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Lab 11

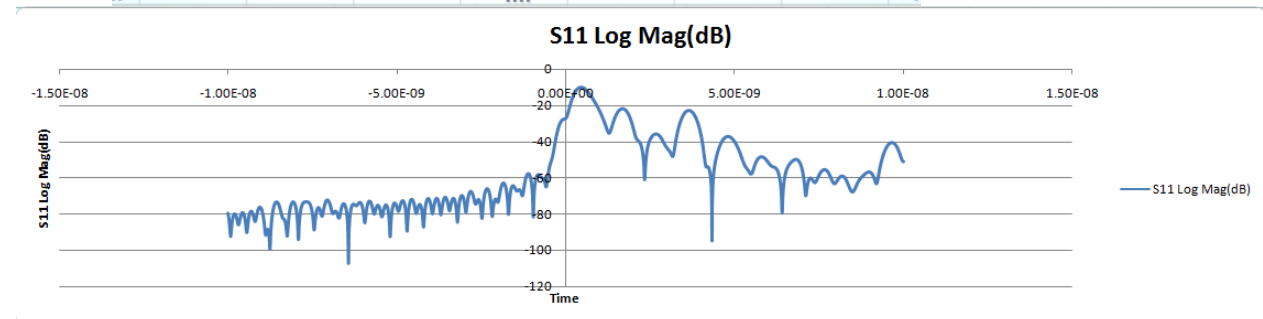
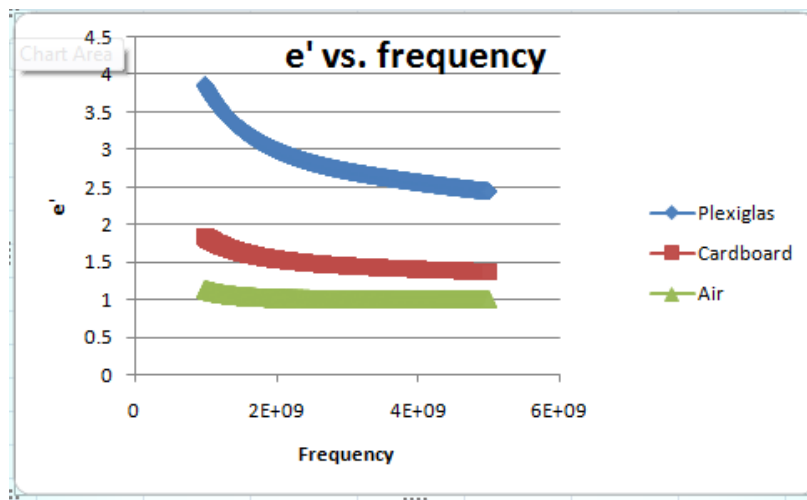
Introduction/Background

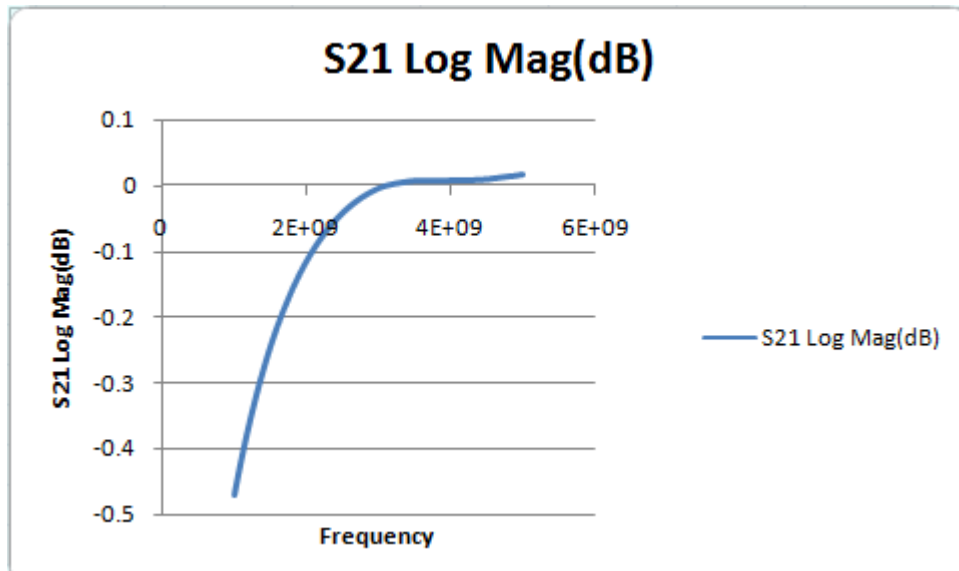
This lab showed us a method of measuring the dielectric constant of a solid. This measurement was found using the GRL calibration method. This method uses two horn antennas to measure the reflection and transmission through a material placed directly between and perpendicular to the antennas.

In Lab Procedure

The lab consisted of David placing sheets of materials between two opposing horn antennas. The first step was to calibrate the cables connecting the network analyzer to the horn antennas to remove noise from the system. A sheet of metal was then placed between the antennas, perpendicular to both, and the measurement taken of that. After the data was taken, the inverse Fourier transform was taken of the data to place the data in the time domain. This allowed David to tell what time the important data was being collected by the antenna, and place a “gate” in order to calibrate the process. After this, the measurement was taken of a sheet of Plexiglas, a large piece of cardboard, and air.

Results and Discussion





The dielectric constants measured by the process for the different materials were:

- Plexiglas: 3.5
- Cardboard: 1.8
- Air: 1.005

These values are pretty similar to what was expected.

Conclusion

The purpose of this lab was to see the GRL calibration in action. The calibration process could have been improved to be more accurate if the holders for the materials were more stable. As it is, the material was not exactly perpendicular to the antennas, and each material could not be in the exact same position as the last material, which would cause inaccuracies in the data. However, despite the difficulties posed by the material holding method, the data gathered in this lab were still fairly accurate.

Reflection

The most rewarding aspect of this lab was seeing how close the measured dielectric constants were to the known values.