

NEW FASANT

ULTRA-CONFORMED REFLECTORS: Training Example 1

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This example presents the design and analysis of an ultra-conformed reflector that radiates a collimated beam applying Physical Optics.

Go to *Layout* *Create Main Reflector*.

Select the *collimated beam* option. Set the frequency to 15GHz and the periodicity to 0.1λ . Choose a plane shape and set the focal point to (0.0, 0.0, 0.5m). Click *Next*.

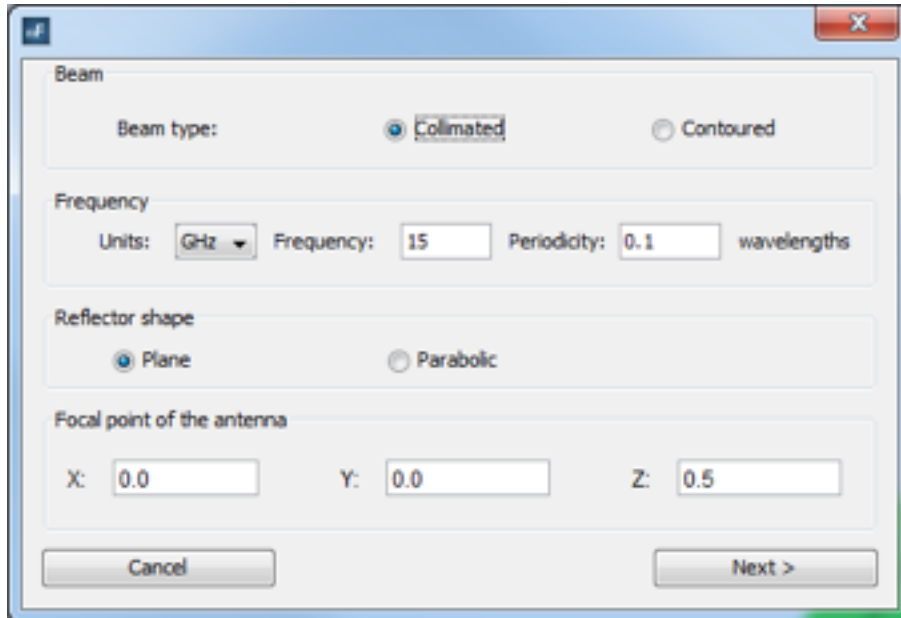


Figure 1 Create main reflector

The direction of the main beam is given by $\theta=5^\circ$, $\varphi=0^\circ$. The ultra-conformed reflector has a circular shape and its radius is 0.25m.

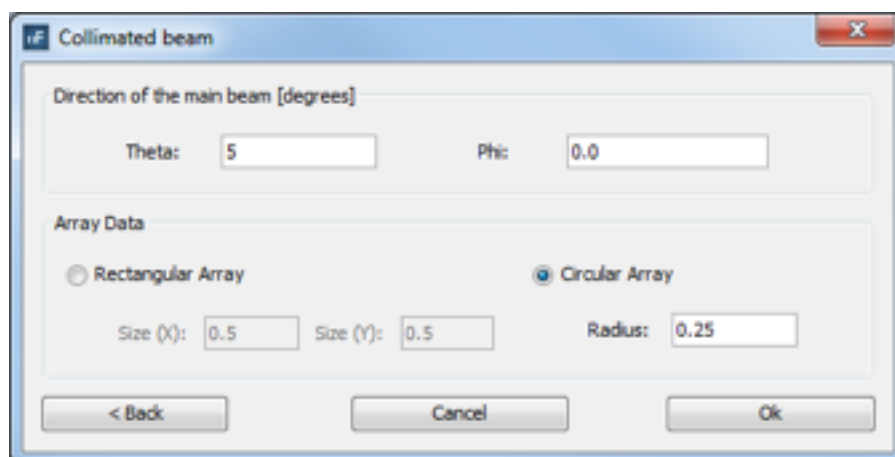


Figure 2 Collimated beam properties

When clicking **OK**, the geometry of the ultra-conformed reflector will be displayed in the main screen.

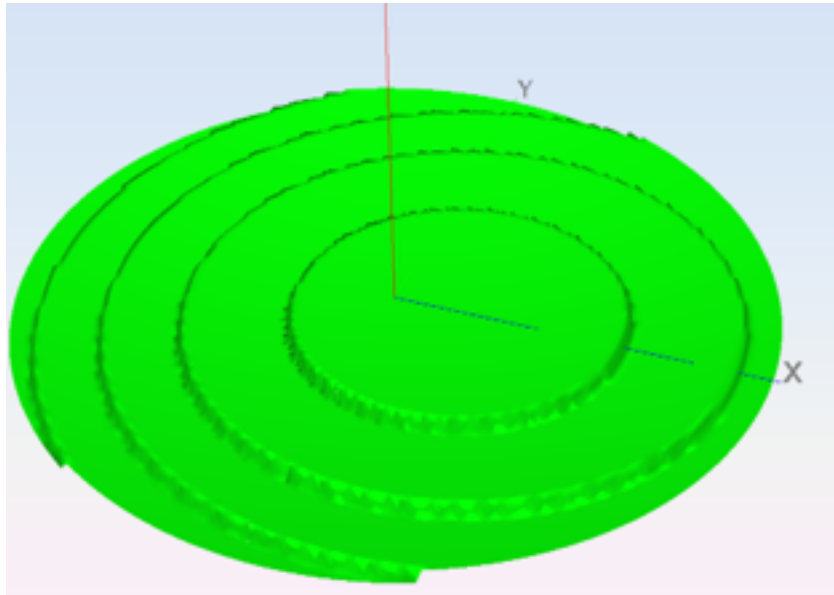


Figure 3 Geometry of the ultra-conformed reflector

Go to Solver  Parameters.

Select *Physical Optics* as the solution method and click *OK*.

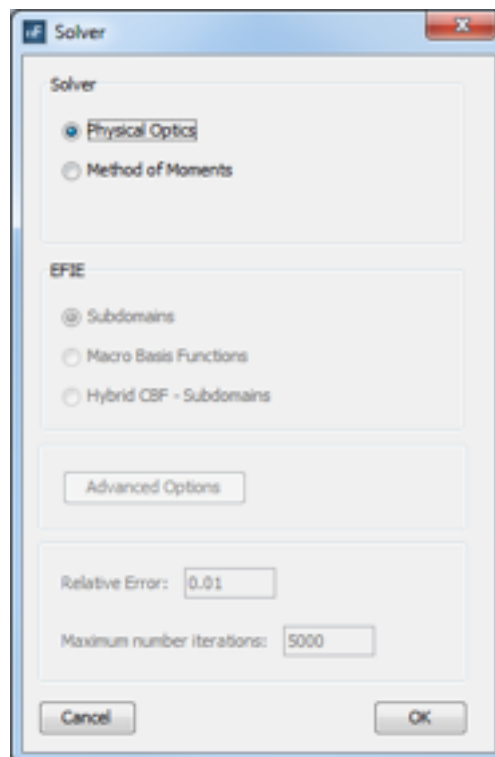



Figure 4 Solver properties

Select *Antennas*  *Define Feed Antenna Pattern File* to create the radiation pattern file that will be used to illuminate the ultra-conformed reflector. Set the antenna cosine model to $n=3$. Click *Create/Edit File*. A table with the values of the pattern file will be displayed. Click *Save File*. A message will be displayed informing that the file has been saved. Click *OK*.



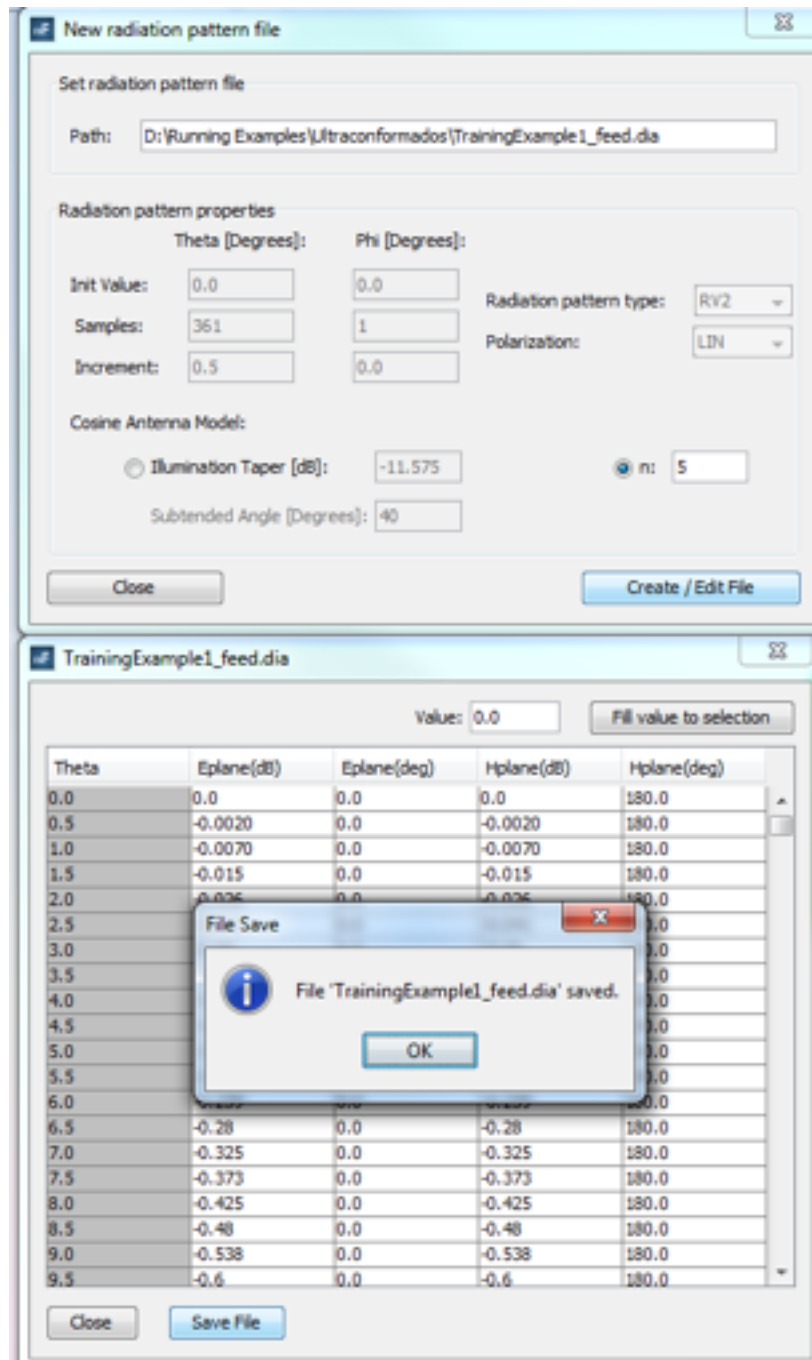



Figure 5 Define radiation pattern file

Now, go to **Antennas**  **Set Feed Antenna Pattern File**. Set one antenna in the next displayed window and click **OK**.

A new window will be displayed to set the antenna properties. First, the file that has just been created must be selected when clicking **Browse**. The extension of this type of files is **.dia**. Note that the coordinates of the antenna position are automatically set considering the focal length that was indicated when the ultra-conformed reflector was generated (0.0, 0.0, 0.5). However, this position can be edited. Finally, the antenna orientation is defined by means of the director cosines. They also are automatically calculated. The antenna always points to the ultra-conformed reflector center (0.0, 0.0, 0.0). Click **OK**.

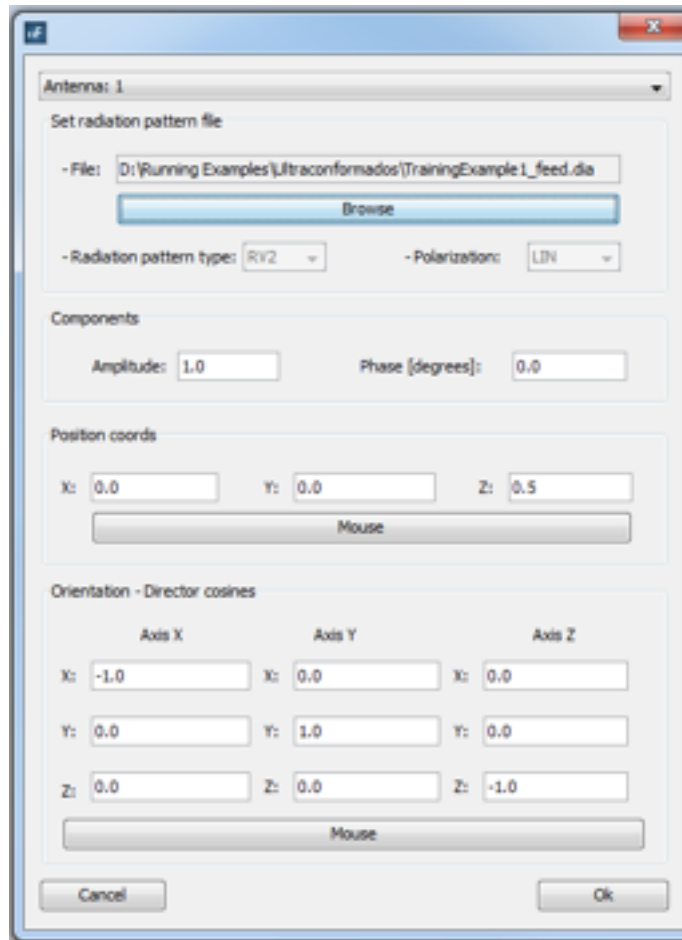



Figure 6 Set radiation pattern file

Note that the antenna is displayed in the main screen in red color. Its reference axes are depicted in green color.

Select *Meshing*  *Create and Visualize Mesh* to mesh the geometry. Set the operating frequency and the number of processors and click *OK*.

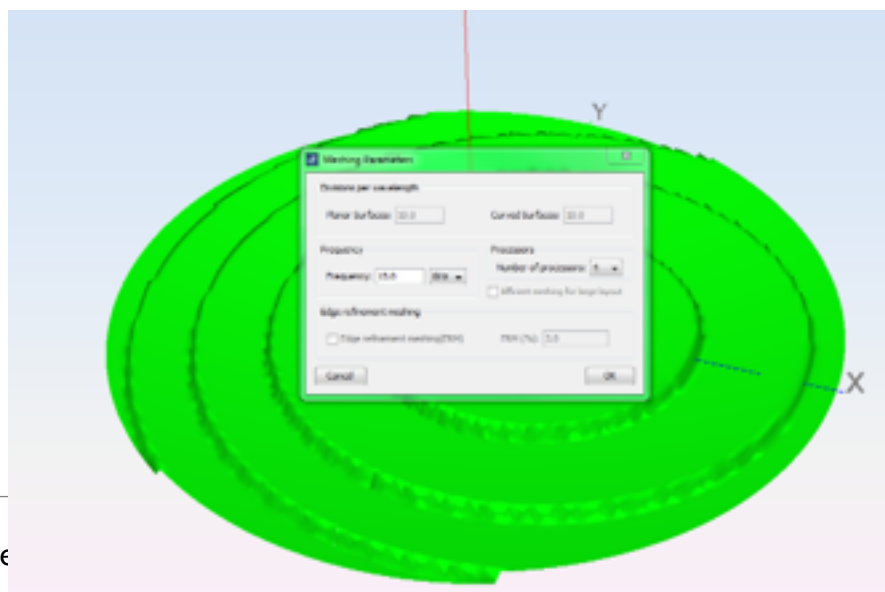


Figure 7 Meshing parameters

Once the meshing has finished, it will be displayed in the main screen.

Go to *Calculate* *Execute* and select the number of processors. Click *OK* to run the simulation.

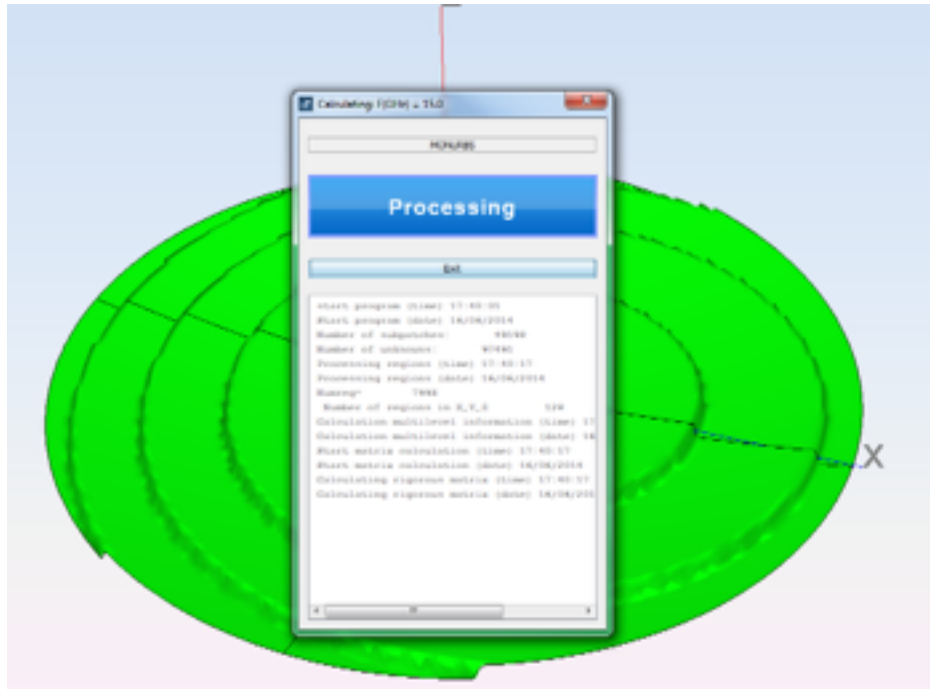


Figure 8 Simulation in progress

When the simulation finishes, go to *Show Results* *View Currents*. Select the units in dB and click *OK*. The current distribution will be shown in the main screen.

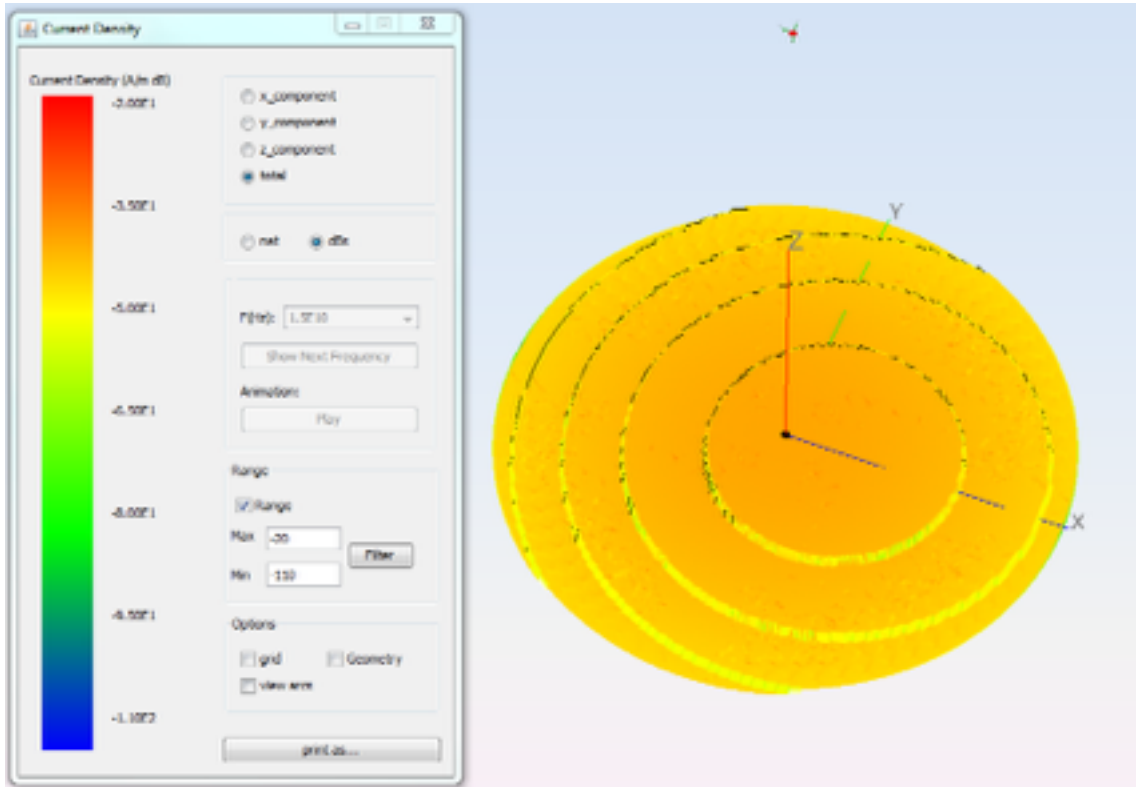


Figure 9 Current distribution in dB

Now go to **Show Results** **Other Diagrams** **View Point Level Curve**. The U-V diagram will be shown in the main screen.

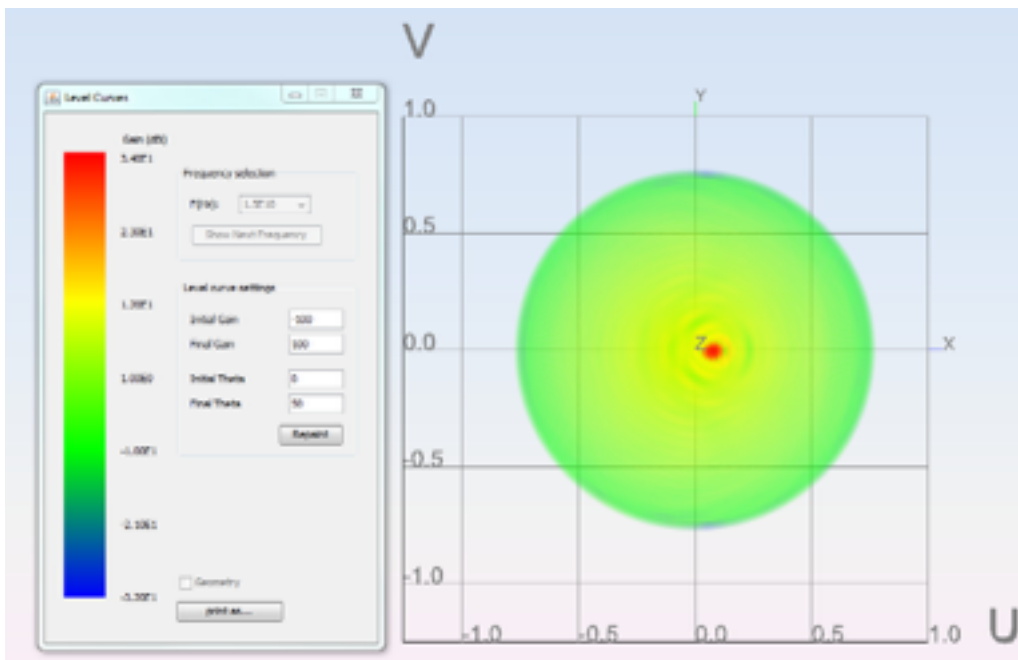


Figure 10 Point level curve

Select **Show Results** **View 3D Pattern** to display the 3D radiation pattern.
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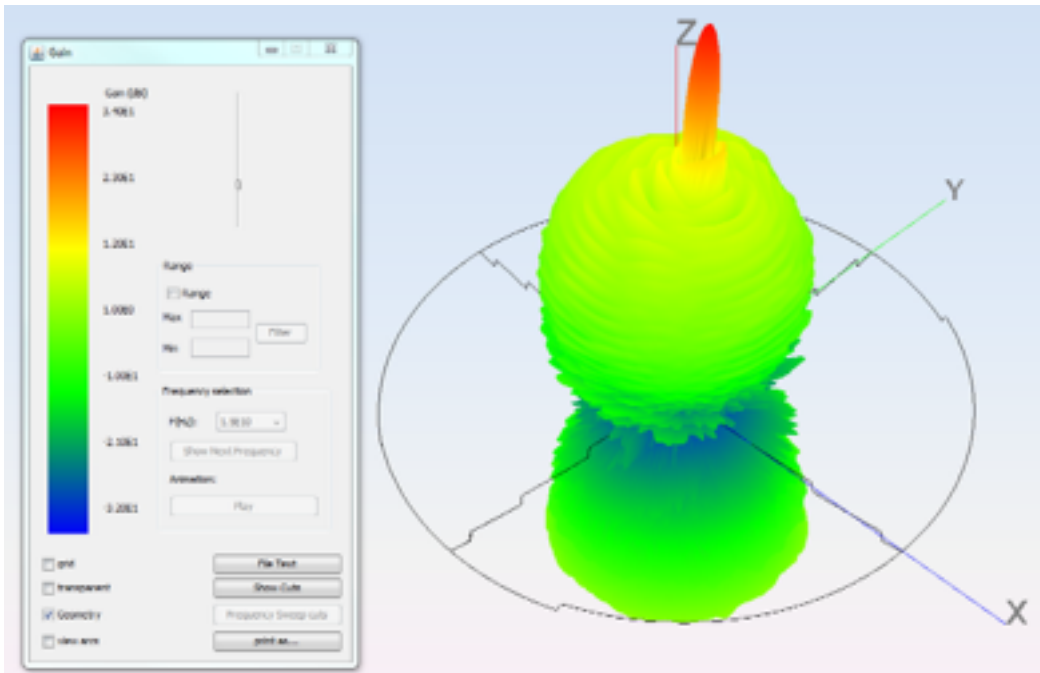


Figure 11 3D radiation pattern

Click the *Show Cuts* button located at the bottom of the secondary window that has been displayed when selecting the option *View 3D Pattern*.

Select *Gain (dBi)* and click *OK*. The graph will be displayed in a new window.

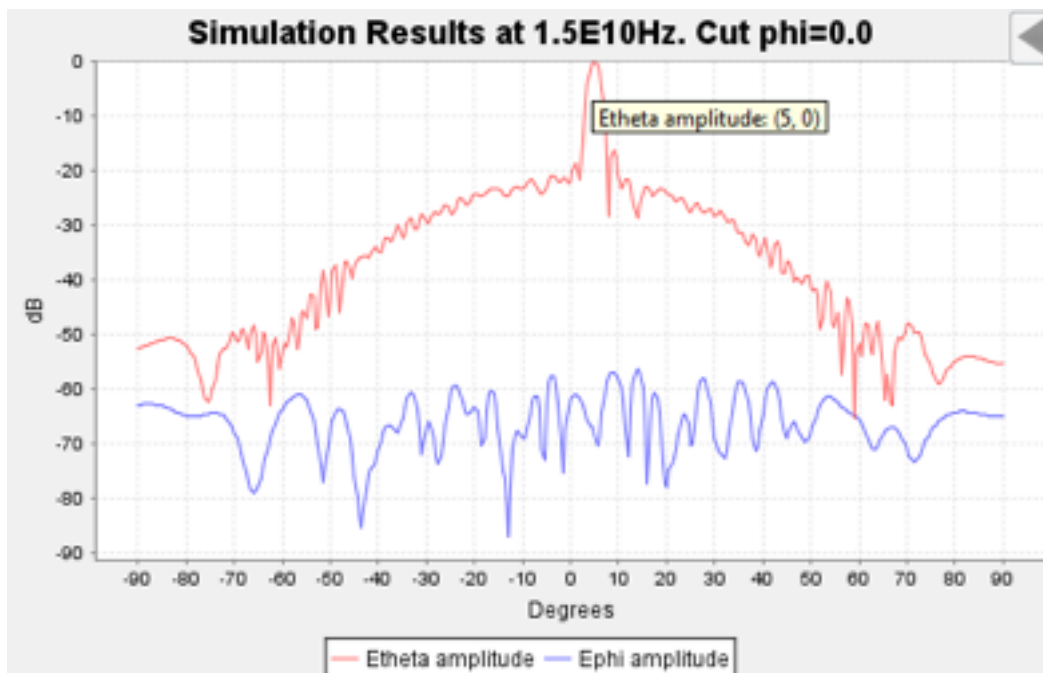


Figure 12 Cut $\phi = 0^\circ$ of the gain

Now go to *Show Results* *Other Diagrams* *View Theta Phi Diagram*. The U-V diagram will be shown in the main screen.

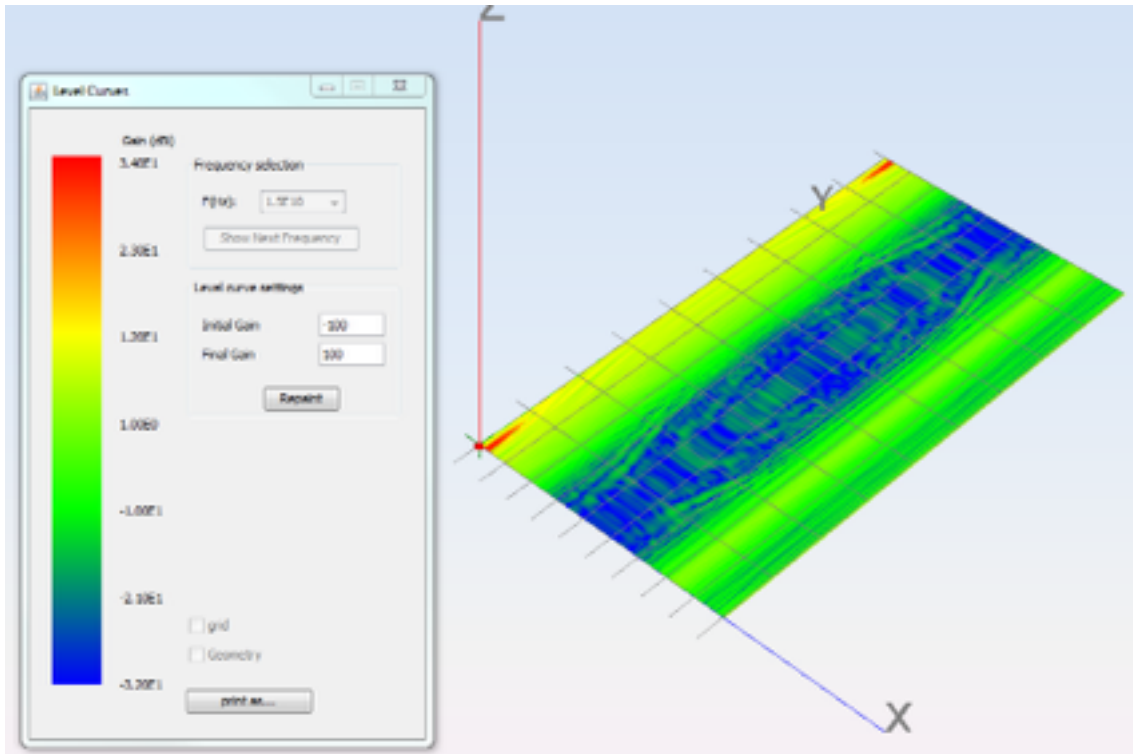


Figure 13 Theta Phi diagram