Abstracts

Optimal simultaneous interpolation/extrapolation algorithm of electromagnetic responses in time and frequency domains

Jin-Lin Hu, Chi Hou Chan and T.K. Sarkar. "Optimal simultaneous interpolation/extrapolation algorithm of electromagnetic responses in time and frequency domains." 2001 Transactions on Microwave Theory and Techniques 49.10 (Oct. 2001, Part I [T-MTT] (Mini-Special Issue on Electrical Performance of Electronic Packaging (EPEP))): 1725-1732.

In this paper, an optimal simultaneous interpolation and extrapolation algorithm in the time and frequency domains is carried out by adaptively choosing the order of the associate Hermite (AH) expansion. Due to the isomorphism of the AH function and its Fourier transform, the time-domain signal and its corresponding frequency-domain transform can be expanded as two isomorphic AH expansions, that can be used for simultaneous interpolation and extrapolation in the time and frequency domains from the partial sampled data of the two waveforms. By using an optimization algorithm, the origin of the expansion and the optimal scaling factor can be found. Hence, by using an adaptive procedure, the order of the expansion can be chosen that leads to accurate interpolation and extrapolation. Some numerical examples are presented to illustrate the efficiency of this method for the complex signal both with and without random noise. The proposed algorithm is also applied to analyze the time- and frequency-domain responses of the ground bounce and lead frame problems in electronic packaging in which the proposed algorithm remains stable when a large order of Hermite expansion is required.

❑ Return to main document.