Design of the Wideband MB Antenna for UWB Systems

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Abstract— In this paper, we propose a new ultra wideband MB antenna for UWB applications. The proposed antenna can designed to operate from 3.2 to 12 GHz.
WBMB antenna can be designed for UWB signals in the frequency range of 3-10 GHz with a bandwidth in excess of 1.5 GHz. The antenna has omnidirectional pattern and nearly consistent group delays across its bandwidth.

Keywords- MB antenna, UWB, Planar monopole.

I. INTRODUCTION

UWB wireless technology allows transmission of data at high rates using very short pulses with extremely large bandwidths. This implies that UWB antennas should exhibit an ultra wide bandwidth in the frequency range of 3.1-10.6 GHz, allocated by the Federal Communications Commission (FCC). The large bandwidth of UWB signals can cause distortion of UWB pulses. Several broadband monopole antennas have been proposed [1]. However, since the ground plane in these antennas is perpendicular to the radiating element, these antennas are non-planar structures.
In this paper, we present a planar broadband monopole with no ground plane. The proposed antenna is a based on the MB antenna (MBA), ,recently presented by the authors [2, 3]. The antenna's parameter are close to those of a tuned dipole at each frequency, and it causes very small distortion on transmitted USB pulses.

II. THE PROPOSED ANTENNA

The proposed antenna is a version of the MBA, designed for UWB systems. MBA is a monopole radiator with half-wave delay line. In the wideband version of MBA (WBMB), the delay line is replaced by a second radiator, such as folded dipole [4]. Fig. 1 shows the structure of the proposed antenna. The antenna consists of a monopole radiator of quarter wavelength at fundamental frequency F, and a folded dipole whose perimeter is half wavelength at F. The folded dipole serves as delay line of the monopole and a second radiator that radiates at 2F. The antenna's dimensions are given in Fig. 1. Fig. 2 shows the simulation results for the far-field of the antenna measured at a distance of 1m from the antenna. As shown in Fig. 2, the antenna exhibits a very wide bandwidth of several GHz.

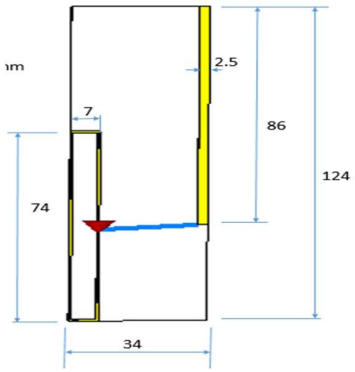

Figure 1. The structure of the proposed antenna

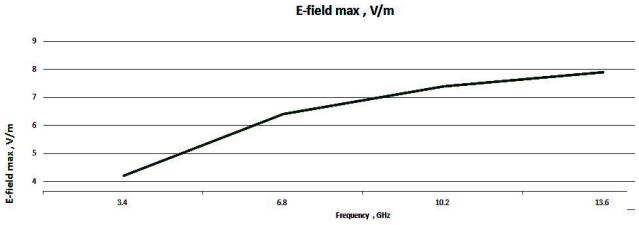

Figure 2. The far-field of the proposed antenna (simulation).

III. CONCLUSIONS

A novel planar UWB antenna is proposed. The antenna is a compact ground-less monopole, whose parameters are close to those of a tuned dipole. The proposed antenna can be the basis for developing different omnidirectional wideband antennas at frequencies up to 20 GHz.

REFERENCES

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