Abstracts

Time-domain vector-potential analysis of transmission-line problems

A time-domain vector-potential (TDVP) approach for the analysis of transient electromagnetic fields is proposed in this paper. The field is analyzed by the magnetic VP for which the wave equation is solved by a finite-difference (FD) scheme. The feasibility of the method has been shown by simulations of several transmission-line problems. The results have been compared with reported data obtained by the conventional finite-difference time-domain (FDTD) method, empirical formulas, and measurements. The proposed approach is not inferior to the FDTD method in terms of generality and memory requirements. At the same time, a reduction of central processing unit (CPU) time is achieved because only three scalar wave equations are solved instead of the six Maxwell equations for all field components. It has also been shown that there are certain structures where the components of the magnetic VP are decoupled, which implies the possibility for a consecutive algorithm with reduced memory requirements.

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