Abstracts

FDTD modeling of wave propagation in dispersive media by using the Mobius transformation technique

J.A. Pereda, A. Vegas and A. Prieto. "FDTD modeling of wave propagation in dispersive media by using the Mobius transformation technique." 2002 Transactions on Microwave Theory and Techniques 50.7 (Jul. 2002 [T-MTT]): 1689-1695.

This paper introduces a technique for finite-difference time-domain modeling of wave propagation in general Mth-order dispersive media. Ohm's law in the Laplace domain with an Mth-order rational model for the complex conductivity is considered as a constitutive relation. In order to discretize this model, the complex conductivity is mapped onto the Z-transform domain by means of the Mobius transformation. This leads finally to a set of difference equations that is consistent with Yee's scheme. The resulting formulation is explicit, it has a second-order accuracy, and the need for additional storage variables is minimal. The numerical stability problem is discussed and the numerical dispersion equation for Mth-order media is given.

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