Field Solution for Radial Waveguides with Annular Discontinuities

A method is established which gives the internal field of a radial waveguide in the presence of annular-type slots on the conducting walls or metallic scatterers inside the guide. The exciting field can have a general form, and the dielectric constant of the region could be lossy or lossless. To obtain a solution, the induced currents (magnetic current in case of slot-type discontinuity) over the scattering bodies are expanded into a finite series of suitable basis functions with unknown coefficients. The total number of these functions is directly related to the electrical dimensions of the scatterers. The complex coefficients are then obtained by employing the appropriate Green's functions and an application of the boundary conditions over the scattering bodies. The method is then applied to the problem of coupling between two radials waveguides by annular slots on the common boundary. It is shown that in general, higher order modes have significant effect on the solution, and for a precise evaluation of the field their contribution must also be included.

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