

Mode-Matching Method for the Calculation of Steps between Rectangular and Elliptical Waveguides

Archiv für Elektronik und Übertragungstechnik (AEÜ),
Vol. 50 (1996), No. 6, pp. 375-383

Abstract

This paper deals with the calculation of the scattering matrix of rectangular to elliptical waveguide discontinuities by applying the mode-matching method. The coupling integrals are formulated for a larger elliptical and smaller rectangular waveguide and vice versa. The waveguides may have an axial offset and the cross-sections may overlap. The computations are verified by measurements and show excellent agreement. This method can be applied to the design of stepped waveguide transitions between rectangular and elliptical waveguides. The design of a transition with three rectangular segments presented here matches the rectangular waveguide WR42 to an elliptical waveguide in the frequency range 17-20 GHz. Although the cross-section of the elliptical waveguide is 6.5 times the rectangular one, the measured return loss is greater than 34 dB.

M. Schneider, J. Marquardt