Abstracts

A memory-efficient formulation of the finite-difference time-domain method for the solution of Maxwell equations

G.D. Kondylis, F. De Flaviis, G.J. Pottie and T. Itoh. "A memory-efficient formulation of the finite-difference time-domain method for the solution of Maxwell equations." 2001 Transactions on Microwave Theory and Techniques 49.7 (Jul. 2001 [T-MTT]): 1310-1320.

With the increase in speed and memory storage in modern computer systems, the finite-difference time-domain (FDTD) method for the solution of electromagnetic problems is rapidly becoming an attractive choice due to its programming simplicity and flexibility in the analysis of a wide range of structures. However, this technique has the drawback of high computer memory requirements and computational power, when analyzing large geometries. In this paper, a modified version of the FDTD method with increased memory efficiency is presented and applied to the calculation of the resonant frequencies of a dielectric resonator coupled to a microstrip line. In this novel approach, the divergence relationship, which spatially links the three electric-field and three magnetic-field components, is used to eliminate one component each of E and H. This leads to a more memory-efficient formulation, where only four field components are stored in the whole domain, with a direct memory reduction of 33% in the storage of the fields.

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