Design of Two Flare UWB Antenna dedicated to the Research of Alive Buried Victims

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***Abstract*— This document presents the antenna design for the detection of alive victims buried under thick layers of rubble. The antenna is used with UWB Radar techniques in order to locate buried alive victims. The detection is based on the signature of alive persons by using Doppler analysis of movements and respiration. Detecting victims in this environment is very difficult due to the large dynamic range of signal levels. In fact, the reflected signal caused by the buried alive victim is very low behind other reflected or disturbing signals such as mobile phones, vegetation movements, water, rescuers… A two flares UWB antenna, light weight and easy transportable has been specially design for the research of buried victims beneath building rubble. This paper focuses on antenna design, simulation and measurement. These measurements have been made by IETR and CEA. The experimental results show a good comparison between measurements and simulations.**

I. INTRODUCTION

This work lies within a project called the VIPERE project (Visualisation de PERsonnes Ensevelies in French) and was supported by ANR (French National Agency for the Research). The goals of this research project are to detect alive victims buried under thick layers of rubble after earthquakes [3], [4].

The antenna, especially design for the VIPERE project, was optimized using CST (Computer Simulation Technology) software. The design and simulation of the antenna was difficult due to strong specifications. In fact, the antenna has to be compact and very slight in order to be easily transportable. It also has to have a 300 MHz to 3 GHz bandwidth with good impulse response, a front to back ratio better than 10dB and an average gain of 10dB.

II. THE TWO FLARE ANTENNA

A. Realization of the prototype

A two flares UWB antenna has been selected for the project [1], [2]. This compact antenna uses a symmetrical flare shaped tongue as radiator and a curve plane as reflector like it is showed in figure 1.

During measurements, a balun is used to feed the two ports of the antenna.

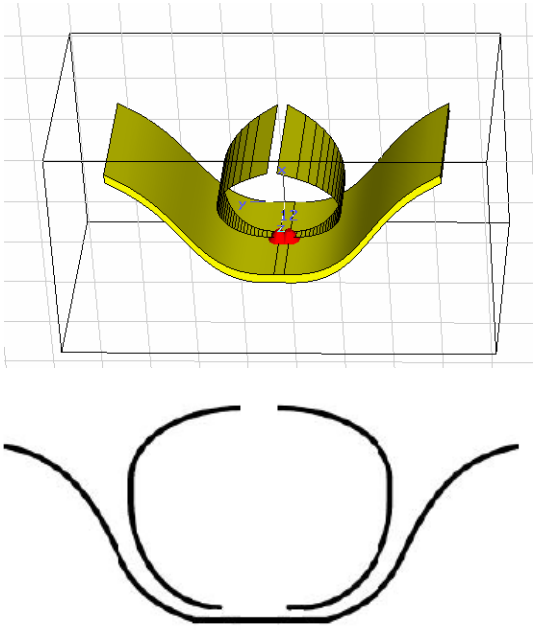

Fig. 1 The optimised two flare antenna with CST

To build this antenna, foam is used as a framework to give their shape to copper sheets (the two central flares and the back reflector). The foam is electrically close to air properties (ε_r=1.1). This material ensures the strength and the lightness of the whole antenna. An exploded view of the prototype is presented on the Figure 2 and the realized antenna is showed in Figure 3 (see in figure 2).

The realized antenna has a small size (220 mm x 300 mm x 210 mm) and weights 1.1 kg.