Abstracts

A Variational Analysis of Anisotropic, Inhomogeneous Dielectric Waveguides

We derive a variational formulation for anisotropic, dielectic waveguides using only the (E/sub x/, E/sub y/) or only the (H/sub z/, H/sub y/) components of the electromagnetic field. We show that the (E/sub x/, E/sub y/) formulation is completely equivalent to the (H/sub z/, H/sub y/) formulation. In fact, they are the transpose problems of each other. Given the variational formulation, one can derive the finite element solution quite easily. We also show how to derive a variational expression where the natural boundary conditions are incorporated as an optimal solution of the variational expression. We illustrate our theory with a simple implementation of a finite element solution. Our solutions agree with previous results, and there is no occurrence of spurious modes. Furthermore, our formulation allows the easy inclusion of loss and frequency dispersion in the /doublebar μ/ and /doublebar epsilon/.

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