

Zero error split step FDTD method for narrow band applications

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Abstract:

It has recently been reported that the four split step finite difference time domain (4 SS FDTD) method is isotropic at a certain stability factor for each space step value. It is also known that the average value of the numerical phase velocity of FDTD methods can be corrected for given stability factor and space step value. In this paper polynomial expressions are obtained for the stability factor values giving zero numerical phase velocity anisotropic error and zero error average numerical phase velocity. These polynomial expressions are included in the 4 SS FDTD codes, so that once space value is chosen from simulation considerations the stability factor (or the time step) and the numerical phase velocity correction factor is obtained directly. A performance study of the method show that zero error isotropic numerical phase velocity can be obtained at space step values as large as five cells per wavelength. The method is narrowband for large space step values.

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