Abstracts

A Partial Variational Approach for Arbitrary Discontinuities in Planar Dielectric Waveguides

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A novel approach for analyzing arbitrary discontinuities in planar dielectric waveguides is proposed that uses the finite-element method along with the frontal solution technique. Based on the partial variational principle (PVP), the fields interior and exterior to the discontinuity finite element region can be treated independently and eventually can be coupled. The interior fields are expanded by the finite element nodal values and the corresponding local bases, while the exterior ones are handled by an approach combining modal expansion and Green's function. In numerical computation, the continuous spectra of the waveguide modes are discretized by the Laguerre expansion method. To check the correctness of the present analysis, two numerical results are compared with those of other methods. The scattering characteristics of several linearly tapered discontinuities, such as transformers and feed structures, are analyzed and compared with those having step junctions.

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