Abstracts

Launching of the HE/sub 11/ Surface Wave Mode by an Electric Dipole Imbedded in a Dielectric Rod

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Recently, there is much renewed interest in dielectric surface waveguides in view of their potential application in communications at the millimetric and optical frequencies. Many of the theoretical and practical problems involved were discussed in an informative survey by Kao. Among them, the excitation of surface waves on these waveguiding structures is, evidently, of much importance. One of the simplest structures, which is, nevertheless, of great practical utility, is the circular dielectric rod. The excitation of circularly symmetric surface waves on a dielectric rod by an elementary source, for example, a nagnetic current ring, has been investigated previously. However, a similar treatment for the HE/sub 11/ dipole mode is not available. The excitation of the HE/sub 11/ mode is of great practical importance, since it is the dominant mode and the easiest one to excite in a pure form if a single-mode operation is desired. Consequently, the HE/sub 11/ mode has been widely used. Snyder used an asymptotic approach in dealing with the excitation of modes on a semi-infinite dielectric rod, since the exact Green's functions for the fields were not known except for the circularly symmetric modes (TM/sub Om/ or TE/sub Om/). It is the purpose of the present paper to present a theoretical study of the problem of exciting the HE/sub 11/ mode.

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