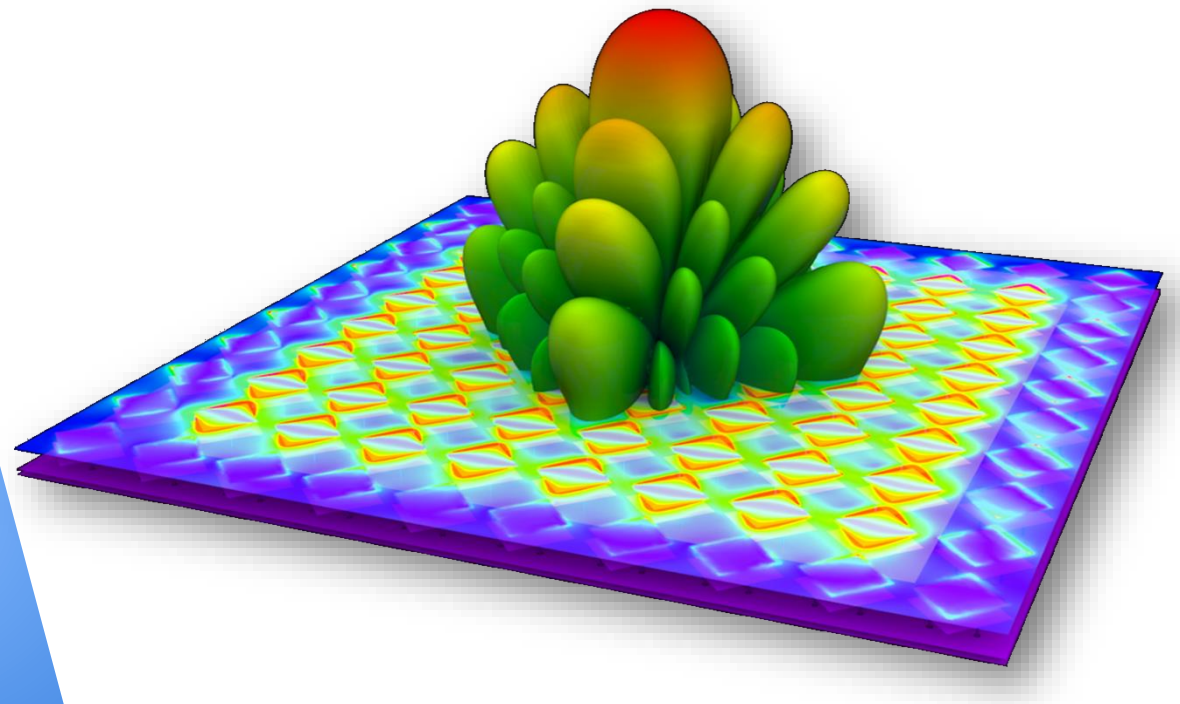
FLUID CODES

Calculations of Antenna Power Parameters



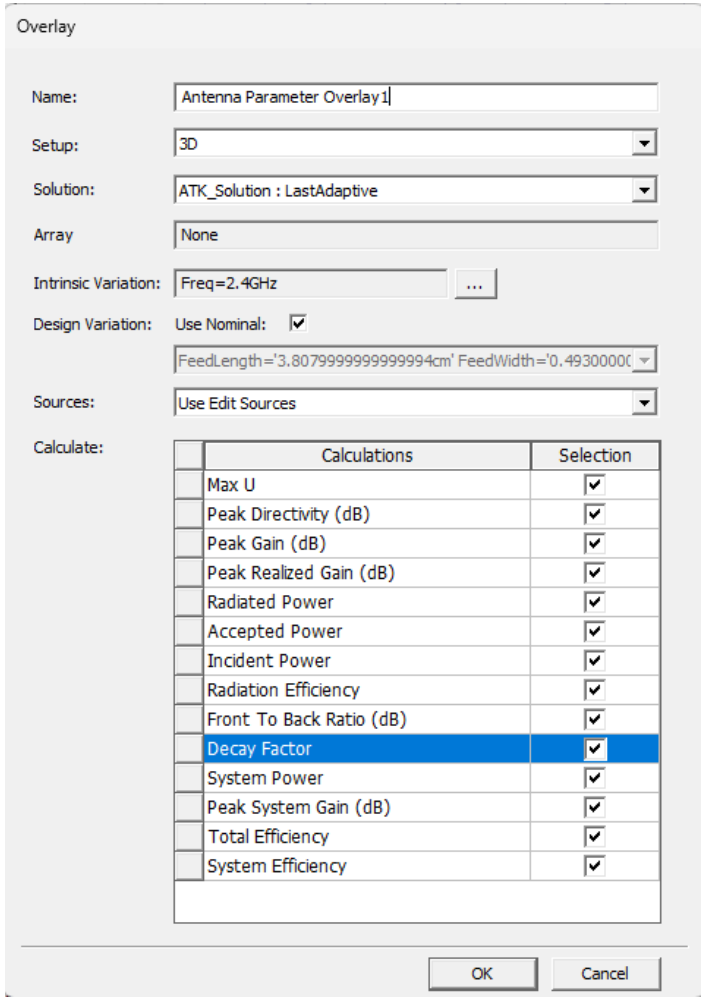
Introduction-Antenna Parameters and Scaling Sources for HFSS — Lesson 1

Ansys / ELITE CHANNEL PARTNER

Antenna Parameters

When dealing with radiated fields, understanding the antenna properties of the radiated bodies is essential. Antennas have many characteristics like gain, bandwidth, directivity, efficiency, and more. The most efficient prediction of an antenna behavior can be achieved through simulation. This requires no prototyping or test setup, which reduces the overall design cycle time.

Ansys HFSS is an electromagnetic simulation tool based on the finite element method (FEM). In addition to design and analysis, HFSS also provides many visual post-processing results for better understanding of the underlying physics.



Antenna Parameters

HFSS calculates a wide range of antenna parameters to help with this analysis. While the physical interpretation of these parameters is well-explained in the HFSS help documentation, certain scenarios can still be challenging to interpret. For instance, applying a matching network through a circuit design with push excitation, or calculating accepted power in multiport cases, can present challenges.

This course provides simulated examples using HFSS to illustrate how these parameters are calculated and interpreted. The antenna parameter results are discussed in different scenarios:

- Standalone single-port antenna
- Single-port antenna with matching network
- Multiport antenna

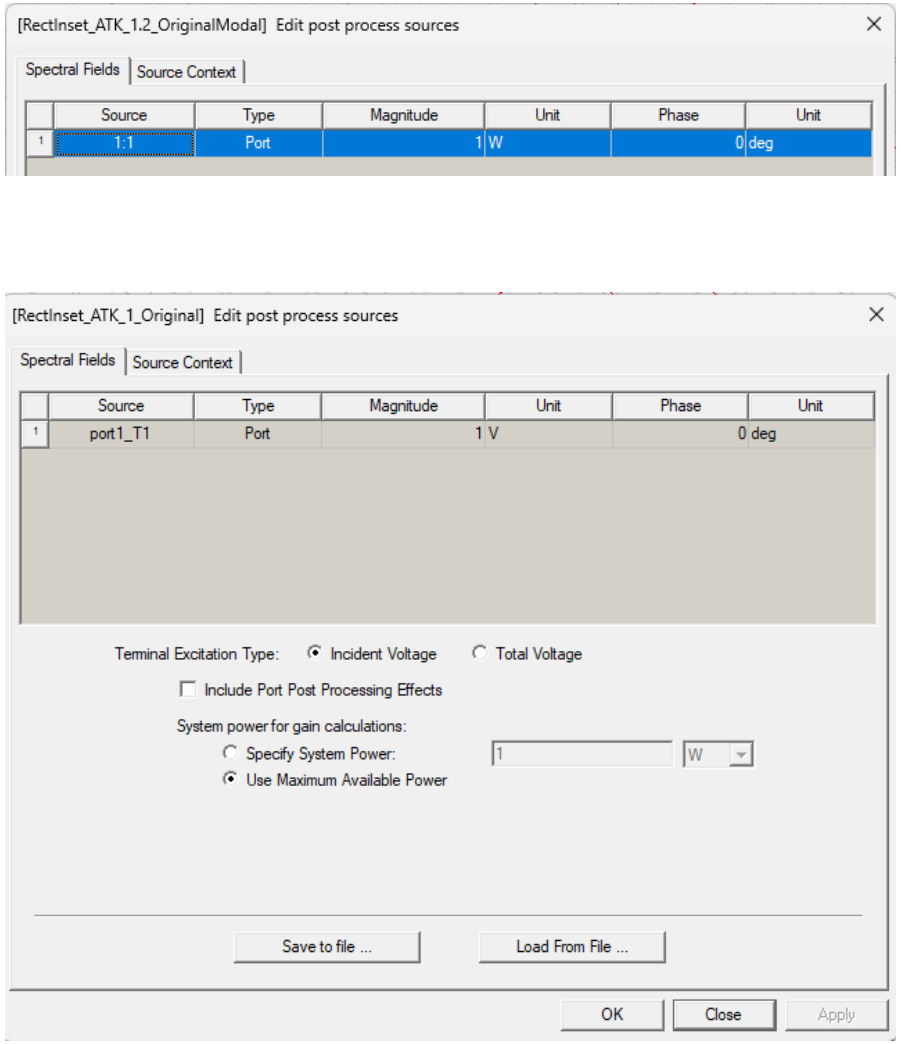
Antenna Parameter Overlay1: Freq='2.4GHz'	
Quantity	**Value**
Max U	5.01433 mW/sr
Peak Directivity (dB)	8.14524
Peak Gain (dB)	8.09891
Peak Realized Gain (dB)	7.99433
Radiated Power	9.65849 mW
Accepted Power	9.76208 mW
Incident Power	10 mW
Radiation Efficiency	0.989389
Front To Back Ratio (dB)	32.8034
System Power	10 mW
Peak System Gain (dB)	7.99433
Total Efficiency	0.965849
System Efficiency	0.965849

Scaling Sources for HFSS

By clicking **HFSS › Fields› Edit Sources**; the **Edit post process sources** dialog box appears. You can scale the magnitude and set the phase of ports, voltage and current sources, Eigenmodes, Characteristic Modes, and incident waves in the Edit post process sources dialog box.

For HFSS modal projects, you specify the total incident power. For HFSS terminal projects, you can also select either Incident or Total Voltage. The Incident Voltage selection includes magnitude, phase, and the impedance of a hypothetical external line. The Total Voltage is the Incident voltage plus Reflected voltage, that is, $V^T = V^i + V^r$.

For gain calculations, you can check whether to **Specify System Power** or **Use Maximum Available Power**. Selecting **Specify System Power** enables a field for entering the power value for power and select units. **Use Maximum Available Power** provides a default. The system power typically comes from an external circuit (e.g., a Circuit project), and is used in computing System Realized Gain in antenna parameters and System Gain in far field reports.



Thank You