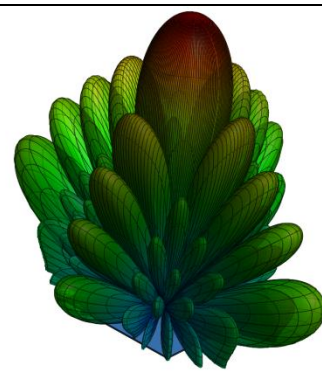
Simulation and compensation of measurement errors in a spherical near-field scanner

Spherical near field scanners (SNFS) are complex measurement systems that enable a full hemisphere radiation measurement of antennas. This thesis has successfully developed a method to simulate different errors as well as performing an in depth study in error correction methods for SNFS. This has been carried out with Phasor Solutions Ltd for the test system that will enable high accuracy antenna measurement for their low profile electronically steerable phased array antennas.



An antenna far field measurement used in the simulations

The world today demands more and more data communication bandwidth in all different places across the world. Everyone that is been travelling by train, airplane or boat wants to be able to connect to internet. This is challenging as this demands satellite communication on moving vehicles which make it difficult to keep a parabolic dish pointed at the satellite constantly. Phasor have successfully developed flat array antennas that solve this problem.

To be able to test their antennas they are in the complex process of designing a SNFS. This project was created to develop a method to be able to simulate measurements taken in the SNFS with particular errors. This would enable Phasor to understand how different errors affect the measurements but also decide on possible correction methods.

By using different advanced software together with basic electromagnetic field theory a method was created which proved that the worst possible error in a SNFS is the radial error. This in itself led to a change in design to diminish the radial error. Other errors were simulated with the developed method.

Together with this work, different error correction methods for SNFS were studied in detail and a particular method was suggested to Phasor, because of its relative simplicity, capacity to correct for different errors and ability to reduce the number of measurement points. This error correction method is now in progress to be implemented using the simulations carried out in this thesis as test cases.