Abstracts

Propagation of TE Modes in Dielectric Loaded Waveguides

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The propagation of TE/sub no/ modes in rectangular wave-guides that contain two dielectric slabs parallel to the narrow wall and extending over the full height of the guide is investigated. Waveguide and dielectric are assumed to be lossless and infinitely long. Apart from these restrictions, the dielectric slabs may have arbitrary thickness, position, and dielectric constant. The analysis is restricted to TE/sub no/ modes with the E-field parallel to the narrow guidewall. The guide containing only one dielectric slab is covered by this analysis. The even modes n = 2, 4, 6, . . . of the guide with two slabs correspond to the odd modes n' = n/2 = 1, 2, 3, . . . of the guide with one slab half the width of the guide with two slabs. For six relative dielectric constants (epsilon/= 2.25, 4.00, 9.00, 12.25, 16.00, 25.00) the cutoff frequencies for TE 10, 20, 30, 40, 60 modes and the normalized propagation constants for TE 10 and TE 20 modes between their respective cutoff frequencies and a frequency slightly above the second- and fourth-order mode cutoff frequency for the empty guide, respectively, have been computed for a large range of slab thicknesses and slab positions. Selected results are presented graphically. These results are discussed. The parametric dependence of field distributions, of normalized characteristic impedances, of the ratio of cutoff frequencies (fractional bandwidth), and of the ratio of magnetic field components (ellipticity) are illustrated.

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