

MomFF_excitation Design Kit

Revision History

Revision	Date	Description
1.0	October 2004	Momentum Radiation Pattern Analysis Utility
1.1	January 11, 2005	Bug fix for ADS2004A, needed when no reference pin is added to the antenna Layout Component.
1.2	January 11, 2005	Enhanced to allow Harmonic Balance analysis
1.3	January 21, 2005	More robust node naming.
1.4	July 13, 2005	Fix for random ADS crashes that were observed on the Windows platform after reading the Momentum surface current file.
1.5	December 5, 2005	Fix for mismatch between AC/HB simulation frequency and Momentum far field frequency. Now, the surface current solution within 1 kHz of the AC/HB simulation frequency will be used to calculate the Far Fields. Otherwise, a new Momentum simulation is launched.
1.6	January 4, 2008	Update for ADS 2008
1.7	June 19, 2008	Fix for a Far Field dialog initialization problem. In some cases, '1 Volt' excitations were shown the very first time the dialog was opened.

Description

This design kit installs a utility to facilitate radiation pattern calculations with Momentum.

Radiation patterns are calculated for a selected frequency and a given port excitation as shown in the Radiation Pattern Control dialog box below. The port excitation specifies what source (a Thevenin voltage source with source impedance) will be attached to each antenna port. The actual voltages to be specified may result from a schematic simulation. The utility in this design kit allows automatic annotation of AC/HB simulated voltages at the antenna ports to the Radiation Pattern Control dialog box.

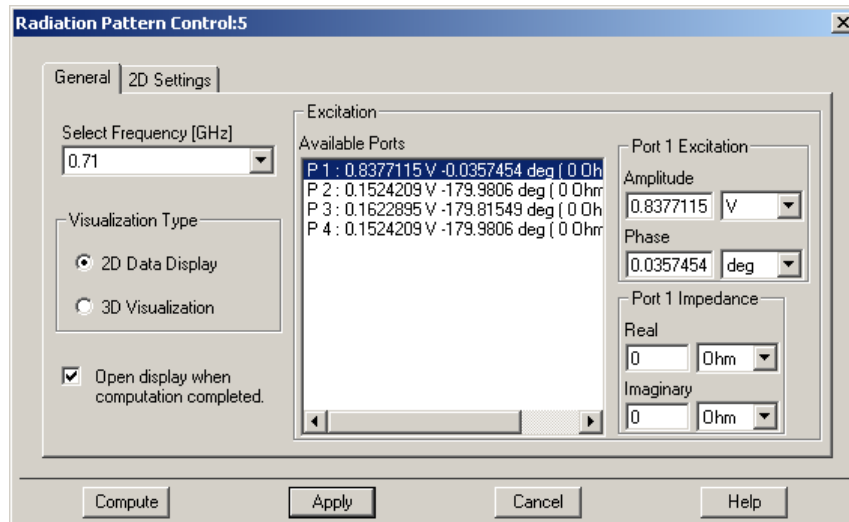


Figure 1 – Radiation Pattern Control Dialog Box

Use Model

First, set up your antenna design (layout, substrate, ports, mesh, etc). Then, create a component using **Momentum > Component > Create/Update...**

Important pre-requisite: the Momentum S-parameter model must be generated from schematic! Make sure you start with an empty database. Specify the following database settings when creating the component:

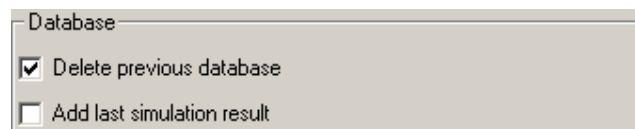


Figure 2 – Database settings during component creation

Insert the new component in a schematic together with all other necessary components. If you choose to add a reference pin to the component, make sure that this pin is grounded! Set up a basic AC or Harmonic Balance analysis.

Important Note: parameter sweeps are not supported!

With the design kit installed, you will see an additional menu pick in a schematic window as shown below.

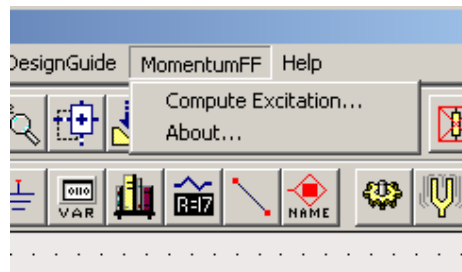


Figure 3 – New Menu Pick

Invoking **MomentumFF > Compute Excitation...** will bring up the following dialog box.

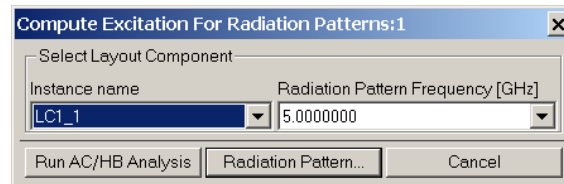


Figure 4 – New Dialog Box

Select the component instance name (your antenna instance) and run an AC/HB analysis by hitting the ‘Run AC/HB Analysis’ button. The difference with a normal AC/HB simulation is that the nodes at the antenna ports will be named so that the voltages end up in the resulting dataset. Momentum will be invoked in this Circuit/EM co-simulation as needed. The simulation results will be stored in the Layout Component model database for later re-use. Make sure that the lowest and highest frequencies for the Layout Component model (double click the component to set this) span the AC/HB simulation band to avoid S-parameter extrapolations.

After the circuit simulation has finished, the Radiation Pattern Frequency list will be filled with all AC or HB simulated frequencies. Select the frequency of interest to calculate the far fields and hit the ‘Radiation Pattern...’ button. At this point, an additional Momentum simulation may be invoked if the antenna surface currents are not available at the selected frequency (not within 1 KHz from this frequency). When a Momentum S-parameter model is generated via the AC/HB simulation, only a limited number of discrete frequencies are actually analyzed to build up a high resolution (AFS – adaptive frequency sampling) S-parameter model. If desired, the antenna layout component can be precomputed with the desired discrete frequencies. One can also use “Layout” Momentum Simulation Control for the Layout Component and explicitly add discrete frequencies to the AFS frequency range using **Momentum>Simulation>S-parameters...** in the component’s layout window. (You may also have to turn off “Reuse Model” if a model database already exists.)

When any required additional Momentum simulation has finished, the Radiation Pattern Control dialog box will open with the port excitations correctly initialized for the selected frequency. The impedance is set to zero so that the voltage at the antenna ports is indeed forced to the simulated nodal voltages. Clicking the ‘Compute’ button will invoke the Momentum Far Field Generator that calculates the far fields for the given port excitation.