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Microstrip Patch Antenna Array Design to Improve Better Gains

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Abstract

This paper presents a 3x3 antenna array of ractangular topology is designed to operate at Ku Band. The antenna has been designed as arrays of patches, where number of elements, spacing's and feeding currents has been optimized to fulfil the requirements of low side lobe level and good cross polarization. The operating frequency of array is from 12 to 18 GHz. The antenna array has been designed and simulated on FR4 Substrate with dielectric constant of 4.4. This paper presents that, the detail steps of designing and simulating the rectangular patch antenna and rectangular patch antenna Array in Ku-band. The design is analysed by FEM based HFSS 14.0 by which return loss, 3D polar plot, Directivity, VSWR and Gain of the antenna are computed. The software simulated results are shows that the proposed antenna array provides good performance in terms of return loss, VSWR and Gain.

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Keywords: Microstrip Antenna, Rectangular Patch Antenna, HFSS 14.0, Return Loss, VSWR, 3D Polar Plot, Directivity, Gain;

1. Introduction

Antenna Array Also called an *array antenna*, antenna arrays are several antennas connected & arranged in a regular structure to form a single antenna. also Phased array antenna (PAA) is a multiple antenna system, in which, that the radiation pattern can be reinforced in a particular direction & suppressed in undesired directions. The direction of phased array radiation can be electronically steered obviating the need for any mechanical rotation. These unique capabilities found that the phased arrays a broad range of applications since the advent of this advanced technology.

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In Modern days Communication Systems, these Antenna arrays plays an important role to create a communication link. Microstrip Patch antennas are widely used in wireless communication systems because of they have low profile, of light weight, low cost, conformal design, low power handling capacity and easy to integrate and fabricate. They can be designed in a variety of shapes in order to obtain enhanced gain and bandwidth. Microstrip Patch Antenna implementations is a mile stone in wireless communication system designs [1].

Phased array antennas are traditionally used for military radar applications. Another important one that can take the advantage of phased arrays is automotive collision avoidance radar or adaptive cruise control technology.

The major Advantages of Antenna Arrays are;

- Increase the overall gain.
- Provide diversity reception.
- Cancel out interference from a particular set of directions.
- "Steer" the array so that it is most sensitive in a particular direction.
- Determine the direction of arrival of the incoming signals.
- To maximize the Signal to Interference Plus Noise Ratio (SINR).

2. Design of Proposed Antenna

In this paper 3x3 Rectangular Microstrip Antenna Array is Design at 13GHz frequency has been designed and simulated at Ku-band.

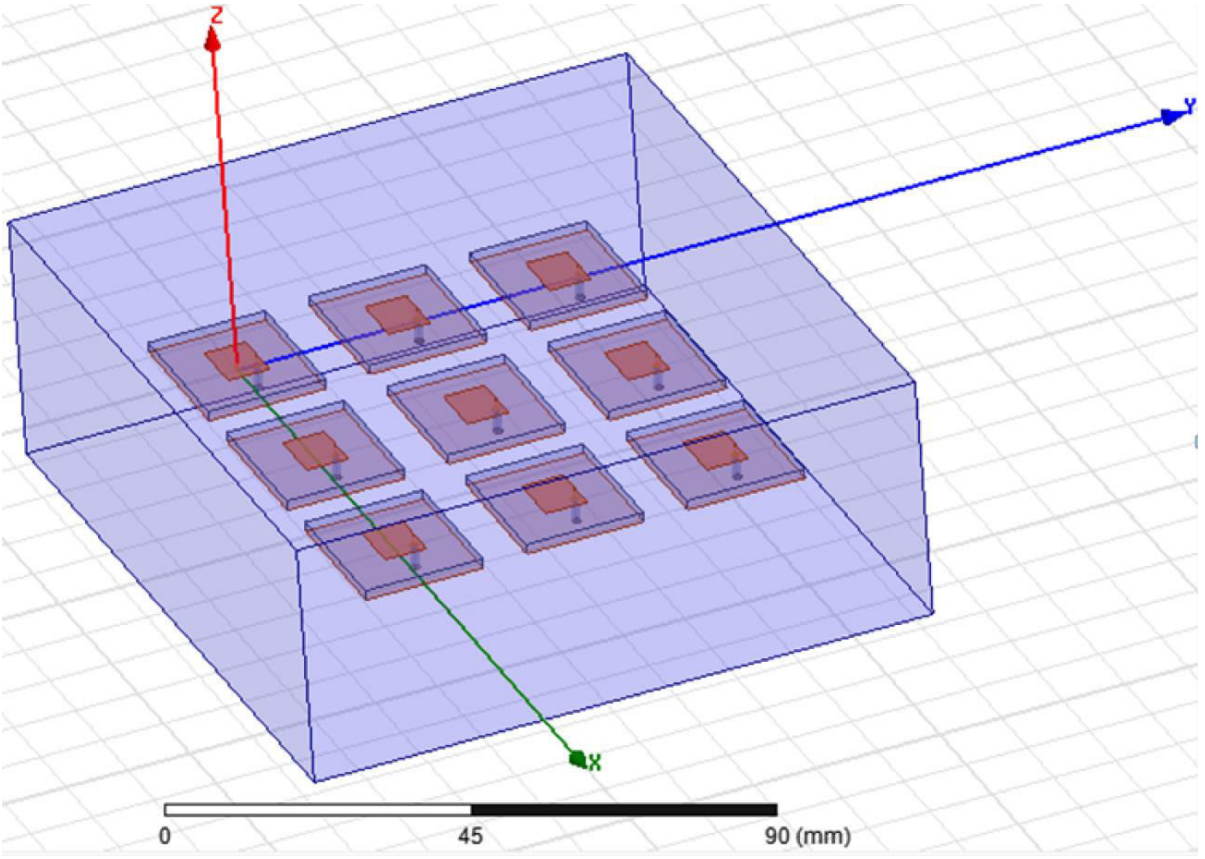

Fig.1 3x3 Rectangular Microstrip Patch Antenna Array Design (Cropped Image)