Abstracts

Construction of solutions to electromagnetic problems in terms of two collinear vector potentials (Aug. 2002 [T-MTT])

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In this paper, the construction of solutions to transient electromagnetic (EM) problems in terms of two collinear vector potentials (VPs) is subjected to a careful theoretical study and numerical verification. The analysis concerns a general isotropic medium that can be inhomogeneous, lossy, and may contain sources. It is also assumed that the medium has instantaneous response, i.e., its EM properties are frequency independent. First, the completeness of the solution in terms of the two VPs in homogeneous and inhomogeneous media is addressed. Second, the behavior of the VPs at interfaces and edges is considered. Finally, a number of simple, but relevant numerical tests are performed to verify the theoretical model. This paper is part of the effort to establish the theoretical background of a novel efficient approach to the analysis of transient EM propagation based on the VPs.

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