Unbalanced Fed Planar Inverted L Antenna

Mitsuo Taguchi Koya Takata
(Graduate School of Engineering, Nagasaki University)

1. Introduction

In recent years, due to the development of wireless communication technology and sensor network, a lot of frequency bands are used. In the VHF frequency band from 30 MHz to 300 MHz, a small antenna size is desired. The authors have proposed an unbalanced fed ultra low profile inverted L antenna [1]. In order to extend the return loss bandwidth, the authors have changed the coaxial cable of the inverted L antenna to a planar conductor [2]. Then, the shape of planar conductor of antenna reported in [2] is modified to a rectangular shape [3]. This antenna is excited by a delta-gap generator between two conducting plane.

In this paper, the coplanar waveguide (CPW) is inserted between the feed point and the bend at the ground plane of the antenna in [3] in order to realize the feed line on the conducting plane. The center conductor of CPW is connected to the conductor of antenna end. In the numerical analysis, the electromagnetic simulator WIPL-D based on the Method of Moments is used [4].

2. Analytical model

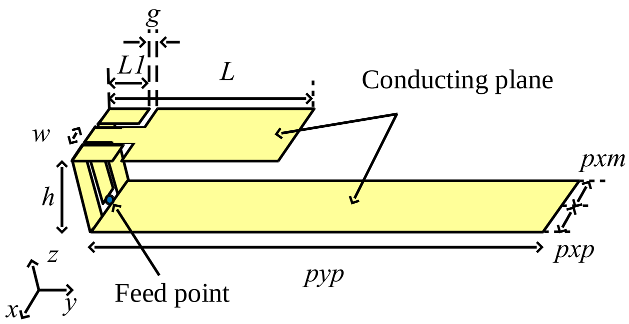
Figure 1(a) shows the structure of the proposed antenna. Figure 1(b) shows the structure of the offset fed planar inverted L antenna previously reported in [3].

3. Numerical results and discussion

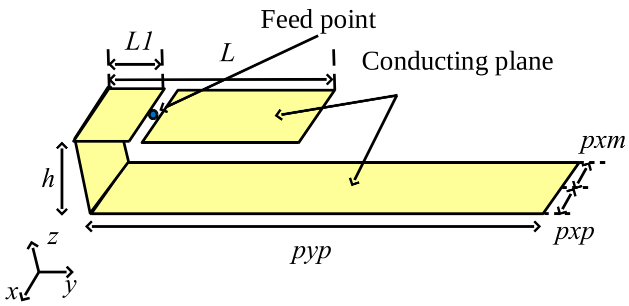
Figure 2 shows the S11 characteristics of two antennas. The S11 characteristics of two antennas are almost same. Figure 3 shows the directivity characteristics of two antennas. The directivities of two antennas are almost same. Therefore, two antennas are equivalent.

4. Conclusion

The unbalanced fed planar inverted L antenna is proposed and numerically analyzed. When the antenna size is 580 mm by 100 mm by 80 mm, S11 less than -10 dB is satisfied and from 174 MHz to 301 MHz. At this frequency band, the directivity becomes 2.35 dBi to 3.96 dBi.



(a) Proposed antenna.
L = 245 mm, $L1$ = 40 mm, h = 80 mm,
pxm = pxp = 50 mm, pyp = 580 mm, g = 4 mm, w = 50mm



(b) Offset fed planar inverted L antenna.
L = 270 mm, $L1$ = 40 mm, h = 80 mm,
pxm = pxp = 50 mm, pyp = 580 mm

Fig. 1 Structure of proposed antenna.

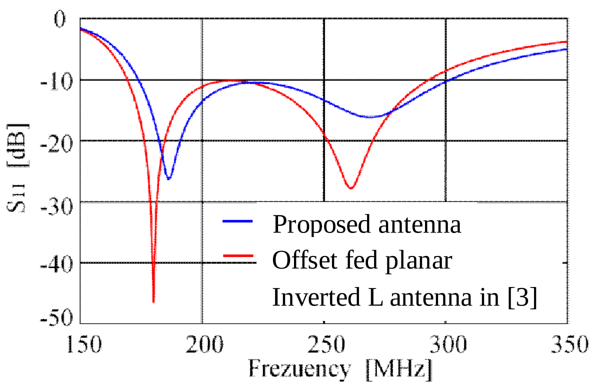


Fig. 2 S_{11} characteristics of two antennas.

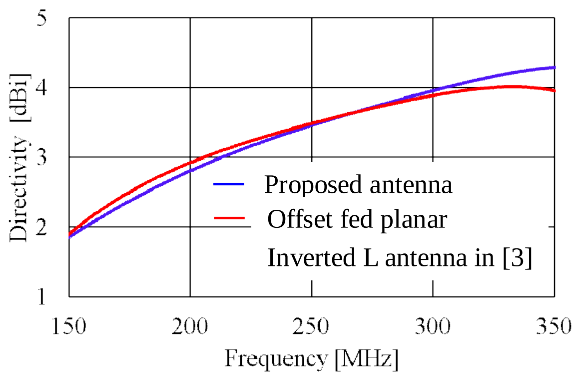


Fig. 3 Directivity characteristics of two antennas.

References

[1] T. Yamashita, M. Taguchi, Proc. of ISAP 2009, pp.361-364, Oct. 2009.

[2] M. Taguchi and K. Takata, Technical Report of ITE, BCT2015-17, Jan. 2015 (*in Japanese*).

[3] K. Takata, M. Taguchi, Proc. on 2016 IEICE Gen. Conf, B-1-53, Mar. 2016 (*in Japanese*).

[4] WIPL-D Pro v11.1: http://www.wipl-d.com.