Abstracts

Helix Leaky Waveguide

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The propagation characteristics of leaky waves in a helix waveguide covered with a slitted cylinder are presented by a method of transverse network representation. The main interest is in helix waveguides with small pitch angles, characterized by a hybrid mode consisting of TE/sub 01/, and a small amount of TM/sub 01/ modes. The leaky wave discussed in this paper may then be regarded as a perturbation of the TM/sub 01/ wave by the slitted cylinder outside the helix. The radiation, metal, and dielectric losses are calculated numerically at a frequency of 50 GHz. The relation between the radiation loss and aperture angle of slit is very different from that of an ordinary leaky waveguide composed of a slitted cylinder without helix, especially when the distance between the helix and shield cylinder is about a quarter of the radial wavelength. The metal and dielectric losses are the same order as radiation loss, however the dielectric loss decreases as the power factor /spl epsiv/"/ /spl epsiv/' increases. The measured total attenuation constant averages about 5 dB/km, almost twice the theoretical value.

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