Abstracts

A New Approach for Analysis of Resonant Structures Based on the Spatial Finite-Difference and Temporal Differential Formulation (Short Papers)

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This paper presents a new procedure for analyzing resonant structures using the spatial finite-difference and temporal differential formulation. Unlike the conventional finite-difference time-domain methods, the finite-difference are only enforced in the spatial domain for Maxwell's equations. The time domain differentials of Maxwell's equations are kept, resulting in a system of first-order deferential equations. In consequence, a resonant structure problem can be formulated in the eigenvalue problem form and resonant modes are obtained by solving the corresponding eigenvalue problem directly. It is shown that the coefficients of the matrix for the eigenvalue problem can be simply obtained from the finite difference time-domain formulation. As a result, an efficient alternative way of using the finite-difference time-domain approach to solve the resonant structure problems is presented. The algorithm is applied to metallic waveguide structures and the numerical results agree well with those from other techniques.

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