



## Simulations and tests of Source tracking using Goniopolarimetry method

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The goniopolarimetry algorithm allows simultaneous direction finding and polarization measurement of incoming radio sources. In our case, we have done simulations and preliminary tests on 300 MHz set up, where we have designed three mutually orthogonal active monopole array antennas and the received signals are fed to the back end receiver to be digitized and correlated. Using those auto and cross-correlated parameters, along with calibrated receiver antenna parameter and receiver system co-ordinates, the gonio-polarimetry algorithm can continuously provide source direction and polarization. This whole set up has been simulated using Cadfeko and Matlab. The simulations gave us good results with maximum error of 5%.

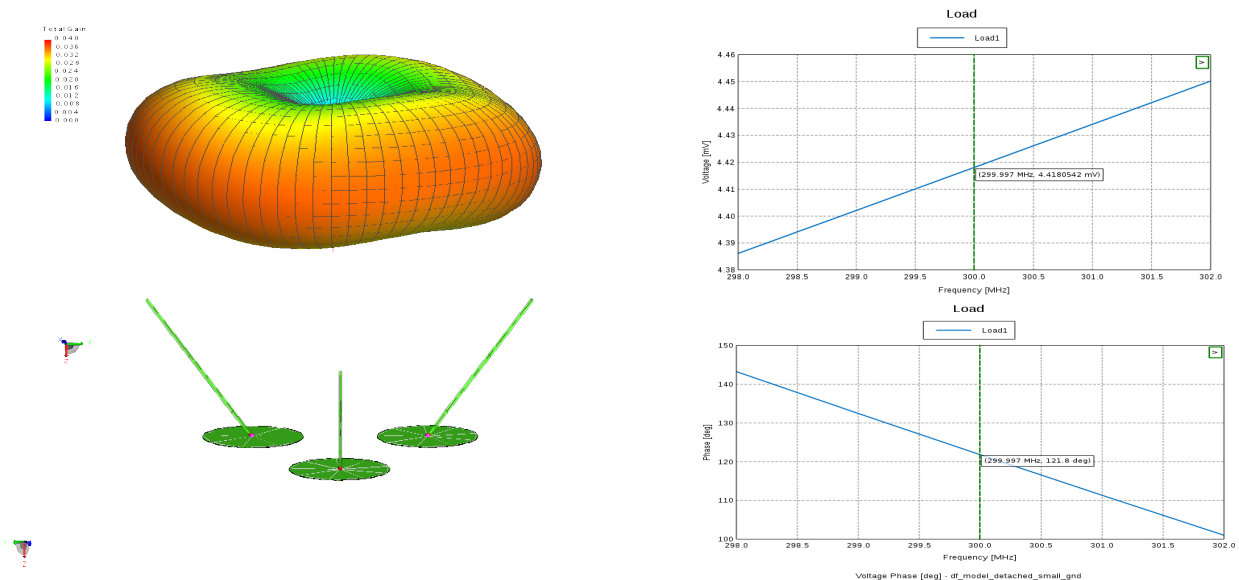


Figure: (a) Field pattern of receiver monopole antenna in Cadfeko (left), (b) Amplitude and phase plot of received voltage by a single monopole antenna

In the Cadfeko antenna simulator, we have designed two cross polarized dipole antennas, together they work as a transmitting antenna. By modifying the phase of source voltage of these two antennas we can create different polarizations, i.e. linear, elliptical or circular polarizations. Three mutually orthogonal monopole antennas with separate ground planes were designed to work as a receiver array for 300 MHz frequency. Monopole antennas are electrically short and terminated with proper matching circuits. In Cadfeko simulation, the received voltages (amplitude and phase) of each of the three monopole antennas were fetched to Matlab code to perform first correlation and then gonio-polarimetry. These simulations were able to detect the transmitting source position along with its polarization informations with 5% of error which can also be minimized by better calibrations. We are working further for practical implementation of the whole receiver to track the Sun and capture radio bursts.

### References:

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