**Indonesian Journal of Electrical Engineering and Computer Science**
Vol. 8, No. 3, December 2017, pp. 627 ~ 630
DOI: 10.11591/ijeecs.v8.i3.pp627-630


# Yagi-Uda Antenna for Navigational Aids Using HFSS

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***Abstract***

*In this paper, the ultra high frequency of yagi-uda antenna for navigational has been designed to improve the usable bandwidth by improving the stability of the radiation patterns. The frequency band of ultra high frequency is 300-3000 MHZ. The main aim of this paper is to reduce the loss, improve the gain and also to enhance the efficiency of ultra high frequency yagi-uda antenna for utilizing the navigational aids. The proposed UHF band of Yagi-Uda antenna has been designed by using ANSYS HFSS tool for the application of navigational aids. The characteristics specifications of yagi-uda antenna such as Radiation pattern, S11 (return loss), impedance matching and gain are analyzed in this work.*

***Keywords****: Ultra High Frequency (UHF), ANSYS, HFSS tool.*



## 1. Introduction

A substantial number of research activities have been conducted on the matter of wireless communications that utilizes microwave bands. The vast majority of the wireless networks utilized today are using Omni directional antennas. In 1989, Yagi-Uda antenna design was first recommended by Huang.The antenna proposed had four patches that were electromagnetically coupled to each other. To achieved the maximum gain of 8 dB. This type of developed arrangement has a various points of advantages over single microstrip antennas like increased gain and directivity. A driven patch component and some parasitically coupled reflectors and director patch element.

The narrow-band antenna of yagi-uda has been designed to operate only on FM channel. The gain for its sizes and an equally narrow main lobe (beam) are the best in this antenna. The yagi antenna has been designed as per the design shown below can cover a line of site distance of even 5 KMs with just 1 watt RF power. Normally a Yagi antenna composed of one reflector (in the rear), one driven element and one or more directors.

In this paper, the ultra high frequency band of yagi-uda antenna has been proposed for navigational aids. The main aim of this work to improve the efficiency of the antenna.The main parameters are s-parameter, return loss, VSWR and radiation pattern.

## 2. Literature Survey

[1] Presented a compact yagi-uda antenna to achieve the radiation pattern and also optimized to be straightforwardly fed by a 50 microstrip transmission line with a balun. In the addition of a cavity is incorporated in the back of the substrate to provide low loss, high gain and best efficiency in this antenna. In [2] explained to improve the effects of atmospheric humidity of the antenna. The effect of changes in relative humidity was greater than the polyimide-coated patch antenna devised for use in an RFID tag. Resonant frequencies of antennas in between 28 and 37 MHz.

In [3] presented the triangular Koch fractal on yagi-uda antenna. The frequency of the antenna is 3GHz.The size of the dipole antenna about the mean distance of 0.5λ and it could be able to see the Direction of beam getting reversed, it acts like a phase shifter. In [4-5] explained the horn antenna has advantages to achieve high gain and low VSWR in the mm wave band. To operate at the W-band, the monopole yagi-uda antenna waveguide pyramidal horn antennas are designed with an optimum size 20x20x30mm$^3$ Genetic algorithms based enhanced K Strange points clustering algorithm is dxplainedin [7].

*Received August 2, 2017; Revised October 27, 2017; Accepted November 11, 2017*

### 3. Yagi-Uda Antenna design

The most luminous antenna design is yagi-uda antenna. It is easy to construct and it has a high gain, greater than 10 dB. Normally it operates in the HF to UHF bands (about 3 MHz to 3 GHz) in the yagi-uda antennas, and also small bandwidth new cryptography algorithm with for effective data communication is discussed in [6]. The design of yagi-uda antenna is shown in figure 1. The radiation boundary of yagi-uda antenna is shown in figure 2.

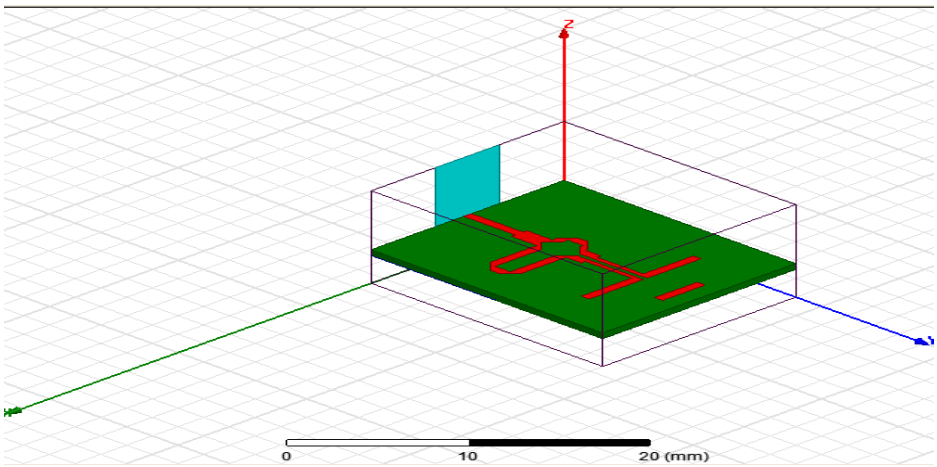


Figure1 Design of Yagi-Uda Antenna

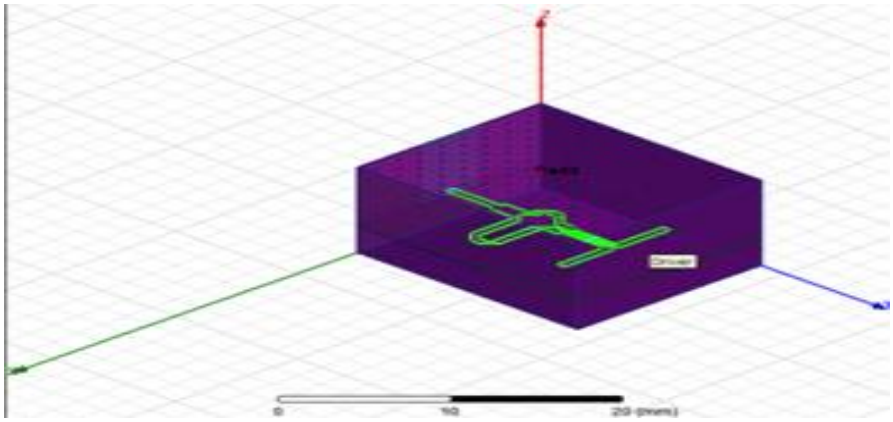

Figure2 Radiation Boundary of Yagi-Uda Antenna

### 4. Simulation Results

The ultra high frequency of yagi-uda antenna result of s-parameter (return loss) is shown in figure3. The result of VSWR is shown in Figure4. The result of impedance and radiation pattern is shown in figure5 and figure6.

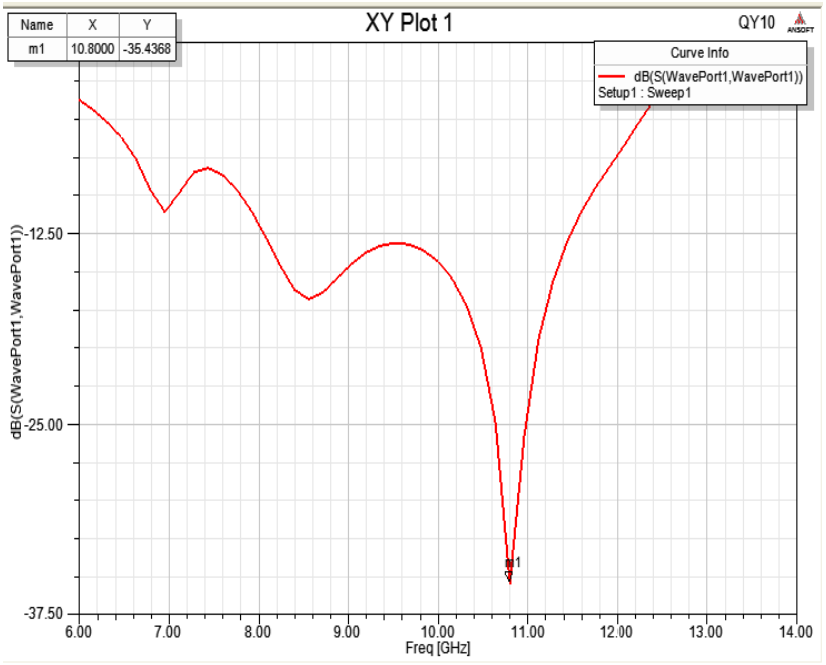


Figure 3. S-parameter (Return Loss)

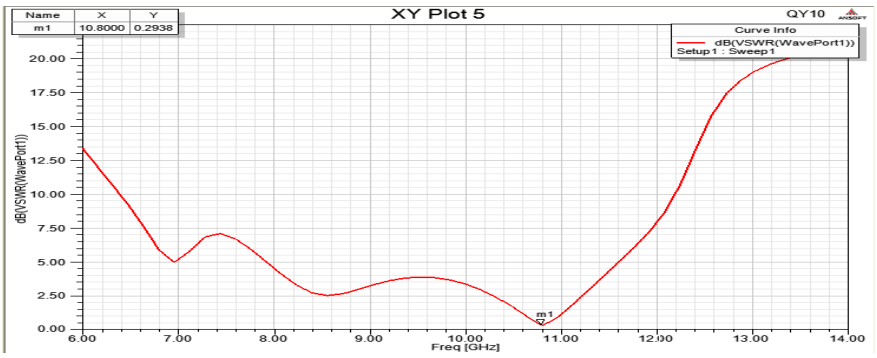


Figure 4. VSWR

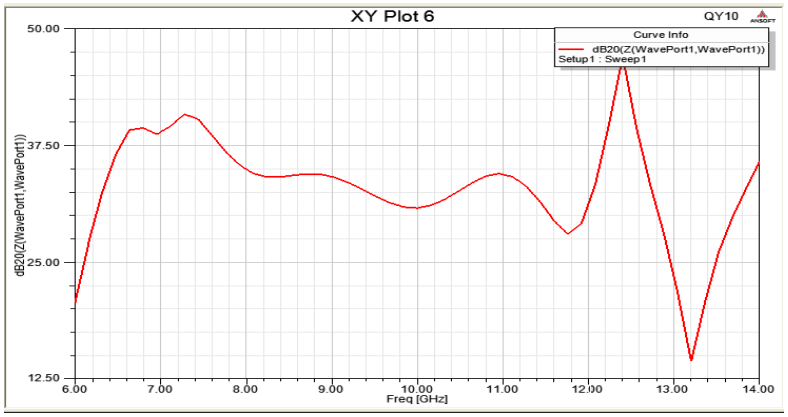


Figure 5. Impedance

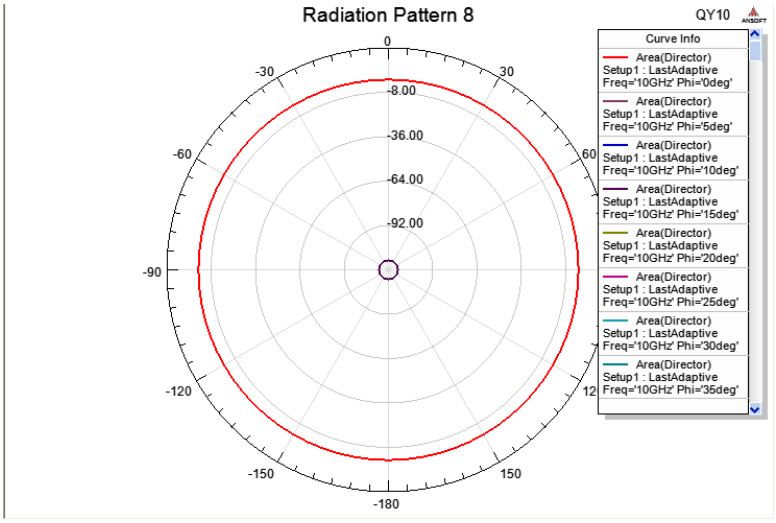


Figure 6. Radiation Pattern

## 5. Conclusion

In this paper, the ultra high frequency of yagi-uda antenna has been designed by using ANSYS HFSS tool for navigational aids. The frequency range of s-parameter is 10.8 GHz and the return loss is -36.43 dB. The yagi-uda design of VSWR is 0.2938.The main goal of this design is to reduce the loss and also improve the efficiency for the application of navigational aids.

## References

[1] He, Y., Oakley, C., Chahal, P., Albrecht, J .and Papapolymerou, J. Aerosol Jet Printed 24 GHz End-Fire Quasi-Yagi-Uda Antenna on a 3-D Printed Cavity Substrate. *International Workshop on Antenna Technology: Small Antennas, Innovative Structures, and Applications (iWAT)*, 2017.

[2] Aliakbarian, H., Hojjat, N. and Lucas, C. Beam Shaping of Yagi-Uda Antenna using Genetic Algorithm. *IEEE*. 2017.

[3] Cao, X., Gong, Z., Yi, Y., Wang, B.and Wan, X. Design of a Dual-Polarized Yagi-Uda Antenna for the Passive Radar. *IEEE*, 2016.

[4] Rajeev kumar, N. and Radhakrishnan, R. Design and Simulation of S Band Triangular Koch Fractal based Yagi-Uda Antenna. *A Workshop on Advanced Antenna Technology, Indian Antenna Week (IAW)*. 2016.

[5] Park, D.H. Design of Millimeter-wave Monopole Yagi-Uda Fed Waveguide Pyramidal Horn Antennas. *IEEE*. 2017.

[6] Ganesh Kumar, K., Arivazhagan, D. New cryptography algorithm with for effective data communication. *Indian Journal of Science and Technology*. 2016; 9(48), 108970.

[7] Johnson, T. and Singh, S. K. *Genetic algorithms based enhanced K Strange points clustering algorithm*. In Computing and Network Communications (CoCoNet), 2015 International Conference on. IEEE. 2015, December; 737-741.