Abstracts

Modified Yee's cell for finite-difference time-domain modeling of periodic boundary guiding structure

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A modified Yee's cell is proposed for the finite-difference time-domain (FDTD) modeling of a waveguide structure with the longitudinally periodic boundary condition. For the presented FDTD scheme based on Floquet's theorem, an arrow representing a complex field component in the original Yee's cell is divided into two real- and imaginary-arrows separated by a half of the longitudinal spatial-increment, /spl Delta/z/2. By the proposed mesh scheme and the periodicity of the computational domain, the handling of the complex field function and the periodic boundary condition is streamlined, resulting in the reduction of the computation time and memory. To verify the proposed scheme, the dispersion diagram of a corrugated parallel-plate waveguide is obtained and compared with the transmission line analysis. Also, the numerical stability condition and the numerical dispersion relation are given.

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