Turkish Journal of Electrical Engineering & Computer Sciences

Plane Wave Diffraction by a Dielectric Loaded Open Parallel Thick Plate Waveguide

Bahattin TÜRETKEN
National Research Institute of Electronics and Cryptology
The Scientific and Technical Research Council of Turkey
41470, Gebze, Kocaeli-TURKEY
e-mail: bahattin@uekae.tubitak.gov.tr
Ali ALKUMRU
Department of Electronics Engineering, Gebze Institute of Technology
41400, Gebze, Kocaeli-TURKEY
e-mail: alkumru@penta.gyte.edu.tr

Abstract: A uniform asymptotic high-frequency solution for a two-dimensional diffraction problem of plane electromagnetic waves by a dielectric loaded open parallel thick plate waveguide is investigated rigorously using the Fourier transform technique in conjunction with the mode matching method. This mixed method of formulation gives rise to scalar modified Wiener-Hopf equations of the second kind for which the solution contains a set of infinitely many constants satisfying an infinite system of linear algebraic equations. A numerical solution of this system is obtained for various values of plate thickness, incidence angle and permittivity, and the effect of these parameters on the diffraction phenomenon is studied.

Key Words: Diffraction, dielectric, waveguide, Wiener-Hopf equation, mode matching method.