Abstracts

Analyzing the stability of the FDTD technique by combining the von Neumann method with the Routh-Hurwitz criterion

A. Pereda, L.A. Vielva, A. Vegas and A. Prieto. "Analyzing the stability of the FDTD technique by combining the von Neumann method with the Routh-Hurwitz criterion." 2001 Transactions on Microwave Theory and Techniques 49.2 (Feb. 2001 [T-MTT]): 377-381.

This paper addresses the problem of stability analysis of finite-difference time-domain (FDTD) approximations for Maxwell's equations. The combination of the von Neumann method with the Routh-Hurwitz criterion is proposed as an algebraic procedure for obtaining analytical closed-form stability expressions. This technique is applied to the problem of determining the stability conditions of an extension of the FDTD method to incorporate dispersive media previously reported in the literature. Both Debye and Lorentz dispersive media are considered. It is shown that, for the former case, the stability limit of the conventional FDTD method is preserved. However, for the latter case, a more restrictive stability limit is obtained. To overcome this drawback, a new scheme is presented, which allows the stability limit of the conventional FDTD method to be maintained.

❑ Return to main document.