped element is investigated and the formation of a shock-wave of a low-loss nonlinear transmission line with distributed diodes is studied. In the simulation results, the modeling of rapidly rising edges occurring in the time signal are demonstrated.

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