ABSTRACT

In this final project, a triangular microstrip patch antenna designed using an array method with fractal geometry is proposed for a working frequency of 5.6 GHz, aimed at C-Band radar applications. The substrate used in this study is FR-4 Epoxy with a dielectric constant (εr) of 4.3, a loss tangent (tan δ) of 0.0265, and a substrate thickness (h) of 1.6 mm, along with a feed line as the feeding channel. The array and fractal methods are employed to enhance both the gain and bandwidth of the antenna.

The antenna design is modeled using the CST Studio Suite 3D simulator and subsequently fabricated. Simulation results show a return loss of -20.608 dB, a bandwidth of 170 MHz, and a VSWR of 1.759. The gain achieved is 3.4 dBi with a unidirectional radiation pattern and linear polarization, meeting the specifications required for the operating frequency of 5.6 GHz. Following fabrication, the measured antenna performance shows a return loss of -22.496 dB, a bandwidth of 74 MHz, and a VSWR of 1.163. The resulting gain is 2.06 dBi with a unidirectional radiation pattern and linear polarization. After further optimization post-fabrication, the antenna exhibits a return loss of -37.65 dB, a VSWR of 1.026, and a bandwidth of 210 MHz. The final gain is 3.26 dBi with a unidirectional radiation pattern and linear polarization.

Keywords: Microstrip Antenna, C-Band Radar, Operating Frequency, Array, Fractal