

Circular Patch Antenna Design Using Genetic Algorithm

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Abstract— Microstrip patch antenna is sophisticated in morphology. To intensification the antenna composition, genetic algorithm is capitalized. Genetic algorithm is united to Matlab software and correlated for the antenna. In view of this dissertation circular patch antenna is capitalize and optimized for the assist of the genetic algorithm that assist in upgrade the bandwidth of the antenna. The accuracy and suitability of this method is untangled by optimizing the sole criterion of the Microstrip patch antenna to obtain the bandwidth value of 19%.

Keywords— Micro strip antenna, Broad band antenna, Genetic Algorithm, optimization, E-shape and H-shaped patches, Matlab.

I. INTRODUCTION

Current momentarily humankind wireless communication are very ponderous meed of the diurnal life. Microstrip Patch antenna is most universally used in the wireless communication for their very ponderous specification like low cost, low weight and efficiency. Vigorous with all this advantage it's have one disadvantage is its narrow bandwidth.

With the multitudinous sprouting in the wireless communication, the Microstrip patch Antenna exigency more attention and its design in more difficult. In such a way, higher values are used for the design of the Microstrip patch antenna. In behalf of which the exploit and bandwidth of the Microstrip patch antenna get affected. Swamped, this problem of design in Microstrip patch antenna method have been applied but none of it's able to reduce the awkwardness of design of antenna due to which they were not able to achieve wide bandwidth of the Microstrip patch antenna.

To such a degree, genetic algorithm is the used because they are adapted for manipulation of high number of stipulation which other method are not able to handle. With the mobilization of genetic algorithm in Microstrip patch antenna it's deign become simple. In this critique, circular Microstrip patch antenna is design using genetic algorithm. The design process is carried in Matlab by utilizing the genetic algorithm and thus, optimizing the design and bandwidth of the Microstrip patch antenna.

II. DESIGN APPROCH

A. Configuration of Antenna

The common form of antenna is shown in fig 1. It repose of a radiating patch and dielectric substrate. The acreage of the MPA are control by the length, width and height. The length controls the frequency at which antenna resonant. The width controls the input impedance of the MPA. The height controls the bandwidth of the antenna.

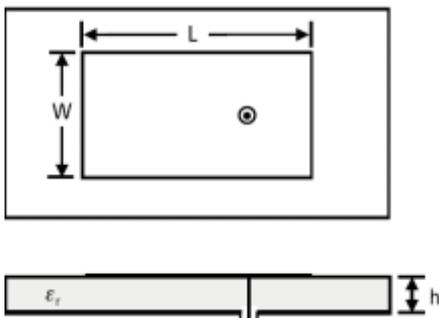


Fig 1. Geometry of antenna

In this analysis, the antenna are designs with the help of cavity model in which the space between the patch and substrate are called the cavity. When the feeding point is correlated to the design of the antenna, the proprietary of the antenna are changed. As the antenna design depend upon the length, width and height, these proprietary is to be optimizing to obtain the required antenna with broad bandwidth.

B. Optimization strategy

In view of this, design of the antenna the suspicion is to optimize the proprietary of the antenna and thus obtain the required bandwidth. The design of antenna institutionalize the length, width and height. In this place to optimize the properties of the antenna given above genetic algorithm are used.

Thereupon to obtain it genetic algorithm is introduced into this design. Now as we know genetic algorithm are superimpose from biological process of natural selection and genes. The genetic algorithm consists of two posture of process they are initiation, reproduction and replacement. The first process initiations are used for the initiations of the population for the generated parameter or chromosomes. Every chromosome represents the parent chromosomes or single solution. Every population is assigned with the fitness function to calculate the fitness value of each single parent. The second process is the reproductions, which is used to develop the new generation from the old ones. The last is replacement in which the old ones is replaced by new ones.

C. Optimization Procedure

Here is the process of optimization which is used in the design of the antenna

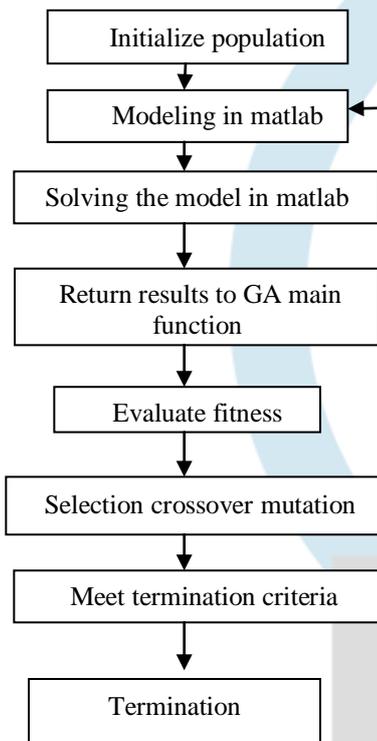


Fig. 2 A block diagram of genetic algorithm function used in this design

The optimization procedure in this design is summarized as follow:

Step1. Accomplish the population randomly with the starting point of the optimization with chromosome.

Step2. Determine the given bandwidth and note down the initial values of length, width and height of the Microstrip patch antenna for every chromosome in the population.

Step3. Generate the new population by continuous following the step till the new population is generating for the given Microstrip patch antenna.

Step4. Prefer the two parent chromosome to create the new child chromosome for the given antenna.

Step5. Crossover the old chromosome with the new child chromosome for the given antenna.

Step6. Placed each new child chromosome into the each position in the chromosome.

Step7. Removed old chromosome with the new chromosome.

Step8. Accepted the new chromosome for further run.

Step9. Test for the end and stop, if not ok repeat the step2.

D. OBSERVATION AND RESULTS

Following are the field and Radiation pattern for Rectangular Micro strip antenna

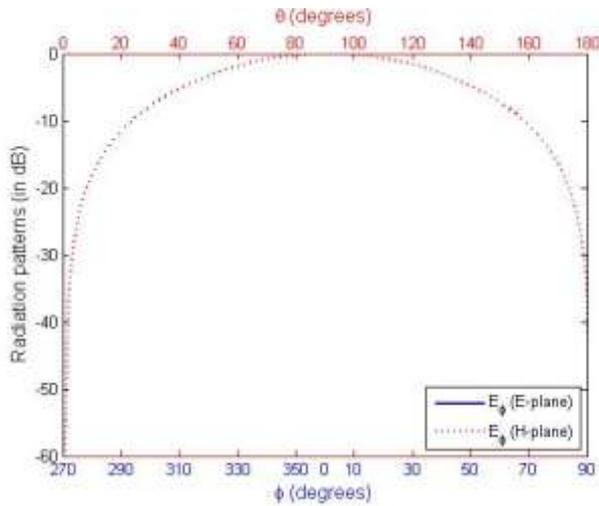
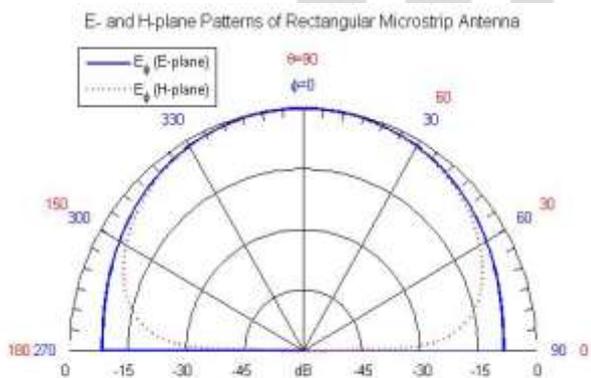


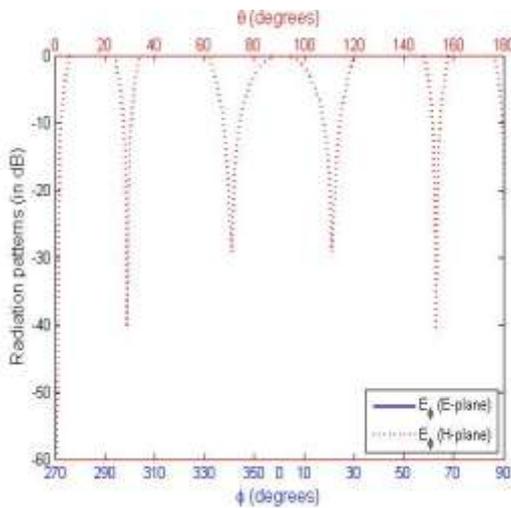
Figure (3)

The input criterion which are given for the design of the Microstrip patch antenna are length, width and height of the substrate. The valve are given as 1) length=2cm 2) width=2cm 3) dielectric constant=2 4) height=20cm. by using the genetic algorithm in the matlab circular Microstrip patch antenna are design and their radiation pattern are obtain.

The fig show that the optimized radiation patterns of the circular Microstrip patch antenna are obtains. From the fig we can see that, the radiation pattern of the antenna change as we change the criterio of the antenna. The bandwidth is capture by putting the minimum value of the height of the antenna and we get the optimized value of the bandwidth of the antenna. Use of the genetic algorithm in the design of the antenna is more effective to obtain the required bandwidth than from any other method of optimization



Figure(4)



Figure(5)

Output parameter

Physical radius of the patch (cm) = 2.3546

Effective radius of the patch (cm) = 2.6107

E-plane hpbw (in degrees) = 112.0000

H-plane hpbw (in degrees) = 80.0000

Directivity of circular patch (dimensionless) = 4.7862

Directivity of circular patch (dB) = 6.8000

E. CONCLUSION

The circular Microstrip patch antenna is design using genetic algorithm in the MATLAB is recommended in this paper. The genetic algorithm is united with the MATLAB and correlated to the antenna. Optimization erector are also enclosed in this dissertation. There are three framework which is optimized are length, width and height and dielectric constant to obtain the optimized bandwidth value. The genetic algorithm is efficient of handling large number of variables. In future GA can be used with different software for the design of the antenna and also while using the genetic algorithm a care should be taken that generation and the pop size should not increase.

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