Abstracts

Microwave filter analysis using a new 3-D finite-element modal frequency method

J.R. Brauer and G.C. Lizalek. "Microwave filter analysis using a new 3-D finite-element modal frequency method." 1997 Transactions on Microwave Theory and Techniques 45.5 (May 1997, Part II [T-MTT]): 810-818.

A new finite element modal frequency method is presented and shown to be advantageous for the analysis of microwave filters. The method analyzes a finite-element model of a filter by first computing the eigenmodes of the three-dimensional (3-D) structure. The computed eigenvalues are shown to reliably determine all of the resonant frequencies in a frequency range; the filter design can be changed until the desired resonant frequencies are computed. Finally, the eigenvectors are used as basis functions to compute the frequency response of the filter, thereby achieving a speedup that increases with the number of frequencies analyzed. Two filters analyzed in this paper show speedups ranging from 1.39 to 4.01, and their computed S-parameters agree closely with measurements.

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