Abstracts

A rigorous analysis of a cross waveguide to large circular waveguide junction and its application in waveguide filter design

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A rigorous analysis is obtained for the problem of scattering at the junction of a cross-shaped waveguide and a larger circular waveguide. The general case of an arbitrary offset and orientation of the cross waveguide axes is considered. The fields matching over the cross aperture of the smaller guide is facilitated by using the transformation of the circular cylindrical Bessel-Fourier modal fields of the circular guide into a finite series of exponential plane wave functions. This permits an analytical finite series solution for the elements of the fields mode matching matrix, from which the general scattering matrix of the junction is obtained. The application of the formulation to circular waveguide filter design is emphasized in the numerical examples. Excellent agreements between theoretical and experimental results are obtained in all the numerical examples.

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