

An Extended Approach for Optimizing Antenna

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Abstract

In this research paper, we present extended approach of optimizing antenna system. The optimizing to find better result of bandwidth frequency in different types of parameter. In optimized antenna most of the parameter kept same but few parameters have changed and we get wider bandwidth as compare to default designed Microstrip patch antenna. That is show the Comparison between Default and Optimized Antenna and Comparison in Gain and VSWR

Keywords: Optimize Antenna, Microstrip, Gain, VSWR, Parameter, Bandwidth.

INTRODUCTION:

In this research paper, Antenna is optimized based on the results obtained in different types of parameter and used of different types of frequency. The aim of optimization is to obtain better Bandwidth, gain and

VSWR. We select only that specification where we get better results after the parametric studies .The varied parameters specification after optimization is shown in Table 1.

Table 1: Optimized Parameters

Parameter	Label	Dimension (mm)
Height of Air Substrate	h	5 mm
Probe Radius	Pr	0.4 mm
Separation Distance	d	0.75 mm
Width of Feed strip	t	1.2 mm
Length of Feed strip	s	3.6 mm
Length of First Slot	L1	6.2 mm
Length of Second Slot	L2	Mm

1. S-Parameter Display for optimized microstrip patch antenna

Figure 1 shows the S-parameter of optimized Microstrip patch antenna. In optimized antenna most of the parameter kept same but few parameters have changed

and we get wider bandwidth as compare to default designed Microstrip patch antenna. This optimized antenna has return loss of -37.00 dB and frequency band from 5.09 GHz to 7.52 GHz which gives the bandwidth of 2.43 GHz.

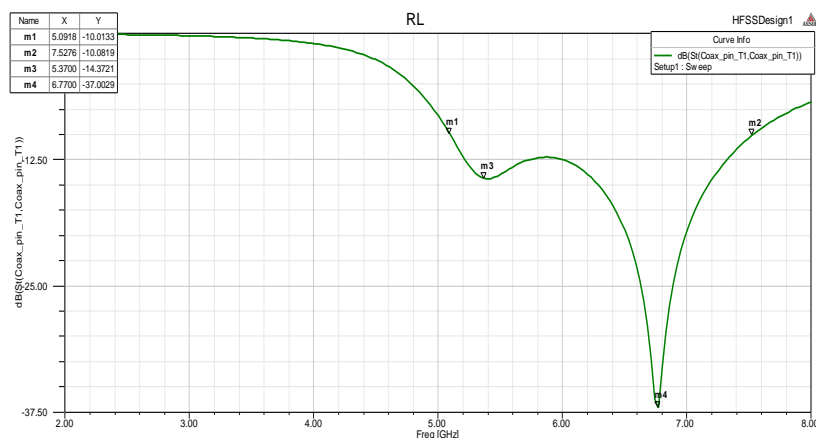


Figure 1: S-parameter of optimized Microstrip patch antenna

2. Gain, VSWR and radiation pattern for optimized antenna

The gain measure for Microstrip antenna is 5.15 dB as shown in Figure 3. A perfectly matched antenna would have a VSWR of 1:1. This ratio indicates how much

power is reflected back or transferred into a cable. VSWR is closely related to S11 the line impedance set in this paper is 50 Ω. Figure 2 shows the VSWR value is 0.22 dB. Figure 4 show the radiation pattern for the antenna.

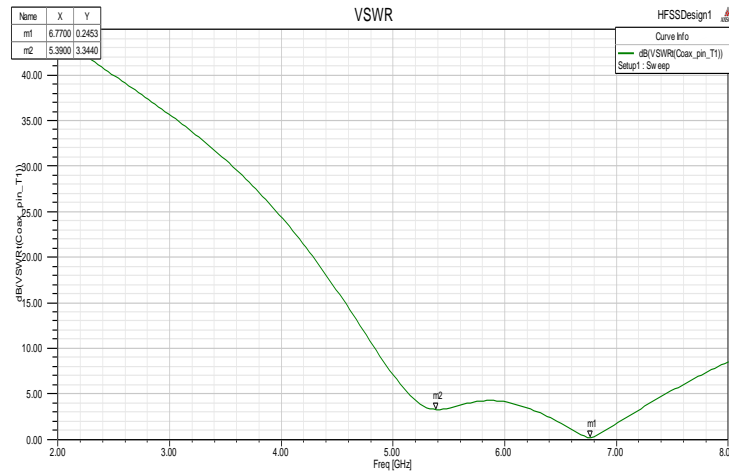


Figure 2: VSWR of optimized Microstrip patch antenna

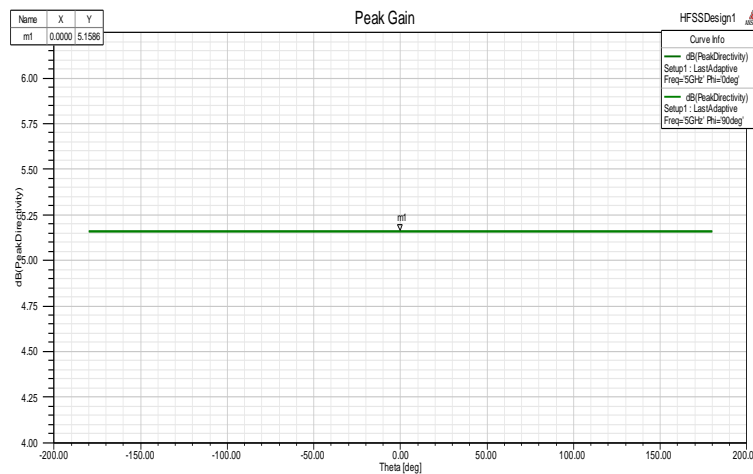


Figure 3: Peak Gain of optimized Microstrip patch antenna

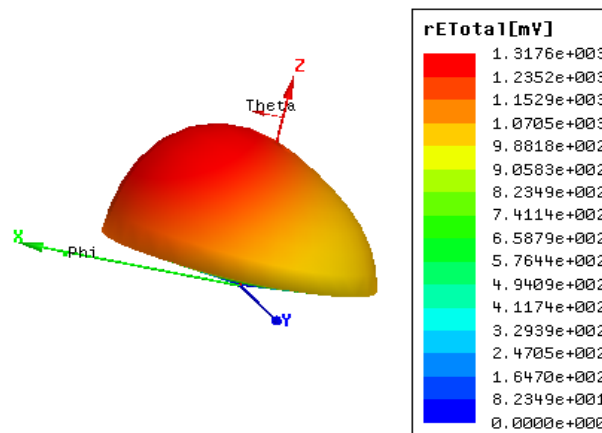


Figure 4: Radiation pattern of optimized Microstrip patch antenna

3. Comparison Between Default and Optimized Antenna

4.1. Improvement in Bandwidth

Figure 5 shows S11 parameter for the default antenna and the optimized wideband antenna.

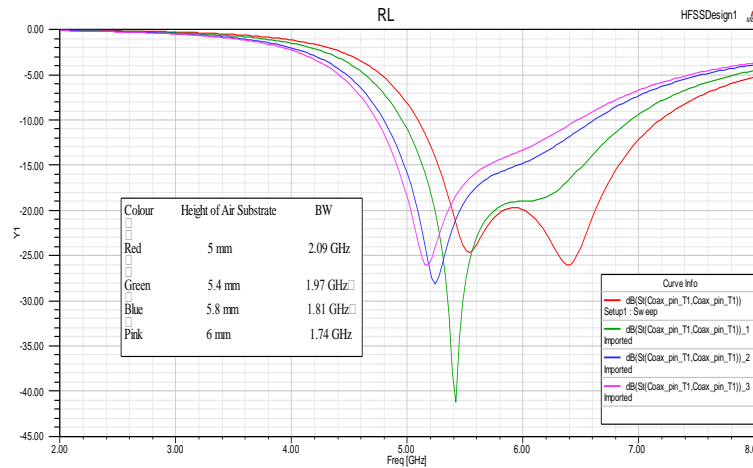


Figure 5: S11 of various size of substrate

The frequency bands for all the two antenna design are shown below. We get 39.65 % BW enhancement.

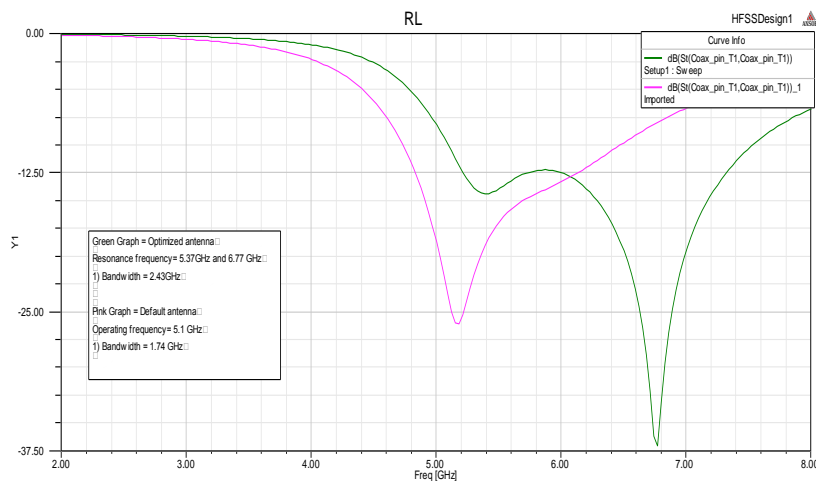


Figure 6: Comparison between S-parameter of optimized and Default Microstrip patch antenna

Table 2: Comparison between Optimized and default antenna BW

Antenna	Optimized antenna	Original Antenna
Graph Colour	Green	Pink
BW (GHz)	2.43 GHz	1.74 GHz

4.2. Comparison in Gain and VSWR

Figure 7 shows the VSWR comparison of default specification antenna and the optimized antenna. VSWR is a measure of how well matched an antenna is to the cable impedance. A perfectly matched antenna would have a VSWR of 1:1. This ratio indicates how much power is reflected back or transferred into a cable. VSWR is closely related to S11 the line impedance set in this project is 50 Ω. For default specification, the lowest VSWR value is 0.86dB for 5.18 GHz while for optimized

antenna acquires the lowest VSWR of 0.22 dB and 3.34 dB at the Resonance frequency of 5.39GHz and 6.77 GHz. Figure 8 shows the Gain comparison of Optimized and Default antenna. The gain measured for default design at its most optimum frequency is 4.6216 dB and the gain measured for Optimized antenna is 5.15 dB not much difference but obtain better gain with optimized antenna. So Optimized antenna is much efficient than default antenna.

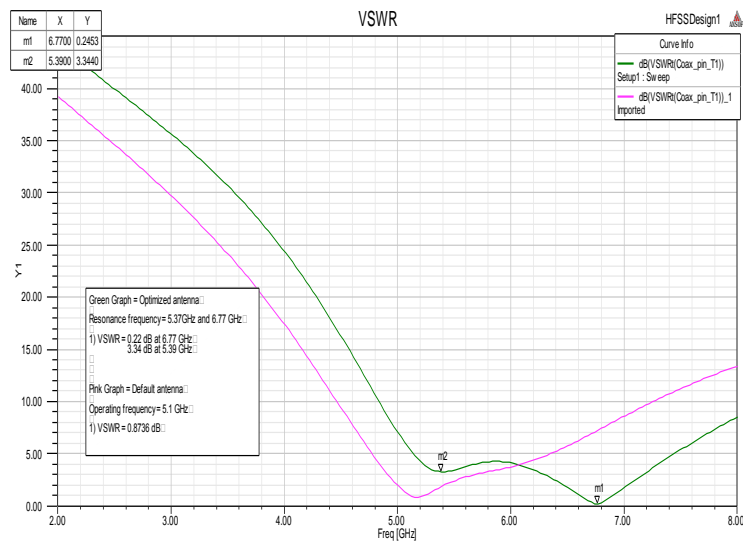


Figure 7: Comparison between VSWR of optimized and Default Microstrip patch antenna

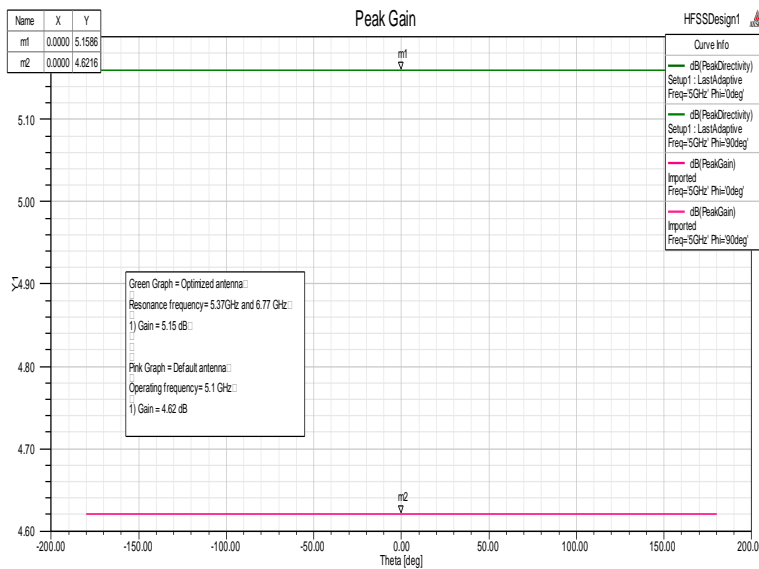


Figure 8: Comparison between Peak Gain of optimized and Default Microstrip patch antenna

5 Result and Conclusion

Table 3: Comparison between Optimized and default antenna BW

Antenna	Optimized antenna	Original Antenna
BW (GHz)	2.43 GHz	1.74 GHz

So finally the optimized Antenna bandwidth becomes 2.43GHz from 1.74GHz. The frequency bands for the entire two antenna studied .We get 39.65 % BW enhancement.

For default specification, the lowest VSWR value is 0.86dB for 5.18 GHz while for optimized antenna acquires the lowest VSWR of 0.22 dB and 3.34 dB at the Resonance frequency of 5.39GHz and 6.77 GHz.

The gain measured for default design at its most optimum frequency is 4.6216 dB and the gain measured

for Optimized antenna is 5.15 dB not much difference but obtain better gain with optimized antenna. So Optimized antenna is much efficient than default antenna.

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