Simulation of Antenna Arrays: Part 3 - Analysis of Half-wavelength Dipole Antenna

Now that we are all aware of how an array of antennas are analyzed from a theoretical perspective, this blog will provide a practical demonstration of how a single, half-wavelength dipole antenna is analyzed in COMSOL Multiphysics v5.5.

Half-wavelength dipole antenna

Half-wavelength dipole antennas, linear or curved, are some of the oldest, simplest, cheapest, and in many cases the most versatile available, thus they can be used to as a simple example for analysis of the antenna. The model setup and electric field distribution of a dipole antenna in COMSOL Multiphysics v5.4 are shown in Fig. 6:

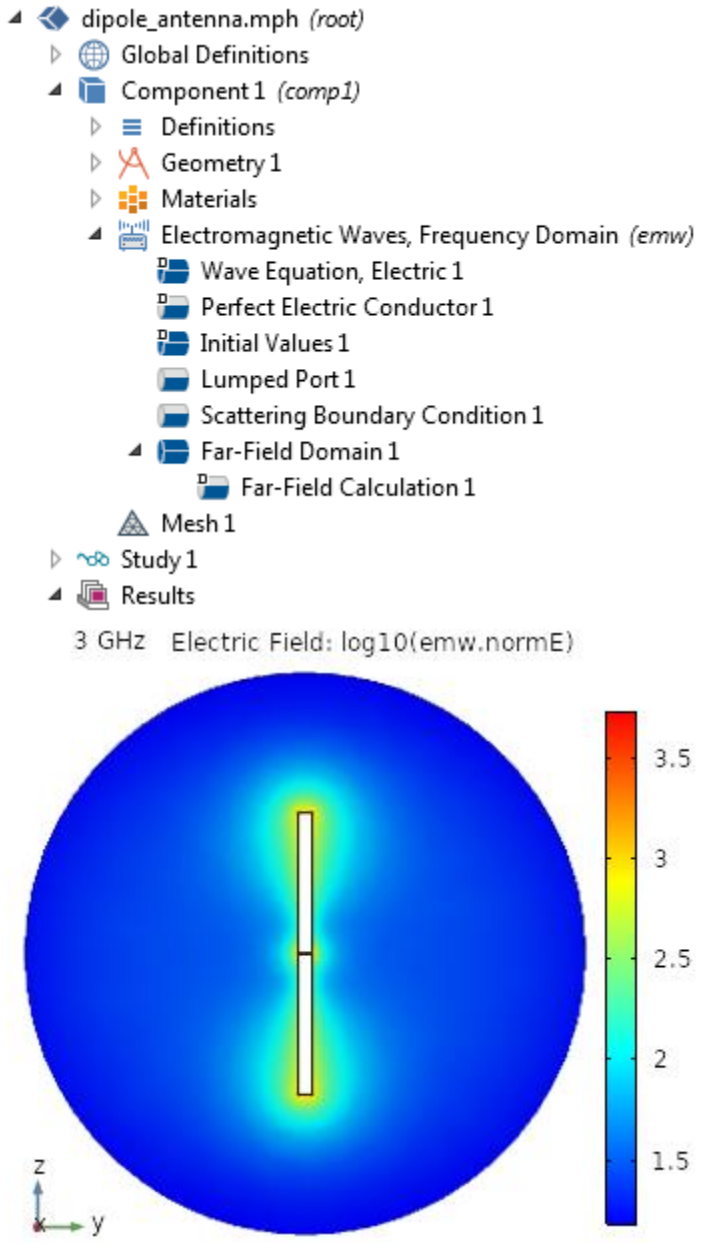

Figure 6: Half-wavelength dipole antenna model setup and electrical field distribution

The **Far-Field Domain** node in the model setup calculates the antenna radiation pattern based on the Stratton-Chu formula. A number of the predefined far-field variables are available for post-processing, a full list of variables can be found in the RF Module User Guide. The plot of the electric far-field pattern of the dipole antenna is shown in Figure 7.

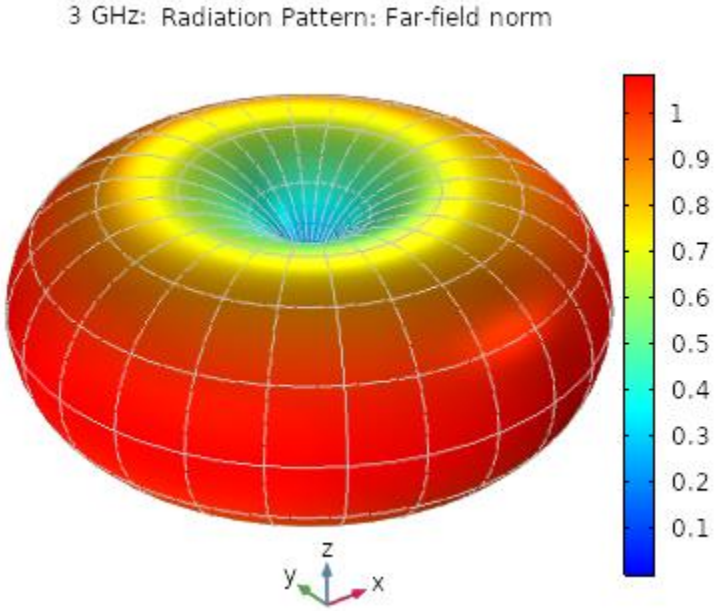

Figure 7: Torus-shaped pattern of the far-field for the half-wavelength dipole antenna

The pattern of antenna gain in a dB scale is shown in Figure 8.

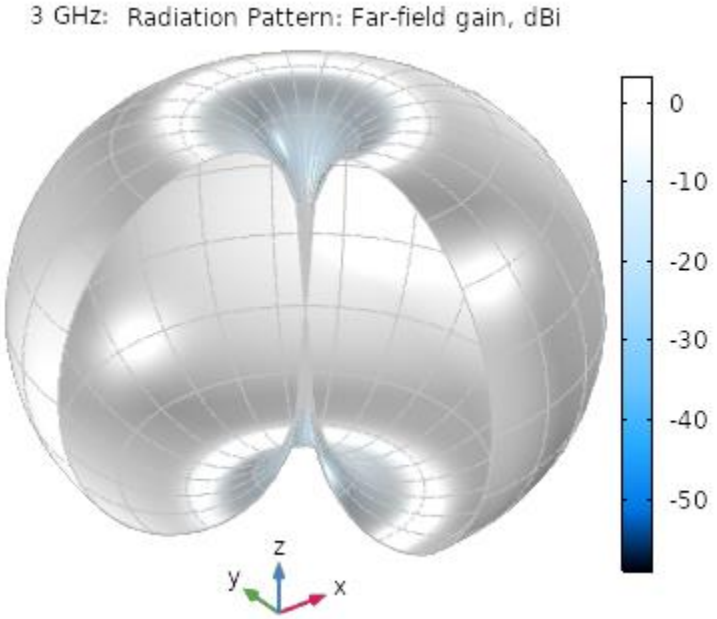

Figure 8: Torus-shaped pattern of gain in dB scale for the half-wavelength dipole antenna