

Wavenology Tutorial

Parametric Analysis

Wave Computation Technologies, Inc.

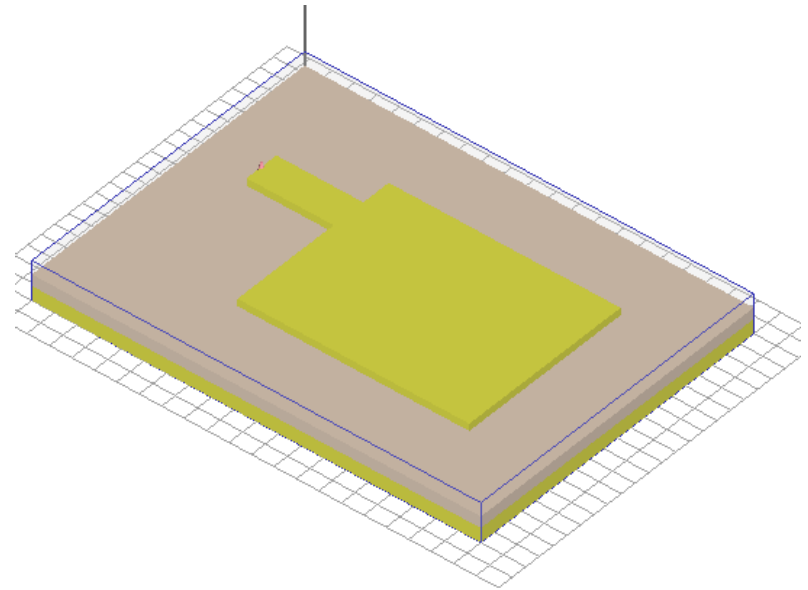
January 15, 2013

Introduction

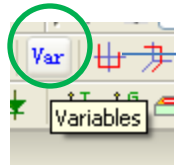
User can use parametric sweeping to decide the geometries dimensions to obtain a desired performance.

For example, there is a patch antenna with designed working freq. at 15.0 GHz. The width and length are expected around 12 mm and 15 mm, respectively.

Here, we will use parametric sweeping to tune the size of patch to obtain a best radiation performance.



1. Design the patch dimensions by **variables**.



Define variables:

$x_1=5$

$y_1=10$

$dx=12.45$

$dy=16$

Name	Content
x1	5
y1	10
dx	12.45
dy	16

Name: Definition:

Add Delete Modify

Reserved Variable Names

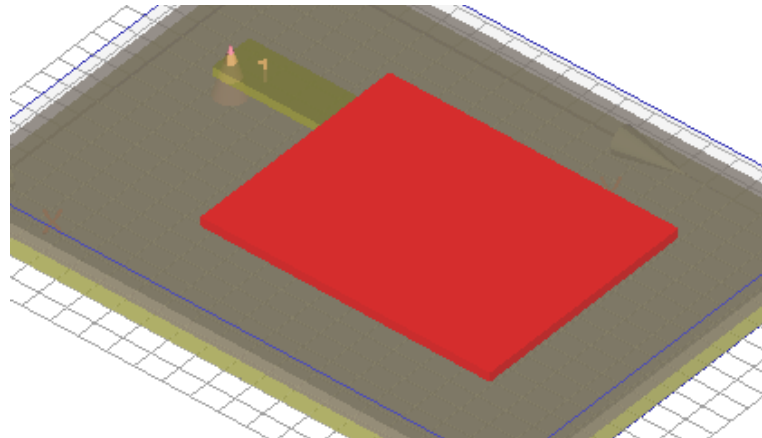
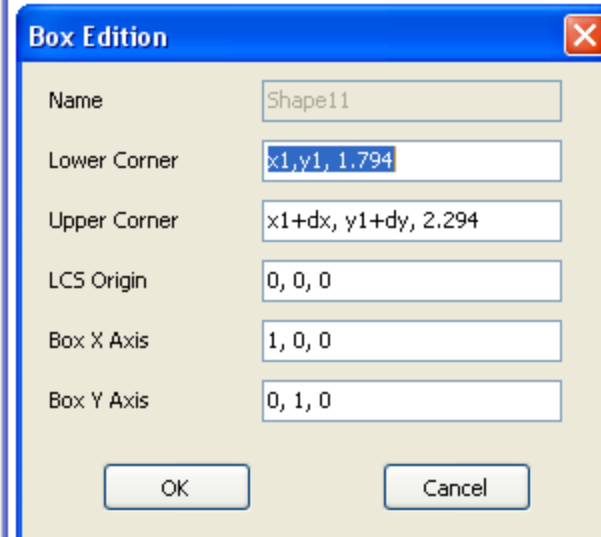
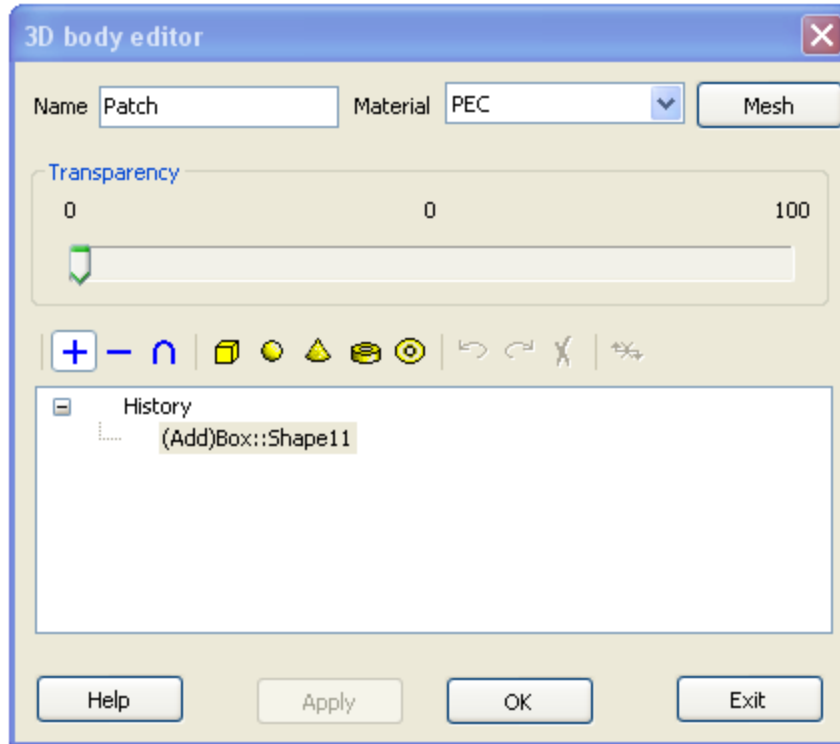
pi;e;t;

Build-In Functions

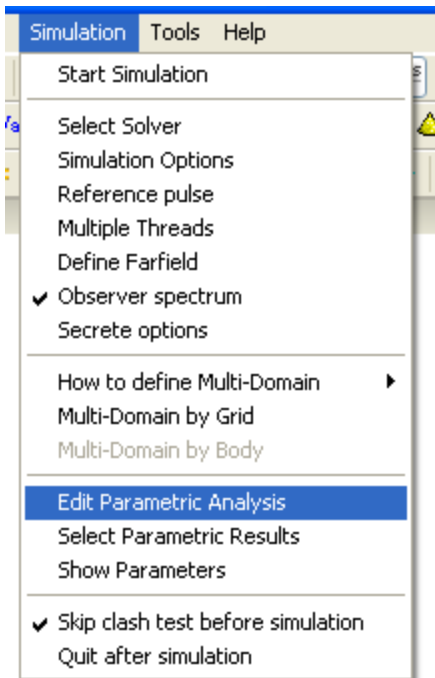
sin(); cos(); tan(); asin(); acos(); atan();
sinh(); cosh(); tanh(); asinh(); acosh(); atanh();
log2(); log10(); ln();
exp(); abs(); sqrt(); delta()

Help OK

2. Define patch dimension by variables.



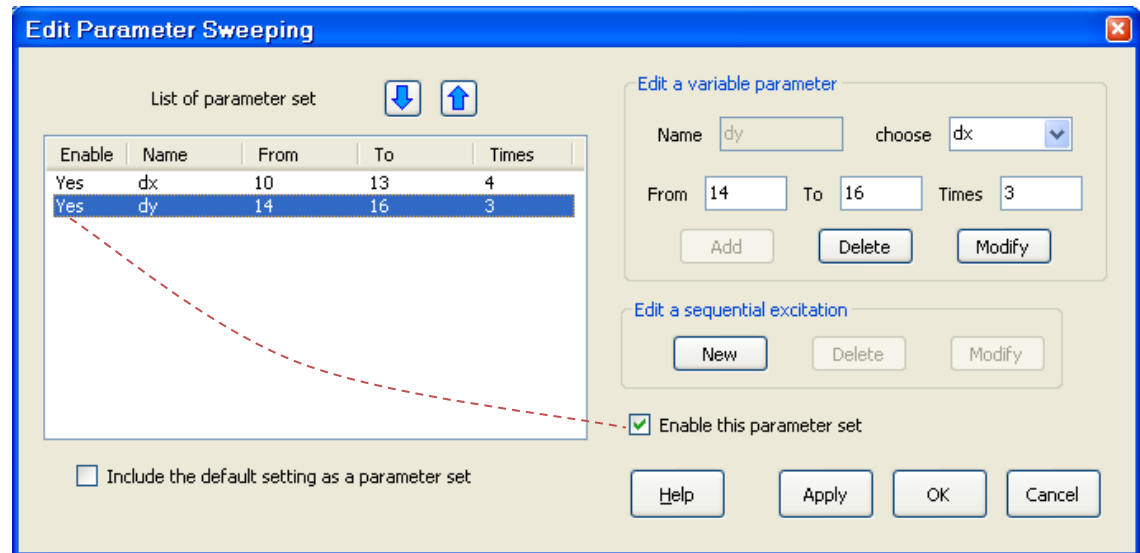
3. Define how to sweep



Use “**Edit Parametric Analysis**” to define which parameters will be swept.

Options:

- Enable this parameter set
→ Enable or Disable the parameter when parametric analysis.
- Include the default setting as a parameter set
→ Add the default parameter set to the last parameter set.



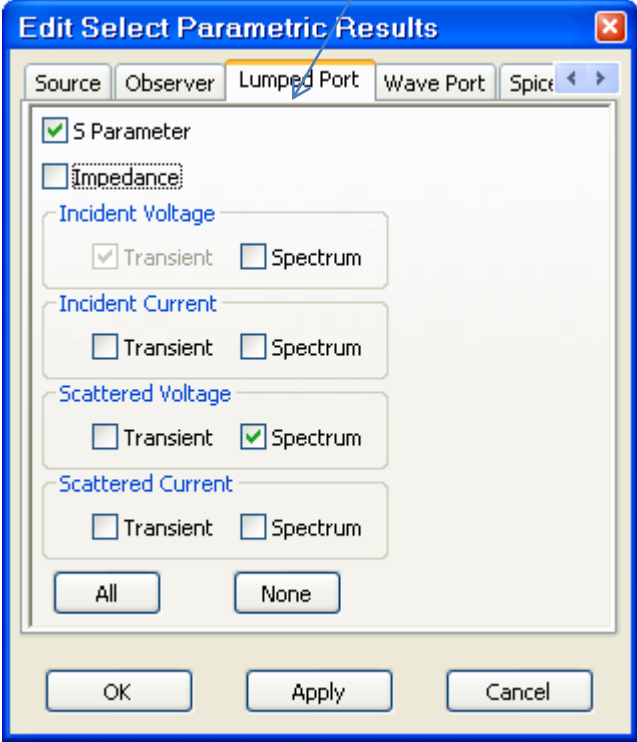
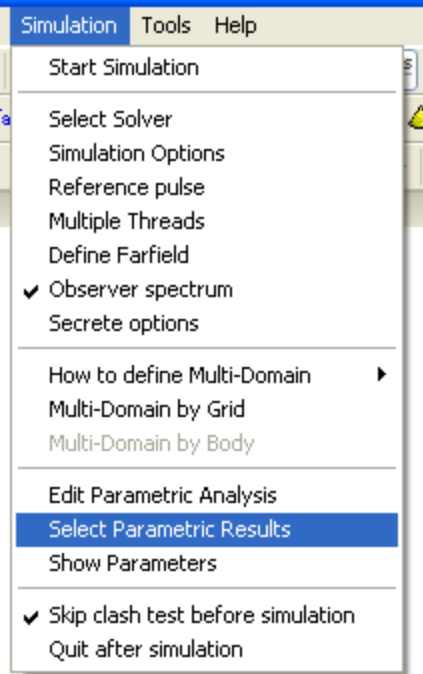
Here, we want to sweep:

dx from 10 to 13 with 4 steps, means dx=10, 11, 12 and 13, respectively.

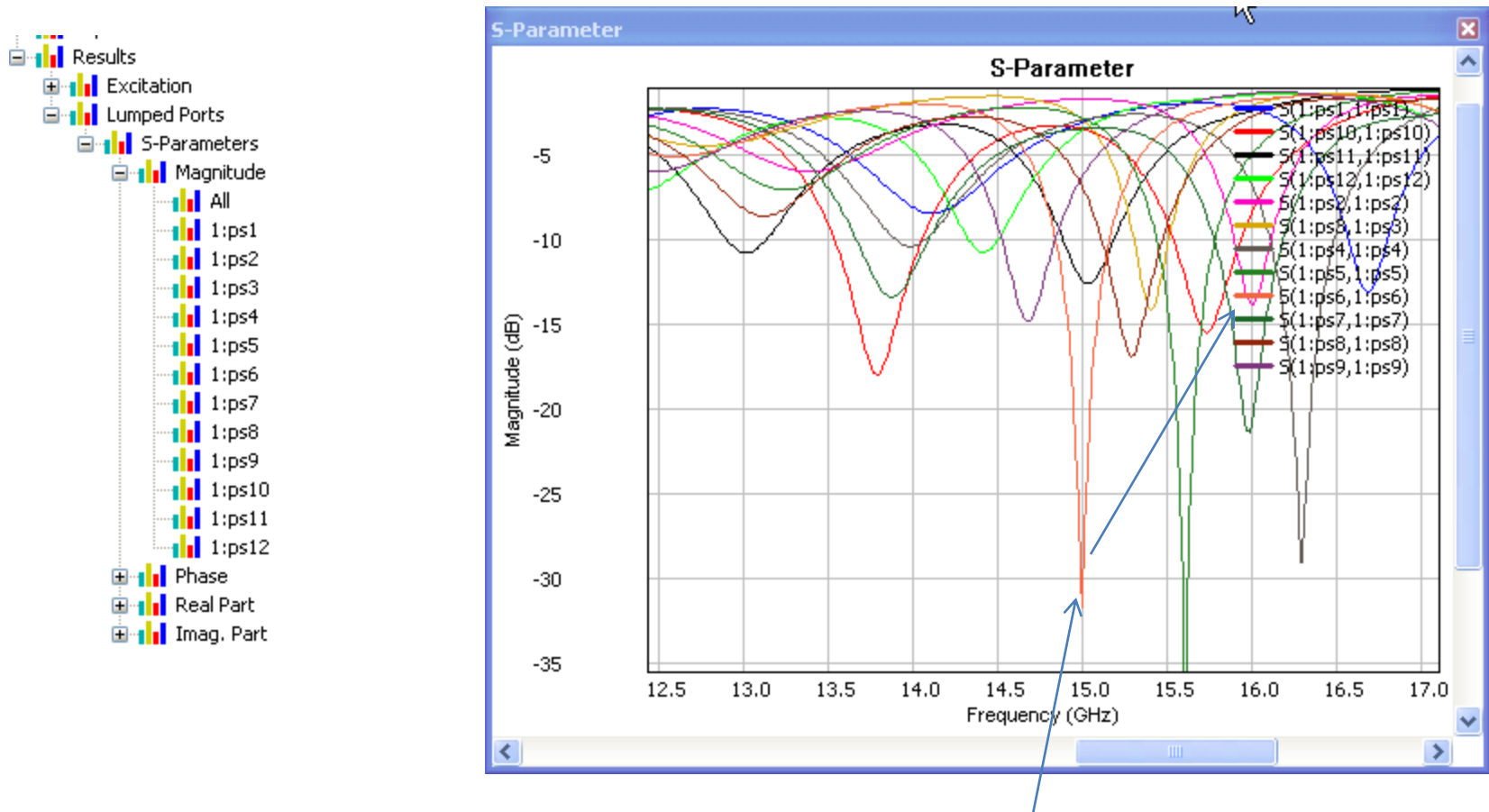
dy from 14 to 16 with 3 steps, means dy=14, 15 and 16, respectively.

4. User need to let system record S11 for the antenna in the sweeping.

Switch to **Lumped port** page and check “**S parameter**”. (In this case, we use lumped port as the excitation and record S11)

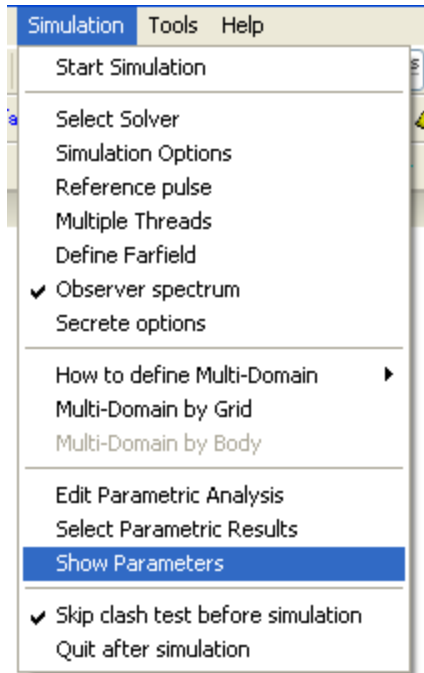


5. run sweeping and get results



It can be seen that **S11 ps6** has the best performance at 15.0 GHz

6. Check the corresponding dx and dy values for **SP6**.



The dialog box titled 'Table of Parameter Values' contains a table with two columns: 'Postfix' and 'Parameter set'. The table lists parameter sets from :ps2 to :ps9. The row for :ps6 is highlighted. Below the table are 'Refresh' and 'OK' buttons.

Postfix	Parameter set
:ps2	dx = 10, dy = 15
:ps3	dx = 10, dy = 16
:ps4	dx = 11, dy = 14
:ps5	dx = 11, dy = 15
:ps6	dx = 11, dy = 16
:ps7	dx = 12, dy = 14
:ps8	dx = 12, dy = 15
:ps9	dx = 12, dy = 16

Press “**Show Parameters**” menu

It can be seen that **S11 ps6** has dx=11 and dy=16, respectively.

Therefore, we can fix the patch with width as 11 mm and length as 16 mm to obtain the best radiation performance at 15.0 GHz.