

Sectional Cylindrical Waveguide with longitudinally distributed slots

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Abstract — Base station Cellular Systems require omnidirectional efficient antennas to provide an acceptable service within the cell site. Conventional antennas used for this purpose are mainly micro-strip patch antennas in the form of a circular array. However, these antenna elements suffer from low efficiency due to the additional losses involved in the feeder line as well as in the material from which the patch antenna is formed. These major drawbacks can be eliminated by introducing a sectional slotted waveguide array that consists of N longitudinally distributed slots at specific positions, and with specific dimensions in order for the antenna to provide high directional efficiency, compactness, high wind resistance and surely high power handling capability.

A series of simulation results have been done on the proposed antenna at the desired 2.4GHz frequency and show a significant gain of about 15dBi over the desired frequency band of interest.

keywords - Sectorized, Sectional, slotted waveguide, radiation efficiency, array, gain, bandwidth, wind resistance.

I. INTRODUCTION

Antennas, today, are used in many systems especially in wireless internet communications and Radar applications where high power handling capability, high gain, proper polarization along with reliable mechanical characteristics are needed. However, these parameters are very hard to simultaneously optimize, there is always a trade-off in between. In this paper, a Sectional Cylindrical Slotted Waveguide Antenna (CSWA) is presented. The purpose of this paper is to provide an optimized version of cylindrical slotted waveguide antennas by simply selecting the optimum position, number, shape and size of the slots within the waveguide's sectional wall. Such configurations are suitable to be used in Wireless internet distributing systems and radar applications. Simulation results along with Experimental validations will be conducted at the 2.4 GHz frequency demonstrating high effectiveness in terms of directional efficiency given a reduced cost, simplicity of fabrication with optimized size and shape [1,2].



Figure 1. Simulated Design of a 7-slots Sectional Cylindrical Waveguide

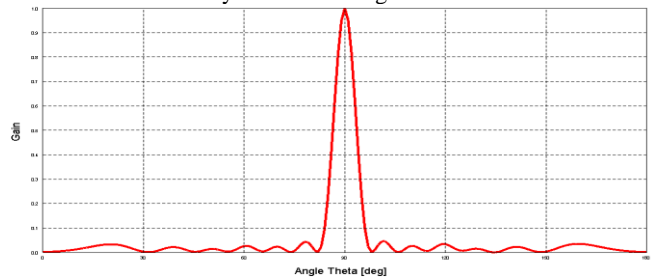


Figure 2. Normalized Linear Rectangular Plot of the Radiation Pattern of 7-slots Sectional Cylindrical Waveguide.

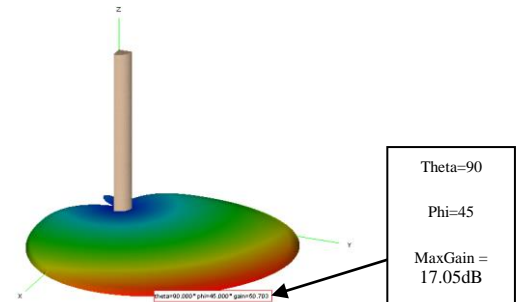


Figure 3. Simulated 3D Radiation Pattern of a 7-slots Sectional Cylindrical waveguide.

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