International Journal of Electrical & Electronics Research (IJEER)
Volume-1, Issue-1, Pages 1-3, June 2013, ISSN: 2347-470X

DIELECTRIC LOADED RECTANGULAR MICROSTRIP PATCH ANTENNA AT 1.5 GHz

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ABSTRACT

The purpose of this paper is to show the effect of soil which is used as a loaded material on microstrip patch antenna operated at 1.5 GHz. In this paper different type of soil are taken & compare their effect when it is wet & dry. For this purpose the device IE3D simulator, Spectrum Analyser (FS315) and tested soil from soil lab. From this experimental result here show that how much signal absorbed when it loaded.

Keywords

IE3D, Spectrum Analyzer, lossless cable, PCB.

1. INTRODUCTION

In this paper for designing of rectangular Microstrip patch antenna, IE3D simulator is used which is a full wave 3D electromagnetic simulator based on MOM method. Microstrip patch is light weighted, low cost & easy to handle when it is loaded with any material. It also reduces time for design of other device which are used in microwave communication like filter, power divider, quarter wave transformer etc.

2. DESIGN & OUTPUT PERFORMANCE

A Microstrip patch antenna consists of radiating patch on one side of a dielectric substrate & other side is ground plane as shown in Fig1. The size of the patch depends on wavelength and thus the Microstrip patch antenna classified as resonant antenna. The radiating patch can be of any shape & size. In this paper design used is of rectangular shape whose design parameter are as follows L=44.42mm, W=57mm, $\varepsilon_r = 4.4$, loss tangent =0.02 and output performance is shown in fig2.

3. TYPES OF MATERIAL

There are three type of soil are used as loaded material for antenna from different places .Out of these three, two are tested from geo laboratory & one taken from garden of collage campus.

Fig1. Design of rectangular microstrip patch antenna

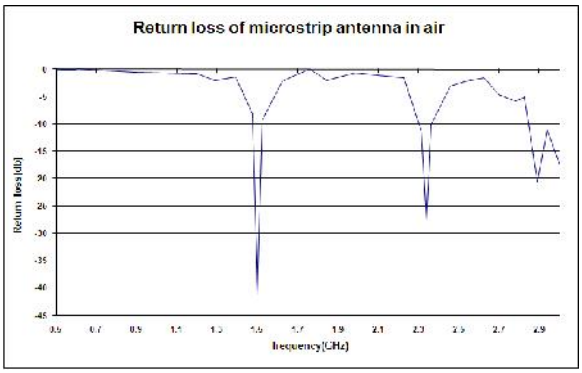

Fig2. Variation of return loss with frequency of antenna without loaded

When the antenna is loaded with dry material performance of antenna are shown in fig3, fig4, fig5.

When it is treated with wet different type of soil the performance of antenna as shown in fig 6, fig 7, fig 8

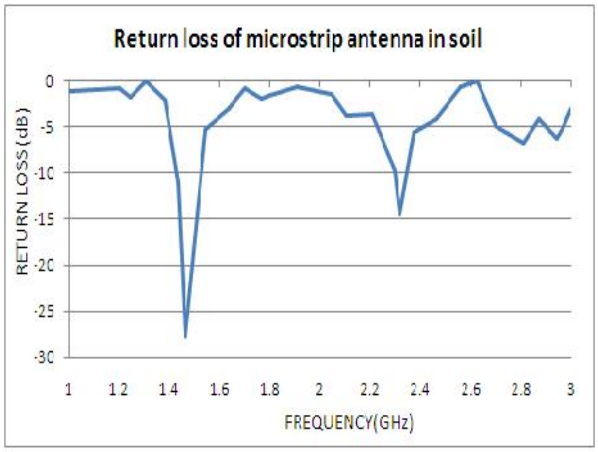

Fig 3 performance of antenna with garden soil

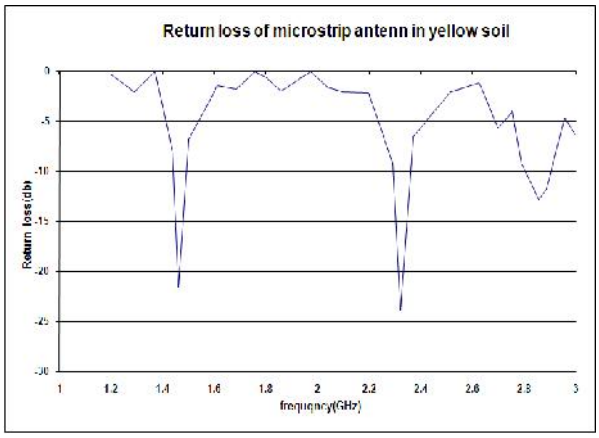

Fig 4. Performance of antenna with yellow soil

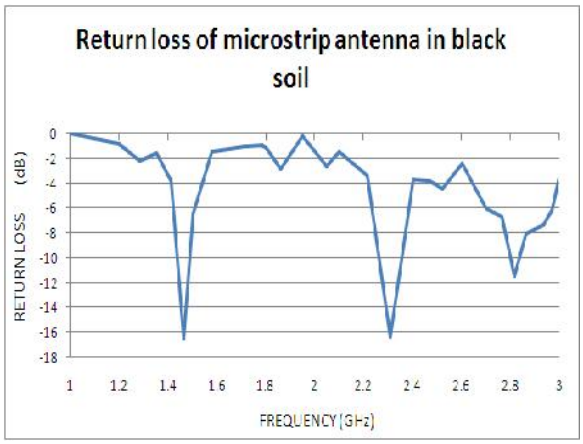

Fig 5. Performance of antenna with black soil

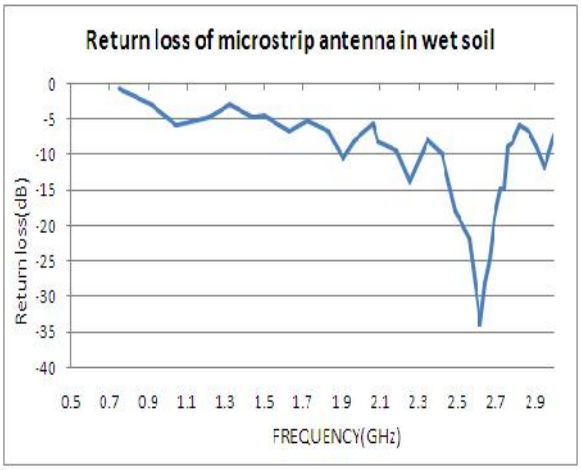

Fig 6 performance of antenna with wet garden soil

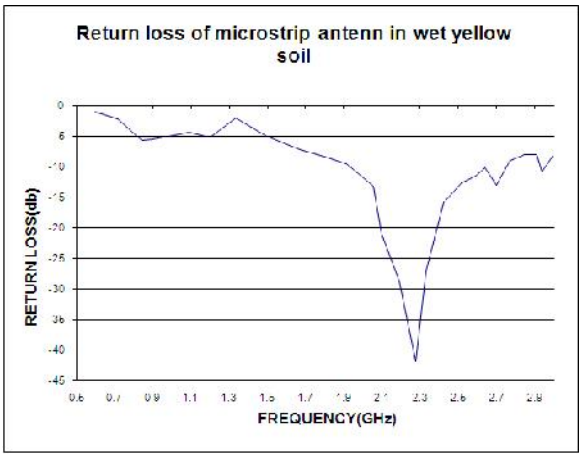

Fig 7 performance of antenna with wet yellow soil

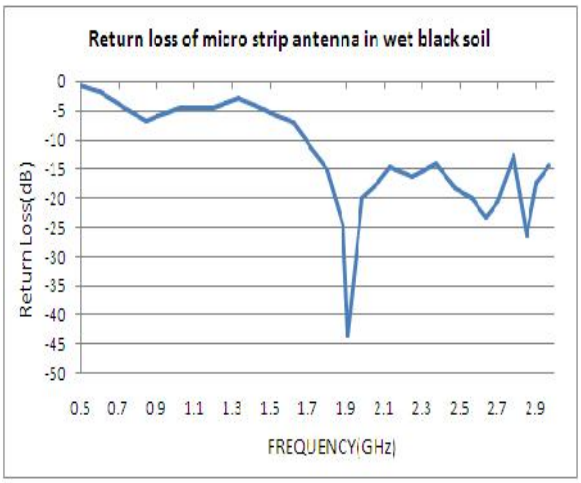

Fig 8. Performance of antenna with wet black soil

Set up use for analysis which contains spectrum analyzer, coaxial cable, antenna with jar as shown in fig 9.

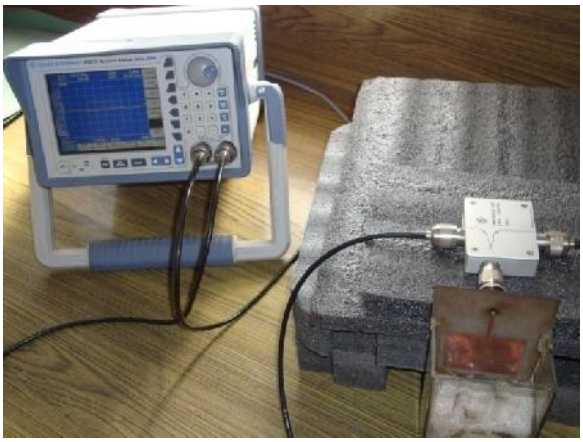

Fig 9. set up use for experiment

4. CONCLUSION

When antenna is not loaded then it give the resonant frequency of 1.5GHz .When it is loaded with dry soil then resonant frequency shifted toward lower frequency and when it is loaded with wet soil then bandwidth is increased & also increase resonant frequency.

5. REFERENCES

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