Abstracts

Scattering at the Junction of a Rectangular Waveguide and a Larger Circular Waveguide

A full wave, formally exact solution is obtained for the problem of scattering at the junction of a rectangular waveguide and a larger circular waveguide. The general case of an arbitrary offset of the wavegnide axes is considered. E-field mode matching over the rectangular aperture of the smaller guide is facilitated by a transformation of the circular cylindrical Bessel-Fourier modal fields of the circular guide into a finite series of exponential plane wave functions in rectangular coordinates. This permits an analytical finite series solution for each of the elements of the E-field mode matching matrix [M] from which the scattering matrix [S] of the junction is easily obtained. Numerical evaluation of the S-parameters for the dominant TE/sub 10/ (rectangular) and TE/sub 11/ (circular) modes in the cases of junctions with no offset and with offset is presented. Moreover, the practical case of a circular cavity resonator with smaller input and output rectangular guides is considered and excellent agreement is found between the calculated and measured S-parameters.

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