Sierpinski_Triangle_Antenna

Where To Find This Example

Select Help > Open Examples... from the menus and type either the example name listed above or one of the keywords below.

Or in Version 13 or higher you can open the project directly from this page using this button. Make sure to select the Enable Guided Help before clicking this button.

Open Install Example

Design Notes

Sierpinski Triangle Antenna

In this example, various dipole structures are analyzed using AXIEM to demonstrate antenna measurements. Return loss measurements are presented, in addition to radiation patterns and current annotation. The simple dipole antenna is presented first, followed by a triangular dipole. Next, variants of the Sierpinski triangle dipole are analyzed.

Description of Axiem Antenna Measurements

You can perform antenna measurements using AXIEM. These measurements include Axial Ratio Radiation Pattern, E-Field Radiation Pattern, and Total Power Radiation Pattern. For each measurement, it is possible to sweep frequency, Phi, or Theta. For information on a specific measurement, select the Measure Help button in the Modify Measurement dialog.

Setup

The primary purpose of this is example is to demonstrate various antenna measurements on Triangle_Dipole_Sierpinski_C3_FFP_EM_Structure. E-Theta Radiation Pattern and E-Phi Radiation Pattern measurements are displayed on graph Sierpinski_C3_Triangle_Dipole_FFP for 2.46 GHz, 8.96 GHz, and 18.84 GHz.

For the sake of comparison, additional structures were added to the example as well. These structures are much simpler than Triangle_Dipole_Sierpinski_C3_FFP_EM_Structure. Note that certain steps are required in order to simulate and view the results for these structures and the steps are given below.

A simple EM structure, Simple_Dipole_EM_Structure, consists of two 15 mm by 0.4 mm structures. Graphs Simple_Dipole_ReZ and Imz and Simple_Dipole_Rfeed_72_S11 are the input impedance and input return loss for this structure. To simulate Simple_Dipole_EM_Structure, you will need to right-click the structure in the Project browser and select Toggle Enable EM Structure. You will also need to right-click on each graph Simple_Dipole_ReZ and Simple_Dipole_Rfeed_72_S11 and select Enable All Measurements.

The next step is the actual triangle dipoles. The simplest structure is Triangle_Dipole_EM_Structure. Each one of Triangle_Dipole_Sierpinski_C1_EM_Structure, Triangle_Dipole_Sierpinski_C2_EM_Structure, and Triangle_Dipole_Sierpinski_C3_EM_Structure have an increasing number of triangular sections cut out to represent the Sierpinski dipole. Input impedance and input return loss are plotted in graphs Sierpinski_Triangle_Dipole_ReZ and Sierpinski_Triangle_Dipole_S11. Graph Sierpinski_Triangle_Dipole_S_Various_Rfeed shows how varying the feed at the input of the dipole affects the input return loss. This is done by using schematics Simple_Dipole_Schematic, Triangle_Dipole_Schematic, Triangle_Dipole_Sierpinski_C1_Schematic, Triangle_Dipole_Sierpinski_C2_Schematic, and Triangle_Dipole_Sierpinski_C3_Schematic and varying the value of Z for the PORT element. To simulate each structure, you will need to right-click the structure in the Project browser and select Toggle Enable EM Structure. You will also need to right-click the specific measurement of the structure you want to analysis under the graph name in the Project browser and select Enable All Measurements.

A final note is that EM_Mesh annotations have been added to all of these structures. It is always a good idea to view the mesh prior to simulating a practical design. To see the mesh for a structure, first open the 2-D layout from the Project browser. With the window active, select View > View 3D EM Layout or Show EM 3D Layout from the toolbars. Now, select Show 3D Mesh to view the mesh.

EM Structure - Triangle_Dipole_Sierpinski_C3_FFP_EM_Structure
EM Structure - Triangle_Dipole_EM_Structure
EM Structure 3D - Triangle_Dipole_Sierpinski_C3_FFP_EM_Structure