Abstracts

Propagation Analysis of Chirowaveguides Using the Finite-Element Method

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Propagation characteristics of chirowaveguides, i.e., waveguides including chiral media, have been calculated using a generalization of the full vector finite-element formulation in terms of the electric and magnetic fields. The described formulation permits numerous inhomogeneous waveguide structures of arbitrary linear composition including chiral media to be analyzed without any nonphysical, spurious modes. In the proposed formulation both the necessary conditions on the tangential field components and the additional conditions on the normal field components are automatically satisfied by the trial functions. In this way the dimension of the resulting sparse generalized eigenvalue problem is significantly reduced. The straightforward extension to the novel class of chirowaveguides, which exhibit a number of interesting new features, demonstrates the versatility of the utilized formulation. The previously noted advantageous numerical properties have thus been preserved. Numerical examples on both metal and dielectric chirowaveguides are given. The finite-element results are compared with exact solutions, which are also reported, and the correspondence is found to be excellent.

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