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Design of ultra-wide band fractal microstrip antenna

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Abstract
In this paper this fractal structure is executed on hexagonal C and a few cycle is applied on beginning shape. This reception apparatus has lowprofile, lightweight and is anything but difficult to be manufactured and has effectively exhibited multiband and broadband qualities. The mimicked outcomes showthat proposed reception apparatus has excellent execution in impedance transmission capacity and radiation design.

Keywords: ultra-wide band fractal microstrip antenna

Introduction
Present day media transmission framework require radio wires with more extensive data transfer capacity and littler measurements than ordinarily conceivable. This has started reception apparatus research in different ways, one of which is by utilizing fractal molded radio wire components. There are a significant connection between radio wire measurements and frequency. This connection states on the off chance that reception apparatus size is not exactly $\lambda/4$ (λ is frequency) at that point receiving wire isn't productive on the grounds that radiation opposition, addition and data transfer capacity is diminished and consequently radio wire size is expanded. Fractal math is an awesome answer for this issue. These structures are perceived by their self-closeness properties and fragmentary measurement. In the ongoing years, the mathematical properties of self-comparative and space filling nature has propelled reception apparatus configuration architects to embrace this calculation a reasonable choice to meet the objective of multiband activity. Fragmentary measurements, self-comparative and scaling properties, describe these structures. The structures that are concentrated as radio wire are not the ones that we got after vast cycle yet those after limited emphasess as wanted by the originator. The space filling property lead to bends that are electrically long yet fit into a minimal physical space. This property can prompt the scaling down of recieving wires [1-4].

In various papers, microstrip fractal radio wire has been concentrated in more cases, Sierpinski fix structure has been utilized that various investigates have been done on size, dielectric layers and feed [5–7]. In this paper a newhexagonal fractal is introduced. This new fractal reception apparatus has high data transfer capacity and great properties.

Antenna characteristics
Figure 1 shows the base shape of hexagonal fractal and its first and second iterations. In this paper only the first and the second iterations are considered since higher order iteration do not make significant effect on antenna properties.

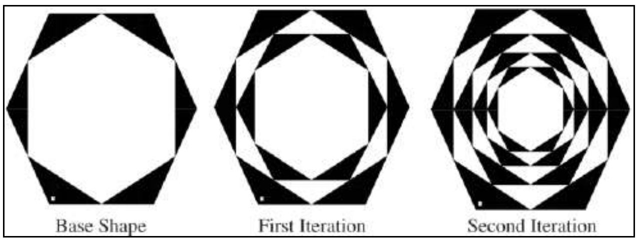

Fig 1: Hexagonal fractal

For this newfractal antenna, the length of each side at hexagonal is 3 cm and a substrate with $\varepsilon r = 2.3$ and h = 2mm thickness. Microstrip line with W = 1mm wide and copper material placed on the substrate. Dimensions of ground plate are 7 × 7 cm.

Location of the coax feed placed on the patches which is 1mm from the each side at the corner. Figure 2 shows the structure of antenna on the dielectric layer.

Simulation results

The MOM (method of moment) is used to analyze this antenna with MWO (microwave office) software.

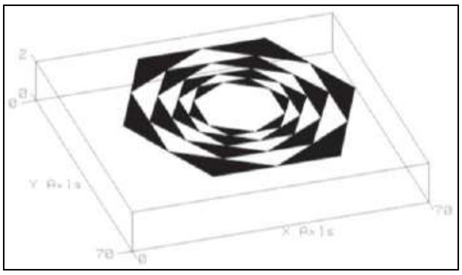

Fig 2: Antenna structure

Figure 3 and Figure 4 depict the S_{11} (return loss) and VSWR (voltage standing wave ratio):

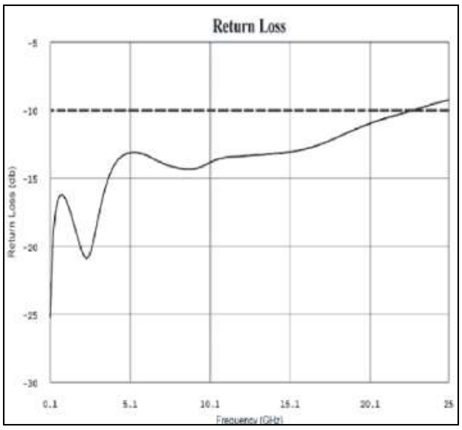

Fig 3: S_{11} (return loss)

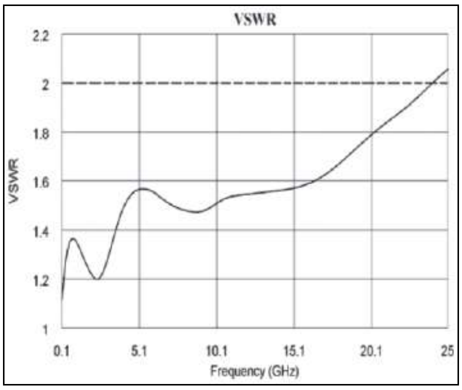

Fig 4: VSWR (voltage standing wave ratio)

The above figures showthat, this antenna is broadband and applied in all frequencies (0.1 GHz–24 GHz) since in these frequencies the $S_{11} < -10$ dB and VSWR < 2. Figure 5 and Figure 6 depict the real and the imaginary parts of input impedance of this antenna. For studied radiation pattern, Figure 7 and Figure 8 depict the PPC (principal plane cut) in $\varphi = 0^\circ$, $\varphi = 90^\circ$ for multiple frequency at all of bandwidth: (1:1:24) GHz.

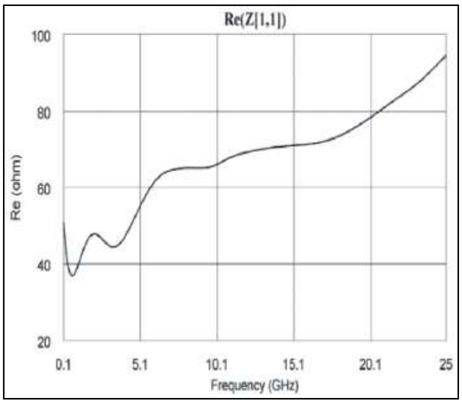

Fig 5: Real part of input impedance

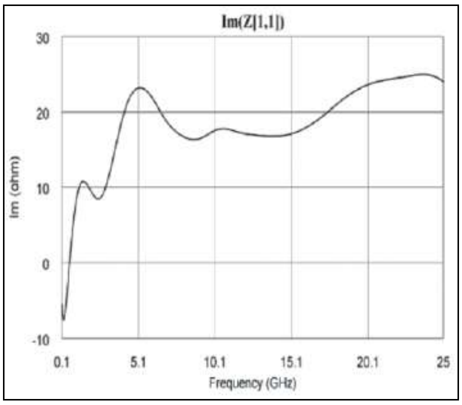

Fig 6: Imaginary part of input impedance

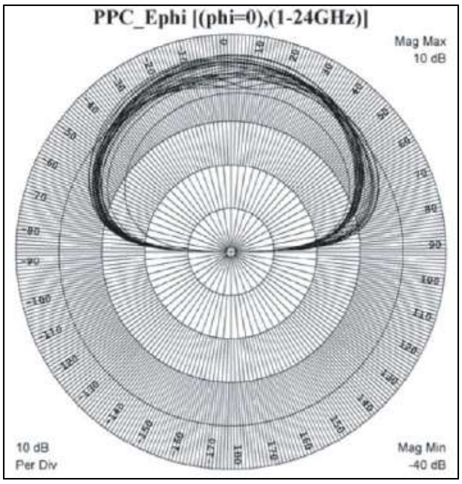

Fig 7: Radiation pattern (PPC) in $\varphi = 0^\circ$

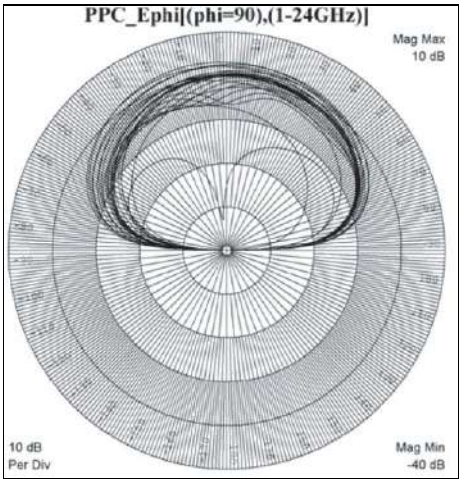

Fig 8: Radiation pattern (PPC) in $\varphi = 90^\circ$

obtained from following formula:

RHCP = $\dfrac{E_\theta + jE_\phi}{\sqrt{2}}$

LHCP = $\dfrac{E_\theta - jE_\phi}{\sqrt{2}}$

Conclusion

A microstrip reception apparatus with multiband and broadband attributes has been effectively illustrated. Multiband attributes of proposed radio wire are additionally watched. The reception apparatus is smaller, easy to plan and simple to create. A critical addition improvement is accomplished.

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