

Radial-Line Band Rejection Filters in Coaxial Waveguides (1967 [MWSYM])

D. Varon. "Radial-Line Band Rejection Filters in Coaxial Waveguides (1967 [MWSYM])." 1967 G-MTT International Microwave Symposium Program and Digest 67.1 (1967 [MWSYM]): 42-46.

Among the simplest and least expensive structures which serve as band rejection filters in the microwave region is the coaxial waveguide with a cylindrical cavity forming a discontinuity in the outer conductor. When the outer conductor of a coaxial waveguide is perturbed by a shorted radial transmission line, the structure acquires a zero of transmission for the TEM mode at a resonant frequency that depends on as many as six parameters. Experience indicates that in restricted regions certain approximate methods, in which one or several of the parameters are neglected, produce fairly accurate results. However, discrepancies of 5% or more are encountered in other regions where the same approximations ought to be valid. The approximations most frequently used correspond to either one of the following situations: (a) total disregard of the fringing fields caused by the two close discontinuities, in which case the cylindrical cavity is represented by a series impedance equal to the input impedance of a shorted radial transmission line; (b) consideration of the fringing fields associated with each discontinuity, but neglect of the interaction between the two. In the latter, the discontinuities are accounted for by equivalent shunt lumped reactive elements, however, they must be far enough apart so that the interaction is indeed negligible.

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