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## Size Miniaturized Fractal Nested Circular Rings-Shaped Microstrip Antenna for Various Wireless Applications

*Abstract-*In this paper; a wideband fractal circular rings shaped microstrip antenna over partial rectangular ground plane is presented. Fractal geometry technique is used in order to take advantage of its self-similar property which lead to attain not only size miniaturization but also wider bandwidth and iteration method is utilized that reach up to third iteration. The proposed model is simulated by High Frequency Structural Simulator (HFSS) package. Such model is designed on FR4 substrate with a compact size of  $(20 \times 18 \times 1.5)$  mm<sup>3</sup>, 4.3 permittivity and 0.02 loss tangent. The microstrip line feed is used to feed this antenna with a length of 4.65mm and width of 3mm, in order to increase the impedance bandwidth of proposed model to 67.64%. This model is designed to operate at a range of frequency (4.5-9.1) GHz with two resonant frequencies at 5.6GHz and 8GHz. The length of ground plane  $L_g$  is optimized for enhance antenna parameters such as input reflection coefficient and Bandwidth. The simulation results show that the input reflection coefficient values are -54.5 dB and -46.5 dB at two resonant frequencies 5.6GHz and 8GHz. Also, radiation efficiency of proposed antenna is 97.29% with peak gain of 4.34dB. This antenna is appropriate for various wireless Applications such as satellite communication, weather radar, (Industrial Scientific Medical) ISM band and (Wireless Fidelity) Wi-Fi.

**Keywords-** C-band; Fractal MSA; HFSS; nested circular rings; rectangular partial ground plane.

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