Wideband Matching of Waveguide Discontinuities by FDTD Methods

Finite Difference-Time Domain (FDTD) methods offer, in principle, promise of great flexibility for application to waveguide discontinuities of any kind. The problem of appropriate termination in the guide environment has recently been addressed. Main remaining disadvantages are the volume of computation involved and lack of analytical insight. Moreover equivalent circuits are prerequisites to effective CAD and synthesis. With a view to remedying these shortcomings, we discuss the extraction from the FDTD analysis of equivalent circuits. Two significant examples are considered: the inductive post and the 90° H-plane corner, including a modified form of the same. The circuits thus obtained are subsequently employed in the CAD problem of matching over the full waveguide band the modified corner by means of two inductive screws. Theoretical and experimental results are in excellent agreement yielding a reflection <=-12 dB over the band 36-40 GHz and showing the effectiveness of the approach.

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