Abstracts

WETD--A Finite Element Time--Domain Approach for Solving Maxwell's Equations

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A family of finite element time-domain methods, WETD(Theta), is derived to solve the time-varying Maxwell's equations. The proposed methodology is based upon the application of the Faedo-Galerkin procedure and the use of the Whitney 1-forms as bases to result in an ordinary differential equation in time for the electric field. Moreover, the resultant ordinary differential equation is solved by employing central and/or backward difference approximations. Since the WETD methods presented here are used in conjunction with tetrahedral finite element meshes, it imposes no limitations on the problem geometry. Also, in this contribution, a general stability condition has been derived for the WETD(Theta) method of which the central and backward differences are special cases corresponding to Theta = 1 and Theta = 0, respectively.

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