Abstracts

Using Linear and Nonlinear Predictors to Improve the Computational Efficiency of the FD-TD Algorithm

J. Chen, C. Wu, T.K.Y. Lo, K.-L. Wu and J. Litva. "Using Linear and Nonlinear Predictors to Improve the Computational Efficiency of the FD-TD Algorithm." 1994 Transactions on Microwave Theory and Techniques 42.10 (Oct. 1994 [T-MTT]): 1992-1997.

It is well known that the Finite-Difference Time-Domain (FD-TD) method requires long computation times for solving electromagnetic problems, especially for high-Q structures. The reason for this is because the algorithm is based on the leap-frog formula. In this paper, both linear and nonlinear predictors, which are widely used in signal processing, are introduced to reduce the computation time of the FD-TD algorithm. A short segment of an FD-TD record is used to train the predictor. As long as the predictor is set up properly, an accurate future realization can be obtained. We demonstrate, by means of numerical results, that the efficiency of the FD-TD method can be improved by up to 90%. With this result, the FD-TD algorithm becomes a much more attractive technique for solving electromagnetic problems.

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