

Laboratory Assignment: Helical Antennas



Names: _____

Objective

This laboratory assignment explores the properties of a broadband helical antenna in both axial and normal modes.

Preparation

Before coming to the laboratory to perform this assignment, the students should prepare the following:

- Complete the laboratory assignments for using the spectrum and network analyzers.
- Bring a USB thumb drive to the laboratory for capturing network analyzer output.

Write-Up

The students performing this laboratory must submit their documented procedures and analysis in a *concise* laboratory write-up. All group member names must appear on the front page. The write-up will be graded on

- Completeness and Technical Correctness
- Technical Writing and Readability
- Conciseness

Equipment Guide



network analyzer



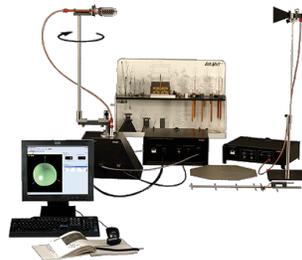
connectors/adapters



calibration kit



assorted coaxial cables



tabletop antenna range

Procedure

Part I: Radiation Measurements of Helical Antennas

1. Perform “Exercise 2-3: Circular Polarization and Helical Antennas” in your *Antenna Fundamentals* lab book (p 2-29 to 2-42). Complete all of the exercises as you go.

Part II: S-Parameters of a Helical Antenna

1. Using the RF test and measurement stations, measure the broadband s_{11} parameter of the helical antenna in Part I. Estimate 3dB bandwidth based on this impedance measurement and comment on the observed properties.

Part III: Numerical Modeling of a Helical Antenna

1. Measure the geometrical properties of the helical antenna that you tested in Part I. Create a labeled, dimensioned, schematic of this antenna.
2. Enter the parameters into NEC and simulate the radiation properties. Compare directivity, impedance, and axial ratio to your part I + II measurements as well as to the theoretical expressions for the helical antenna.