Abstracts

Low Loss Dielectric Waveguides

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The history of dielectric waveguides begins back in 1910 with the publication of a theoretical paper by Hondros and Debye, who gave a mathematical treatment of transverse magnetic mode propagation in lossless dielectric guide. In the 1930's Southworth began experimental work on these modes while Carson, Mead, and Schelkunoff developed a general theory which showed the existence of TE, TM, and hybrid HE modes. During World War II, dielectric rod antennas came into use. However, dielectric waveguides as transmission lines were considered impractical at that time when the shortest wavelengths in use were several centimeters long. The size of dielectric required at these long wavelengths, and the problems of support, radiation, and crosstalk, appeared to be serious drawbacks to the practical utilization of these guides. Furthermore, there was no great need for dielectric guides, since dominant-mode metallic guides had sufficiently low loss while flexibility could readily be obtained by corrugated guides or by coaxial lines.

❑ Return to main document.