Abstracts

Characteristics of Metallic Waveguides Inhomogeneously Filled with Dielectric Materials with Surface Plasma Layers

T.-F. Wu, J.K. Butler and M.W. Scott. "Characteristics of Metallic Waveguides Inhomogeneously Filled with Dielectric Materials with Surface Plasma Layers." 1987 Transactions on Microwave Theory and Techniques 35.7 (Jul. 1987 [T-MTT]): 609-614.

The propagation of millimeter waves in metallic waveguides inhomogeneously filled with dielectric materials having surface plasma layers is characterized. The modal phase shift and attenuation of a 94-GHz wave are computed for a 10-μm plasma layer thickness as a function of carrier density. In the unexcited state, 90 percent of the millimeter-wave power is confined to the interior air region of the guide, while the remaining 10 percent propagates in the semiconductor insert. In the excited state at high injection levels, over 99 percent of the wave power propagates in the air region. Consequently, in this state, the waveguide will have a very low loss. A resonant cavity using the waveguide configuration shown to have a wide tuning range and high cavity Q.

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