Abstracts

Multiple image technique (MIT) and anisotropic perfectly matched layer (APML) in implementation of MRTD scheme for boundary truncations of microwave structures

Qunsheng Cao, Yinchao Chen and R. Mittra. "Multiple image technique (MIT) and anisotropic perfectly matched layer (APML) in implementation of MRTD scheme for boundary truncations of microwave structures." 2002 Transactions on Microwave Theory and Techniques 50.6 (Jun. 2002 [T-MTT]): 1578-1589.

This paper presents an adjustable multiple image technique (MIT) and an anisotropic perfectly matched layer (APML) employed in the context of multiresolution time-domain (MRTD) scheme for the truncation of the computational boundary, with the MIT used for perfect electrically conducting (PEC) shields and the APML for open structures. We begin by presenting a systematic formulation for developing the constitutive relations and update equations in the transform domain of the MRTD, when considering both the original and image regions. We then illustrate the applications of the above techniques by analyzing a two-layer dielectric-loaded cavity, printed circuit enclosed by a PEC, as well as open transmission lines. Although, in principle, one can employ a large number of images to ensure the accuracy of the MRTD computation, in practice, it is useful, from the point-of-view of computational efficiency, to develop a criterion that determines the number of requisite images. While its formulation may appear to be lengthy, the MIT is based on physical concepts that are fairly well suited for computer programming.

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