Abstracts

Application of the AWE method with the 3-D TVFEM to model spectral responses of passive microwave components

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This paper describes an efficient algorithm to evaluate the spectral response of passive microwave devices. The method is based on the combination of the tangential-vector finite-element method (TVFEM) for modeling three-dimensional (3-D) microwave passive components and the asymptotic waveform evaluation (AWE) technique for efficiently computing the spectral responses. Unlike previous AWE approaches, which use direct matrix factorization to solve for the moments, we employ a preconditioned conjugate gradient (PCG) method. It is observed that the iterative PCG solver converges much faster by solving only the additional components of the higher moments outside the span of previous moments. Moreover, this paper discusses the effect of shifting the expansion frequency from the real frequency axis to the lower half of the complex frequency plane. Through several numerical examples, a waveguide with an obstacle inside, mitered 90/spl deg/ E- and H-plane waveguide bend, microstrip low-pass filter, and microstrip patch antenna, we show that shifting reduces the pollution due to dominant resonant modes and, consequently, results in a much wider convergence range for the moment-matching AWE technique.

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