Abstracts

Analysis of Waveguides with Metal Inserts (Dec. 1989 [T-MTT])

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A systematic analysis of waveguides with metal inserts is presented. The method is based on a field expansion in terms of the normal modes of the corresponding hollow waveguide without metal inserts. The analysis leads to two main formulations the matrix formulation and the moment method formulation. The matrix formulation is suitable for structures with smooth metal inserts, which are free from sharp edges, while the moment method is more suitable for metal sheets (e.g. strips and fins) or metal inserts with sharp edges (e.g. ridges). The validity of the method is tested by investigating some special cases, in which the surface of the metal insert coincides with one of the coordinate surfaces, e.g. a bifurcation in circular or rectangular waveguides. The method is then applied to the analysis of striplines and ridge waveguides. It leads to a generalization of the widely used spectral-domain technique in that ridges, fins, and strips with finite thickness can now be analyzed likewise. Any existing routine for the analysis of planar structures which is based on the spectral-domain technique can then be slightly modified in order to take the metallization thickness into account.

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