Abstracts

An Unconditionally Stable Finite Element Time-Domain Solution of the Vector Wave Equation

S.D. Gedney and U. Navsariwala. "An Unconditionally Stable Finite Element Time-Domain Solution of the Vector Wave Equation." 1995 Microwave and Guided Wave Letters 5.10 (Oct. 1995 [MGWL]): 332-334.

This paper presents an implicit finite element time-domain (FETD) solution of the time-dependent vector wave equation. The time-dependent formulation employs a time-integration method based on the Newmark-Beta method. A stability analysis is presented demonstrating that this leads to an unconditionally stable solution of the time-dependent vector wave equation. The advantage of this formulation is that the time step is no longer governed by the spatial discretization of the mesh, but rather by the spectral content of the time-dependent signal. A numerical example of a three-dimensional cavity resonator is presented studying the effects of the Newmark-beta parameters on the solution error. Optimal choices of parameters are derived based on this example.

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