A Novel Design of Elliptic Fractal Multiband Planar Antenna for Wireless Applications

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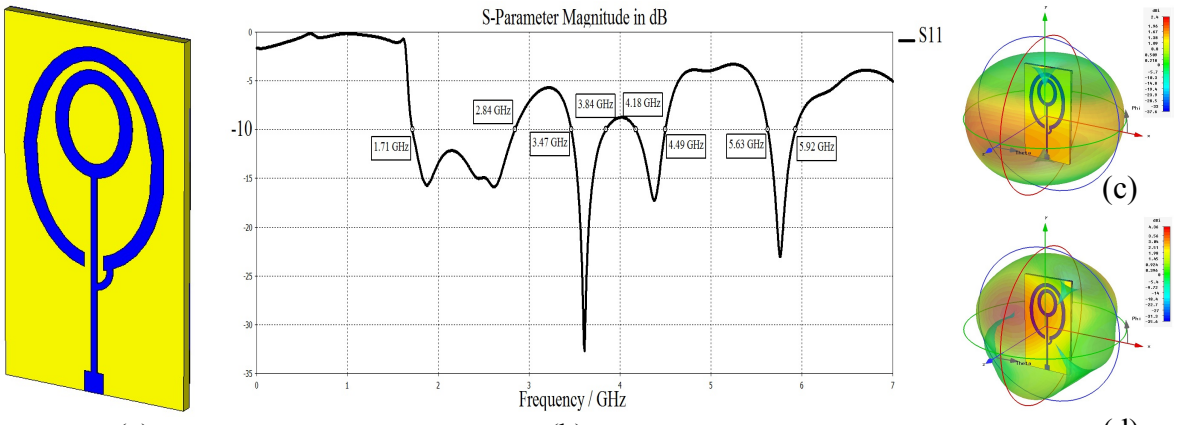
The mobile phone applications had known an increase through the last years. Starting with GSM-900 on 1992, a mobile phone can today support the quad bands (850, 900, 1800 and 1900 MHz), Bluetooth, IMT-2000 (International Mobile Telecommunications), Wi-Fi (2.4 and 5 GHz), GPS, LTE (Long Term Evolution), ISM (Industrial, Scientific & Medical) bands (2.4 and 5.8 GHz) and NFC (Near Field Communication). These developments need antennas with a multiband behavior, small size and low cost of fabrication.

One of many techniques that improve the antennas characteristics is the fractal geometry. Fractals are defined as being derived from the Latin fractus meaning broken, they are a self-similar geometrical shapes, which are repeating themselves at different scales (W. Hödlmayr, *Fractal Antennas: Introduction to fractal technology and presentation of a fractal antenna adaptable to any transmitting frequency*, antenneX Magazine No. 81, January 2004). This self-similarity gives a multiband aspect to the antenna based on fractal geometry. Also according to the used fractal geometry, it is possible to reduce the size of the antenna while keeping the same characteristics.

In this work a new fractal multiband planar antenna based on elliptic geometry is presented. This structure is optimized and validated by using CST-Microwave Studio. The simulation results presents a good Return Loss and Radiation Pattern in the DCS (Digital Cellular Service) band at 1800 MHz, the UMTS (Universal Mobile Telecommunications System) at ([1920 - 1980] MHz ; [2110 - 2170]), the LTE 2600 MHz and the ISM band at 2.4 and 5.8 GHz. The antenna is designed on an FR4 substrate with 53 x 28 mm² as dimensions.

The figure below shows the proposed antenna, its Return Loss and radiation pattern. The simulation results obtained validated this antenna with a good matching input impedance and a stable radiation pattern.



The proposed antenna (a), its Return Loss (b), the radiation pattern at 2.3 GHz (c) and 5.8 GHz