Abstracts

Finite Element Analysis of MMIC Waveguide Structures with Anisotropic Substrates

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This paper presents an extended finite element formulation for a full-wave analysis of biaxial and transverse plane electric and magnetic anisotropic materials with application to monolithic microwave integrated circuits (MMIC's). A convenient formulation of the characteristic impedance based on a power-voltage definition is developed using vector-based finite elements. The resultant generalized eigenvalue problem is solved using a numerically efficient algorithm based on a forward iteration, taking full advantage of the sparsity of the involved matrices. Numerical results are compared and agree well with existing published data for various MMIC configurations. Two specific coplanar waveguide structures, one with a conventional and the other with a suspended substrate, are examined using four common anisotropic materials. Principal axis rotations of the anisotropic substrates are also considered to improve dominant mode dispersion characteristics and minimize higher order mode interactions.

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