Abstracts

Radiation from Bends in Dielectric Rod Transmission Lines

The radiation from the fundamental mode propagating around curved dielectric rod transmission lines is investigated experimentally with microwave frequencies. Three methods are used to determine the attenuation by radiation: measuring the insertion loss of bends, measuring the Q-factor of ring resonators, and measuring the Q-factor of sections of curved dielectric rod transmission lines terminated by large reflecting plates. The attenuation is found to depend mainly on the combination $R \lambda_0^2 / r_0^3$, where R is the radius of curvature, λ_0 the free space wavelength and r_0 a measure of the transverse field extent of the HE_{11} mode. The experimental results are compared with theoretical predictions of other authors. The measured values of the attenuation constant are found to be smaller than the theoretical values. The distribution of the electromagnetic field near bends is recorded using a semiautomatic field plotter. From the field pictures, it can be concluded that the curved dielectric waveguide radiates tangentially from the outer side. The results presented will also be useful for understanding the mechanism of radiation from bent optical waveguides.

❑ Return to main document.

Click on title for a complete paper.