Abstracts

Rays, Beams, and Modes Pertaining to the Excitation of Dielectric Waveguides

L.B. Felsen and S.-Y. Shin. "Rays, Beams, and Modes Pertaining to the Excitation of Dielectric Waveguides." 1975 Transactions on Microwave Theory and Techniques 23.1 (Jan. 1975 [T-MTT] (Special Issue on Integrated Optics and Optical Waveguides)): 150-161.

The two-dimensional problem of excitation of an inhomogeneous dielectric layer by a Gaussian beam is considered, with emphasis on useful representations that treat the field either in terms of multiple reflections or in terms of guided modes. A recently developed method is employed whereby the beam fields are generated from line source fields by assigning a complex value to the source coordinates. When applied to the asymptotic solution for the line source field, this procedure furnishes a simple and quantitative relation between line-source-excited ray optics and paraxial beam optics. It also clarifies the role of lateral ray and beam shifts for reflection at a boundary with incidence-angle-dependent reflection coefficient, especially when multiply reflected fields are converted into modal form. Results are given for beams which are reflected at both boundaries, reflected at one boundary and refracted before reaching the other boundary, and trapped by refraction without reaching either boundary. In the first case, conversion to modal form is more convenient at large distances whereas in the latter case, paraxial beam tracking is preferable.

❑ Return to main document.