Abstracts

Improved global rational approximation macromodeling algorithm for networks characterized by frequency-sampled data

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Recently, the demand for high-performance wireless designs has been increasing while simultaneously the speed of high-end digital designs have crossed over the gigahertz range. New simulation tools which accurately characterize high-frequency interconnects are needed. This paper presents improvements to a new macromodeling algorithm. The algorithm employs curve-fitting techniques to achieve a pole-residue approximation of the frequency-sampled network. The frequency sampled S-parameters or Y-parameters can be obtained from measurement or full-wave simulation to characterize the frequency-dependent interconnects behavior. The improvements extend the approach to lossless structures, increase its accuracy with pole-clustering, and ensure its validity with a passivity test. This paper addresses some of the special considerations that must be made to the method so it can efficiently and accurately be applied to lossless circuits and structures. The resulting algorithm is now capable of accurately extracting a wide-band frequency domain macromodel from frequency-sampled data for either LC circuit (lossless) or RLC circuits (lossy). The frequency-domain macromodel can be linked to a SPICE circuit simulator for mixed signal circuit analysis using RF, analog, and digital circuits. The circuit can be simulated in the time domain using recursive convolution.

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