# Laboratory 5

Simulation in HFSS, Dipole Antenna, part II

Start ANSYS Electronics Desktop, then start HFSS by clicking on the corresponding icon in the ribbon. We continue the work in laboratory 4, start by loading the previous project file. Save the project with a new name.

Check that the model is correct, according to the indications in laboratory 4 and check that a resonance characteristic similar to the one in the figure bellow has been obtained.
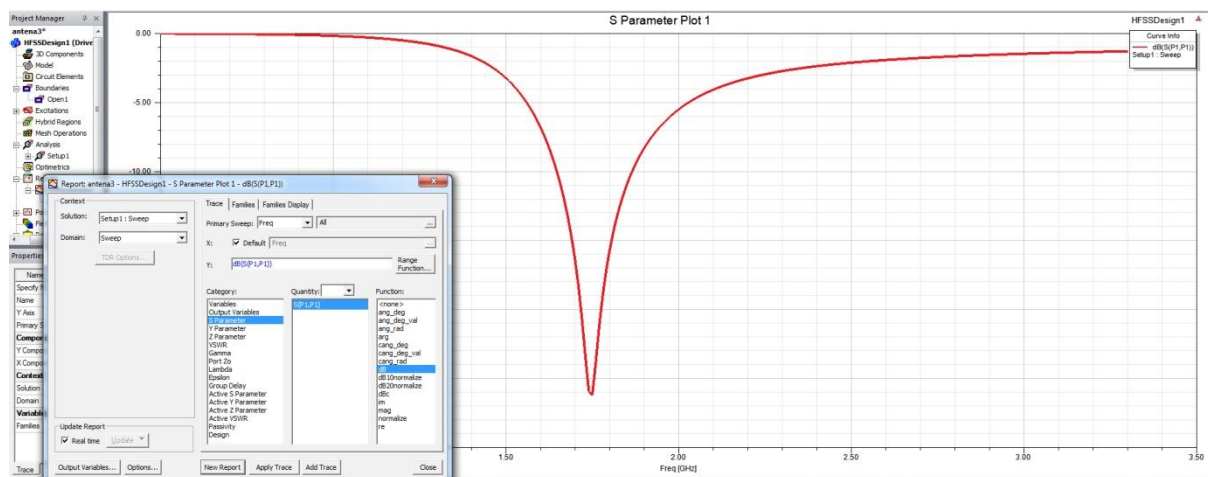

Tuning the antenna dimensions

Results show that the antenna resonates at a different frequency instead of the desired one, that you used to calculate the dipole length. To create an antenna for the frequency specified in your own assigned data, the length of the two wires will need to be modified. Change the value of the corresponding parameter in the **HFSS > Design Properties** window, and repeat the chang/simulation until an antenna with the desired resonant frequency is obtained.

Plot other important antenna features

To view the antenna input impedance select **HFSS > Results > Create Modal Solution Data Report > Rectangular Plot**, select "Z Parameter" (Category) and "im" (Function) and press the **New Report** button, then, without closing the window, select "re" (Function) and press the **Add Trace** button to plot the real and imaginary part on the same graph. Use the **Add Marker** command to observe the frequency at which the imaginary part

of the impedance passes through zero. Add a marker on the curve of the real part of the impedance at the same frequency.
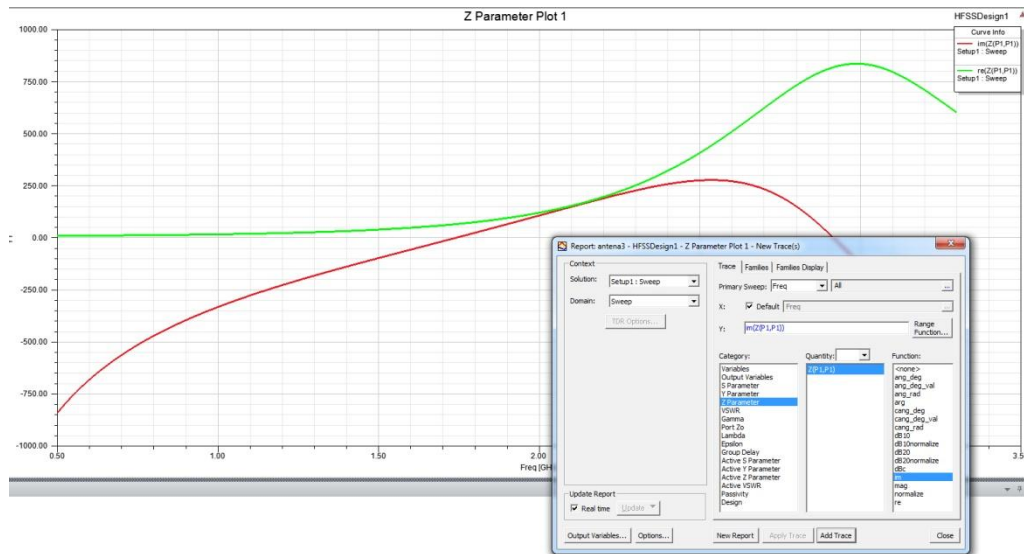

To plot the directivity of the antenna, select **HFSS > Results > Create Far Fields Report > 3D Polar Plot**, select "Directivity" (Category), DirTotal (Quantity) and "none" (Function), and press the **New Report** button. Repeat the procedure and in the function list choose "dB" to represent directivity also in logarithmic coordinates.
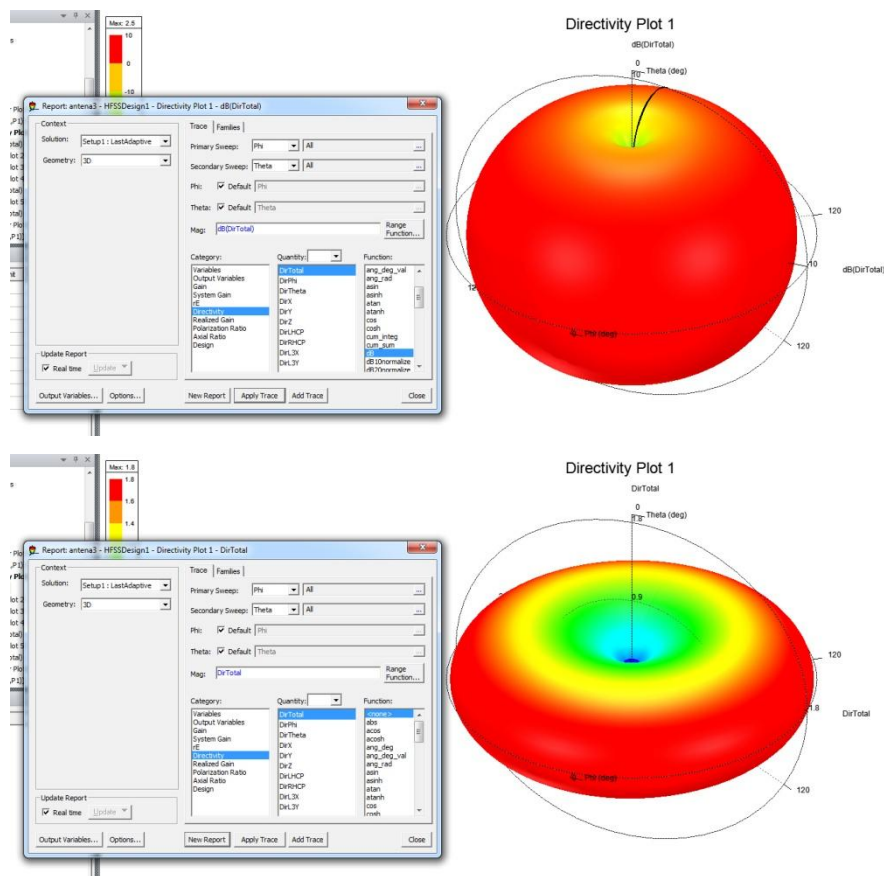
For other methods of ploting directivity select **HFSS > Results > Create Far Fields Report > Rectangular Plot**, and **HFSS > Results > Create Far Fields Report > Radiation Pattern**, then select "Directivity" (Category), DirTotal (Quantity) and "dB" (Function). To display the result for a single Phi angle value choose the **Families** tab and for the Phi variable replace "All" with "0deg".

Pentru alte metode de reprezentare a directivității selectați **HFSS > Results > Create Far Fields Report > Rectangular Plot**, și **HFSS > Results > Create Far Fields Report > Radiation Pattern**, apoi selectați "Directivity" (Category), DirTotal (Quantity) și "dB" (Function). Pentru a afișa rezultatul pentru o singură valoare a unghiului Phi alegeți tab-ul **Families** și pentru variabila Phi înlocuiți "All" cu "0deg".
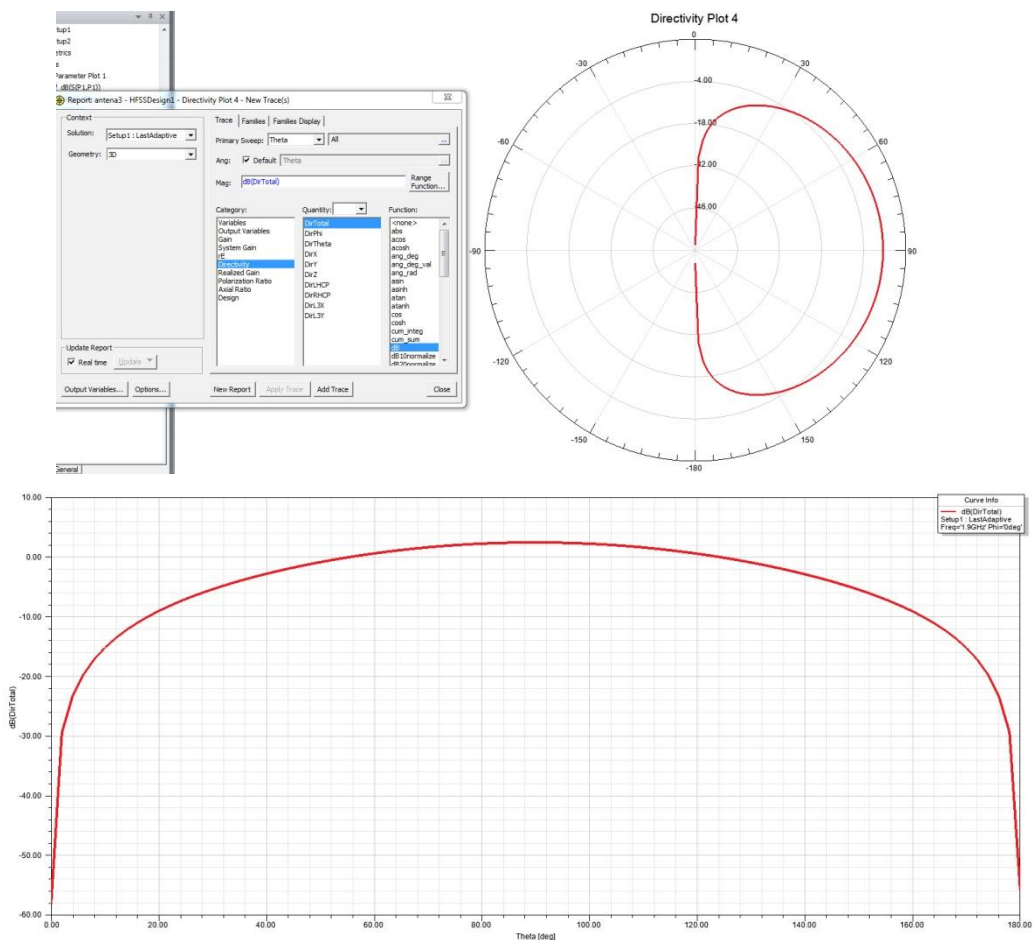
Activity in the laboratory

1. Design (tune) the antenna to obtain the resonant frequency assigned in your own data for laboratory 4, by varying the length of the two wires. The length change can be done manually or using the parametric analysis (**HFSS > Optimetrics Analysis > Add Parametric**) with

the advantage of decreasing the level of human intervention to achieve the required design but with the disadvantage of performing more simulations than strictly necessary.

2. After tuning the antenna dimensions to achieve the desired resonant frequency, plot the S parameters, input impedance, directivity characteristic in 3D and 2D polar coordinates following the model.

3. Save the project. Create a project archive from the menu ("*.aedtz") with the simulation results included (set the "Results/solution files" option) and upload the archive to the lab server (it **must** be a **single** file).

Very important! If the archive size (including results) exceeds 10MB, it will not be possible to upload it directly to the server. In this case, use a cloud service (such as Google Drive or Microsoft OneDrive) where you upload the archive and submit to the server a download link to this file (check from another device/computer that the link allows download without username / password).