Abstracts

A Perturbation Theory for Dielectric and Optical Waveguides with Application to the Launching of Surface Modes

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A perturbation technique is employed for dielectric waveguides with a small dielectric difference between the guide and its surrounding medium, resulting in an analytically simple, selfconsistent, theory for surface modes. The field equations are shown to manifest bounded waveguide simplicity. In partitular the transverse electric and magnetic fields are related by a constant and possess the orthogonality of a metal waveguide. Furthermore, an analytic expression is presented for the eigenvalues. Although the analysis is based on small dielectric differences, it is shown to be adequate when the inside dielectric is as large as twice the outside. The results of the perturbation analysis are applied to the excitation of a semi-infinite dielectric rod excited by a uniform field.

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