Archimedian Spiral Ultra Wideband Antenna For Wireless Communications

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Abstract – An Archimedean patch antenna with matching slots for ultra-wideband (UWB) communications. The proposed antenna, which is based on a multi-band antenna concept, maintains a return loss of less than −28.5dB and VSWR 2 as well as frequency notched properties within a controllable bandwidth from 3 to 8 GHz.

Keywords: Archimedean, UWB, Controllable Bandwidth, Return loss

I. INTRODUCTION

The recent spectrum allocation for ultra-wideband (UWB) radio communication has sparked renewed interest in the subject of UWB antennas. Several designs for UWB antennas have been recently proposed. For example, in [1] diamond and rounded diamond designs have been reported. However, traditional UWB antennas are "multi-narrowband" and, therefore, are not optimized to receive a single coherent signal across their entire operating bandwidth. Furthermore, with the growing demand of higher-frequency in data communications, higher-frequency cutoff performance is needed for a UWB system to have better signal-to-interference ratio (SIR) so as to reduce the interference from other indoor radio frequencies.

On the other hand, UWB antennas behavior and performance should be consistent and predictable across the matching band. Moreover, successful transmission and reception of UWB pulses entails minimization of spreading and distortion of the pulse, which requires sufficient impedance matching, gain flatness and linear phase throughout the entire-bandwidth. Although, in general it is desirable to achieve Omni directional radiation pattern, how- ever, if waveform dispersion occurs in a predictable fashion it can then be compensated for. Another important consideration in the design is the size of the antenna, which should be kept small without compromising performance.

II. SYSTEM MODEL

Printed circuit components and microstrip antennas have been increasingly used due to their widespread applications especially in wireless communications. The analysis of scattering, radiation, and propagation in planar-layered structures with printed conductors is often carried out using mixed-potential integral-equation (MPIE) method [2–5]. In this letter, we propose a microstrip patch antenna with matching slots, which presents stable characteristics across the matching band.

For the purpose of analysis and design, we have considered all the current distributions and employed the Galerkin's Method of Moment (MOM) procedure and Rao Wilton Glisson (RWG) basis functions [3] in solving the MPIE. This MPIE solution is obtained in terms of vector and scalar potential Green's functions, when used to obtain the design characteristics of microstrip structures.

The configuration of the proposed antenna is illustrated in Fig. 1,

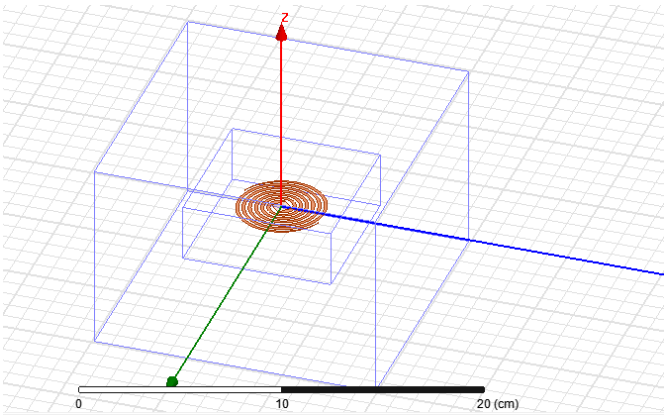

Fig 1 Simulated Antenna design

Table 1 Antenna Measurements

Parameters	Details
Number of Arms	2
Number of turns	2.96 cm
Inner radius	0.53 cm
Height	1cm

III. SIMULATION/EXPERIMENTAL RESULTS

The simulation results with graphs and appropriate tables.

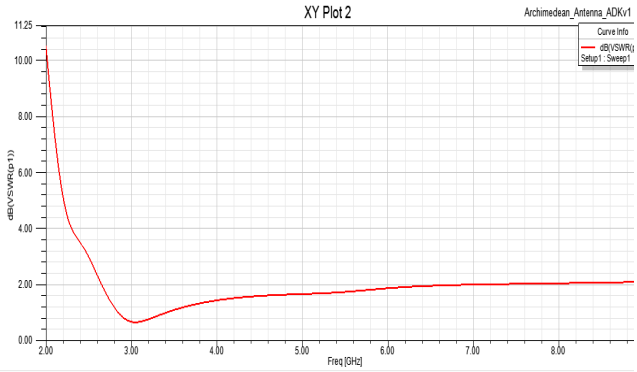

Fig 2 Voltage standing wave ratio (VSWR)

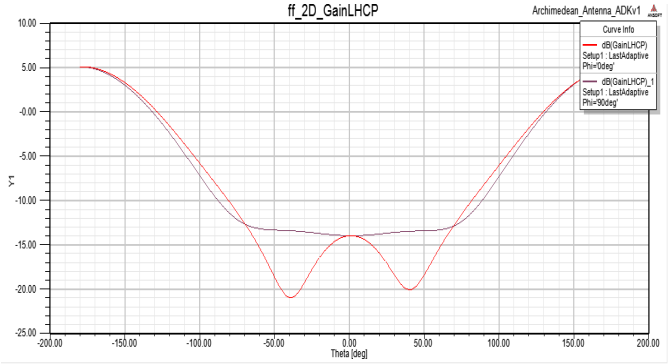

Fig 3 Gain of the antenna

S. No.	Antenna parameters	Simulation
1.	Return loss(dB)	-28.5
2.	VSWR	1

Table 2 Result summary

IV. CONCLUSION

An Archimedean patch antenna with matching slots for ultra-wideband (UWB) communications. The proposed antenna, which is based on a multi-band antenna concept, maintains a return loss of less than −28.5dB and VSWR 2 as well as frequency notched properties within a controllable bandwidth from 3 to 8 GHz.

V. FUTURE SCOPES

A new UWB patch antenna with matching slots on a thin substrate is presented in this paper. The simulation results show that the antenna maintains a return loss with notched properties, which is viable for UWB applications. Some design correction has to make to attain better return loss and VSWR.

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