

## ANALYSIS OF PARALLEL PLATE WAVEGUIDE T AND STEP JUNCTIONS

Sembiam R. Rengarajan

Department of Electrical and Computer Engineering, California State University, Northridge, CA 91330

Parallel plate waveguide T and step junctions are used in applications such as continuous transverse stub (CTS) and other antennas. An analysis of the T junction in such a structure has been presented in the prior literature (K.H. Park, H.J. Eom, Y. Yamaguchi, IEEE Trans. Microwave Theory Tech., vol. 42, no. 2, pp. 356-358, Feb. 1994). In that paper, the continuity of the tangential component of the magnetic field and the continuity of the Fourier transform of the electric field are enforced. We present a method of moments solution to the integral equation for the aperture electric field at the junction. Boundary conditions for the tangential components of the electric and magnetic fields are applied, with the use of the parallel plate Green functions. The numerical analysis in our method is simpler. Step discontinuities in parallel plate waveguides are employed in CTS-type antennas for impedance transformations. A precise knowledge of the junction susceptance is required in the analysis and design of such structures. A moment method solution to the tangential component of the electric field at the junction and the scattering parameters of the step discontinuity are also presented in this paper.

Numerical results obtained for the T junction compare well with previously published results. Computed results are also validated by the power balance conditions which are satisfied to great precision. The scattering parameters and coupled power for a range of values of waveguide heights, and dielectric constants will be presented at the meeting. These results are applicable in the analysis and design of antennas and microwave circuits such as power dividers, couplers and impedance transformers.

Abstract Submission Form

2006 National Radio Science Meeting

Abstract: rengarajan32459

Date Received: September 27, 2005

1. (a) Sembiam Rengarajan  
Department of Electrical and Computer Engineering  
California State University  
Northridge, CA  
91330 USA  
srengarajan@csun.edu  
(b) 818-677-3571  
(c) 818-677-7062
2. B - Fields and Waves
3. (a)
4. C - Contributed Paper
5. No special instructions