Abstracts

Multiply Reflected Gaussian Beams in a Circular Cross Section

S.-Y. Shin and L.B. Felsen. "Multiply Reflected Gaussian Beams in a Circular Cross Section." 1978 Transactions on Microwave Theory and Techniques 26.11 (Nov. 1978 [T-MTT]): 845-851.

A well-collimated beam reflected repeatedly within a circular cross section undergoes periodic focusing and defocusing. This behavior is of interest for tracking of beams around a type of acoustic surface wave disk delay line, and it also relates to beam monitoring after oblique injection into the endface of a multimode optical fiber. The problem is analyzed by considering first the field excited by an isotropic line source inside a dielectric cylinder, and then converting this to Gaussian beam excitation by assigning a complex value to the source coordinate location. Because the wavelength is small compared to the cylinder radius, ray-optical methods are employed to construct the solution, with inclusion of such novel ingredients as the lateral ray shift on a curved boundary. Results are obtained for the amplitude and phase of the ray and beam field and for such beam parameters as the location of the focus the minimum beam width and the rate of beam divergence between successive reflections.

❑ Return to main document.