Octagonal Shaped Patch Antenna with a Rectangular Slot

Hüseyin Karaağaç
Department of Electrical and Electronics Engineering
International University of Sarajevo, Sarajevo, Bosnia and Herzegovina

Outline

- Introduction
- Previous Works
- Antenna Geometry
- Simulation Results
- Analaysis Results
- Conclusion
- References

Introduction

- Microstrip patch antennas (MPA) are a class of planar antennas which have been researched and developed extensively in the last four decades. They have become favorites among antenna designers and have been used in many applications in wireless communication systems, both in the military sector and in the commercial sector.[1] Microstrip patch antennas are low cost, flexible and highly efficient. Different shapes and sizes of Microstrip patch antennas are available in the field of communication

Introduction

- Microstrip patch antennas are low cost, flexible and highly efficient. Different shapes and sizes of Microstrip patch antennas are available in the field of communication.
- The simulation resulted in the return loss plot and gain plot that satisfy the set requirements. The compact size and affordable materials make the antenna suitable for wide applications.
- The study and the design of octagonal patch antenna is presented in this research paper. We begin first with schematic model of the octagonal patch antenna. After the simulations, a parametric study was studied and we finish by conclusion of our work.

Previous Work

- Kai Fong Lee,Kwai Man Luk andHau Wah Lai, Microstrip Patch Antennas Introduction,vol.2(1), 1-23, August 2017

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Previous Work

- Swagata B. Sarkar, Design and Analysis of Multiband Octagonal Microstrip Patch Antenna with Different Annular Ring Department of Electronics and Instrumentation Engineering, Sri Sai Ram Engineering College, India, vol.1(1), 1, 2016
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Previous Work

- [4] Houda Werfelli, Khaoula Tayari, Mondher Chaoui, Mongi Lahiani, Hamadi Ghariani Design of Rectangular Microstrip Patch Antenna National Engineers school of Sfax Laboratory of Electronics and Technology of Information, vol.1(1), 1 , 2016.

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Antenna Design

- The geometry of the fabricated octagon slot antenna is shown in

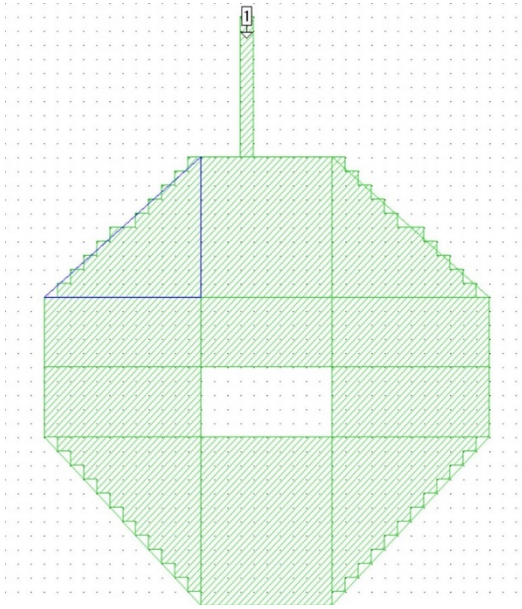

Fig. 1.Picture of top view of the antenna

Antenna Design

- The size of the antenna is 34×32 mm.
- Antenna was designed by feeding it from bottom-center
- The antenna is designed on a dielectric substrate whose thickness and permittivity are 2.2 mm and 1.6, respectively.
- Antenna has a symmetrical structre which means that the denoted lengths and widths are repeatable through the design. Highest gain and the lowest input match were obtained at 3.94GHz.

Analysis Results

The input match (S_{11}) of the antenna is shown in Fig. 2. The input match is less than -10 dB at 3.94 GHz. Fig. 3 has the radiation pattern of the antenna with 5.2 dB co-pol and -15 dB cross-pol

Analaysis Results

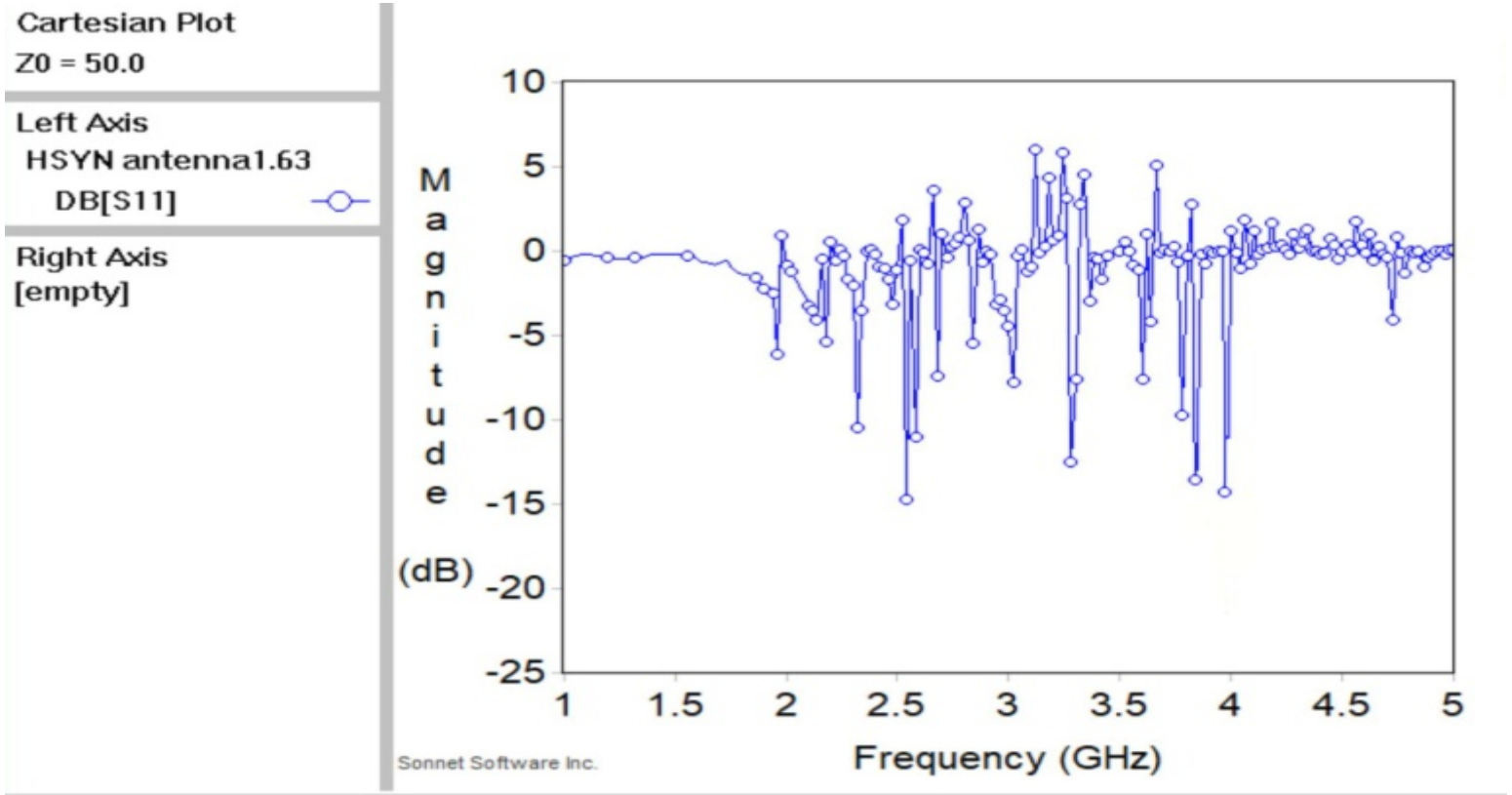

Fig. 2

Analaysis Results

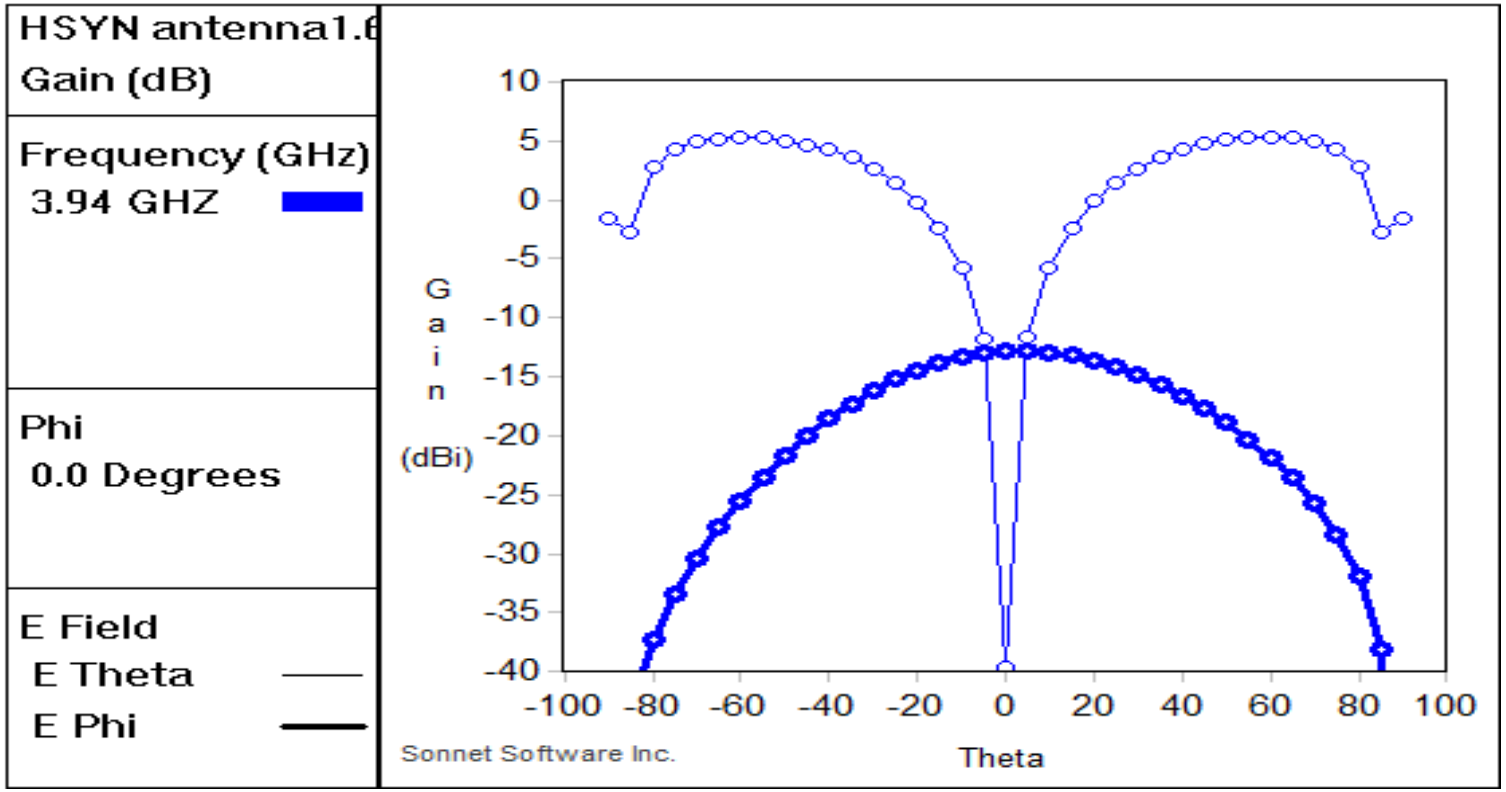

Fig. 3

Analysis Results

- Table I and II show the parametric study of the dielectric. As seen, gain and input match are in acceptable levels for fabrication tolerances.

Dielectric thickness (mm)	1.6	1.63	1.61	1.59	1.57
S11	-12.8	-12.96	-13.98	-12.75	-12.64
Gain(dB)	5.25	5.22	5.30	5.23	5.20

TABLE I: CHANGE OF DIELECTRIC THICKNESS

Dielectric constant	4.4	4.41	4.39	4.38	4.42
S11	-12.8	-13.01	-12.59	-12.39	-13.24
Gain(dB)	5.25	5.28	5.22	5.19	5.31

TABLE II. CHANGE OF DILECTRIC CONSTANT

CONCLUSION

- A wideband octagon patch antenna is designed and simulated.
- According to analysis results:

The antenna operates at 3.94 GHz. At 3.94 GHz

The gain of the antenna is 5.2 dB with -12.8 dB input match

References

- [1] Kai Fong Lee,Kwai Man Luk andHau Wah Lai, Microstrip Patch Antennas Introduction,vol.2(1), 1-23, August 2017
- [2] Swagata B. Sarkar, Design and Analysis of Multiband Octagonal Microstrip Patch Antenna with Different Annular Ring Department of Electronics and Instrumentation Engineering, Sri Sai Ram Engineering College, India, vol.1(1), 1, 2016
- [3] B. Abirami and M. Shalini, “Designing of S shaped microstrip patch antenna for broadband application using slotting technique,” International Journal for Research in Applied Science & Engineering Technology (IJRASET), vol. 4(11), 2321-9653, November 2016
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