Abstracts

Attenuation and Radiation Characteristics of the HE/sub 11/ -Mode

C. Dragone. "Attenuation and Radiation Characteristics of the HE/sub 11/ -Mode." 1980 Transactions on Microwave Theory and Techniques 28.7 (Jul. 1980 [T-MTT]): 704-710.

The asymptotic properties of the fundamental mode HE /sub 11/ inside a large waveguide of finite surface impedances are discussed. The analysis applies to corrugated waveguides, certain optical fibers and wave-guides with metal walls coated by a dielectric layer. It is shown that for k-->/spl infin/ the HE/sub 11/ -mode has the following two properties: it is polarized in one direction and the field vanishes at the boundary. Because of these properties, it is useful in the design of microwave feeds, since it minimizes cross-polarization and edge illumination at the aperture. It is also useful for long distance communication because of its low attenuation constant. Both the far field of a feed and the attenuation constant are discussed. It is shown that rectangular apertures have negligible cross-polarization over wider bandwidth than circular apertures. Furthermore, if the medium inside a waveguide is Iossless, so that power is lost only at the boundary, then the attenuation constant is very small, it is asymptotic to (ka)/sup -2/ for large ka, where k = 2 pi/lambda and a is a characteristic dimension of the waveguide. A rectangular waveguide consisting of four metal plates coated with thin dielectric layers is shown to be attractive for long distance communication, because of its simplicity of fabrication and its low attenuation.

❑ Return to main document.