The performance of the Extraction of Wideband Response from Early Time and Low frequency Data and Method to Find the Optimal Parameters

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Extrapolation of wideband response from early time and low frequency data is a good approach to reduce the computational loads for electromagnetic analysis. It has been accomplished by the use of the orthonormal Hermite, Laguerre or Bessel- Chebyshev polynomials. The fact that Fourier transforms of the presented polynomials are analytic functions allows us to work simultaneously with time and frequency domain data. However, the performance of this creative method is sensitive to two important parameters - the scaling factor *l1* and the expansion order *N*. It's very significant to find the optimal parameters to achieve the best performance and put this method into practice. In this paper, how the parameters affect the performance of the extraction is carefully discussed. Then a method to find the useful range of the parameters and a numerical and hybrid procedure to search the optimal parameters are promoted. The computation load of this method is not large because we only deal with small matrix and DFT/IDFT of short series of data. The estimated parameters are quite accurate compared with the real optimal ones. In addition, the searching procedure is stable to guarantee a converged extrapolation and a best or near best performance. The searching procedure is automatic and easy to program and can be used in practice. The feasibility of the proposed method is validated by two scattering examples of conductiong or dielectric scatters. Finally the performances using three different polynomials vs. *N* at the optimal *l1* are compared and reasons are explained.