

DESIGN OF A SMALL SIZE HIGH FREQUENCY (HF) HELICAL ANTENNA



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ABSTRACT

The main objective of this project is to focus on the designing of helical antenna in the High Frequency (HF) range from 3 MHz to 30 MHz. Several parameters dimension and helical's profiles were studied in order to obtained a suitable resonance frequency. Among the helical antenna parameters that being studied were on its different forms that link to multiple diameters, radius ratio, and number of turns. The software that was applied for the simulation is the CST Microwave Studio (CST MWS) which is an analytical tool that provides an accurate 3D EM simulation results for high frequency design. The helical antenna was constructed, enables the comparison of results to be analyzed. From the design, the "return losses" were obtained. There were less than -10 dB. The results concluded that the helical antenna performed the properties of the High Frequency (HF). This also revealed that the major lobe of the patterns occupied the entire region $0^\circ \leq \theta \leq 90^\circ$. Moreover, the helical antenna was circularly polarized. Per the simulation, result showed that by increasing the number of turns (N), the frequency would reduce repeatedly. The findings, on the other hand showed that by increasing the radius ratio to the design, the bandwidth of 10-dB would be wider. Hence, it acted as a broadband antenna. For the same design of 60 number of turns (N), the simulation would result the frequency of 24.3 MHz, and the construction done resulted 13.42 MHz. From the fabrication results that were obtained, by reducing the number of turns, the resonance frequency increased repeatedly. There were slightly offset between the simulation and fabrication results that could be due to inaccurate of the CST Microwave Studio (CST MWS) and other related effects. In a nutshell, the results of experiment revealed that the designed helical antenna performed as a High Frequency (HF) broadband antenna.

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