Abstracts

Solutions of the Vector Wave Equation for Inhomogeneous Dielectric Cylinders--Scattering in Waveguide

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Some solutions of the vector wave equation for an inhomogeneous dielectric cylinder, suitable for numerical calculations of the scattered electromagnetic (EM) field in waveguide, are presented in cases where the cylinder axis is parallel, or perpendicular, to the incident electric field vector. The scattered field, given in terms of normal modes of the rectangular waveguide, permits easy determination of the transmission and reflection coefficients for the structure. The dielectric susceptibility may be considered as variable along the cylinder radius according to a parabolic function (Luneberg-type profile). Finally, numerical results of the scattered near field are presented for Teflon cylinders of different diameters, in the case of parallel polarization. They are compared with laboratory measurements in the microwave X band made as a reliability test of the computational program. The agreement between measured and computed values is satisfactory within a deviation of 10 percent in the whole frequency band.

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