Abstracts

Finite Element Analysis of MMIC Structures and Electronic Packages Using Absorbing Boundary Conditions

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In this paper, a three-dimensional finite element method (FEM) is employed in conjunction with first and second-order absorbing boundary conditions (ABC's) to analyze waveguide discontinuities and to derive their scattering parameters. While the application of FEM for the analysis of MMIC structures is not new, to the best of the knowledge of the authors the technique for mesh truncation for microstrip lines using the first and higher-order ABC's, described in this paper, has not been reported elsewhere. The scattering parameters of a microstrip discontinuity are computed in two steps. As a first step, the field distribution of the fundamental mode in a uniform microstrip is obtained by exciting the uniform line with the quasi-static transverse electric field, letting it propagate, and then extracting the dominant mode pattern after the higher order modes have decayed. In step two, the discontinuity problem is solved by exciting the structure by using the fundamental mode obtained in step one. The scattering parameters based on the voltage definition are calculated by using the line integral of electric fields underneath the strip. Numerical solutions for several waveguide discontinuities and electronic packages are obtained and compared with the published data.

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