Abstracts

On the use of linear-prediction techniques to improve the computational efficiency of the FDTD method for the analysis of resonant structures

Linear-prediction (LP) techniques are used to accurately and efficiently compute the frequencies and damping factors of microwave resonant structures from their transient response, which was previously obtained by using the finite-difference time-domain (FDTD) method. The LP equations are formulated in terms of a total least squares (TLS) problem and are solved by using the singular-value decomposition (SVD) algorithm. This approach confers robustness to the LP method, improves the spectral resolution, and provides a simple criterion for selecting the order of the LP model. We illustrate these characteristics of the LP method by applying it to two types of problems: the determination of the propagation constants of waveguides loaded with lossy dielectrics, and the calculation of the resonant frequencies of cylindrical cavities loaded with dielectric ring resonators.

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