

HFSS 建模與計算(3)

- 11. 根據數據結果修改計算頻率
- 12. 描繪場分佈
- 13. 設定Field calculator
- 14. Animation
- 15. 遠場分佈

11.1 回到原始模型。在Project 視窗點選Optimetrics: properties。
將\$length變數設為 single value，value = 50mm。

The screenshot displays the ANSYS Electronics Desktop interface. The main window is titled "dipole antenna - HFSSDesign1 - Gain Plot 5 - SOLVED". The Project Manager on the left shows the project structure, with "Optimetrics" selected under "Analysis". The Properties panel for "Optimetrics" is visible, showing a table with columns "Name", "Val...", "Unit", and "Evaluat".

The "Setup Sweep Analysis" dialog box is open, showing the "Sweep Definitions" tab. A table lists the sweep variables:

Sync #	Variable	Description
	\$length	Single Value at 50mm

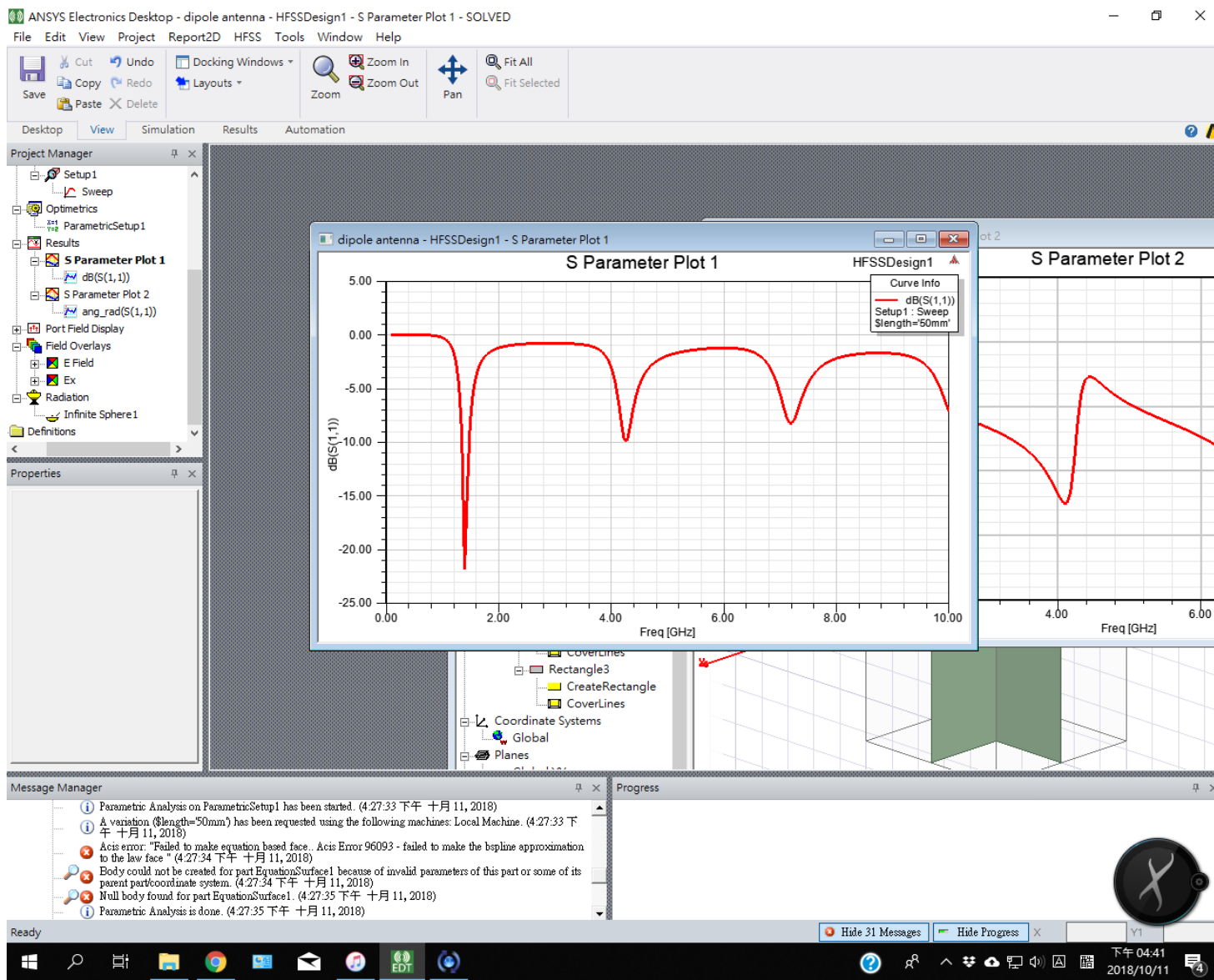
The "Add/Edit Sweep" dialog box is also open, showing the configuration for the selected variable:

- Variable: \$length
- Nominal value: 50mm
- Single value (selected)
- Value: 50 mm

The Message Manager at the bottom shows the following log entries:

- Parametric Analysis is done. (4:32:48 下午 十月 11, 2018)
- Normal completion of simulation on server: Local Machine. (4:39:47 下午 十月 11, 2018)
- Parametric Analysis on ParametricSetup1 has been started. (4:39:47 下午 十月 11, 2018)
- A variation (\$length=50mm) has been requested using the following machines: Local Machine. (4:39:47 下午 十月 11, 2018)
- Parametric Analysis is done. (4:39:53 下午 十月 11, 2018)
- Simulation was aborted by user on server: Local Machine. (4:44:57 下午 十月 11, 2018)
- Normal completion of simulation on server: Local Machine. (4:52:53 下午 十月 11, 2018)

11.2 打開S參數的計算結果，在0.10GHz到10GHz內有三個吸收，為重要的頻率。把頻率記下來為 1.4GHz, 4.25GHz和 7.2GHz。我們將針對這三個頻率計算場分佈。



11.3 為了增加計算精確度，點選Analysis: properties，修改solution frequency為Multi-frequencies，修改頻率為1.4GHz, 4.25GHz和7.2 GHz。修改完後需要重新計算

The screenshot displays the ANSYS Electronics Desktop interface for a dipole antenna simulation. The main window shows a 3D model of the antenna and an S Parameter Plot 2 graph. The graph plots dB(S(1,1)) on the y-axis (ranging from -17 to 0) against Freq [GHz] on the x-axis (ranging from 7.44 to 6.00). A red curve shows the S-parameter response, with a prominent resonance dip around 4.25 GHz.

The **Driven Solution Setup** dialog box is open, showing the following configuration:

- Setup Name: Setup1
- Enabled: Solve Ports Only:
- Adaptive Solutions:
 - Solution Frequency: Single Multi-Frequencies Broadband
 - Table of frequencies:

Frequency	Unit	Max. Delta
1.4	GHz	0.02
4.25	GHz	0.02
7.2	GHz	0.02
 - Maximum Number of Passes: 25
- Buttons: Add, Remove, Use Defaults, HPC and Analysis Options...

The Properties panel on the left shows the following settings for the S Parameter Plot 1:

Name	Val...	Unit	Eval...
Name	Set...		
Enabled	<input checked="" type="checkbox"/>		
Passes	25		
Percent ...	30		
Delta S	0.01		
Solution ...	3	GHz	
Basis Or...	Firs...		
Max Refi...	100...		
Use Max...	<input type="checkbox"/>		
Use ABC ...	<input type="checkbox"/>		

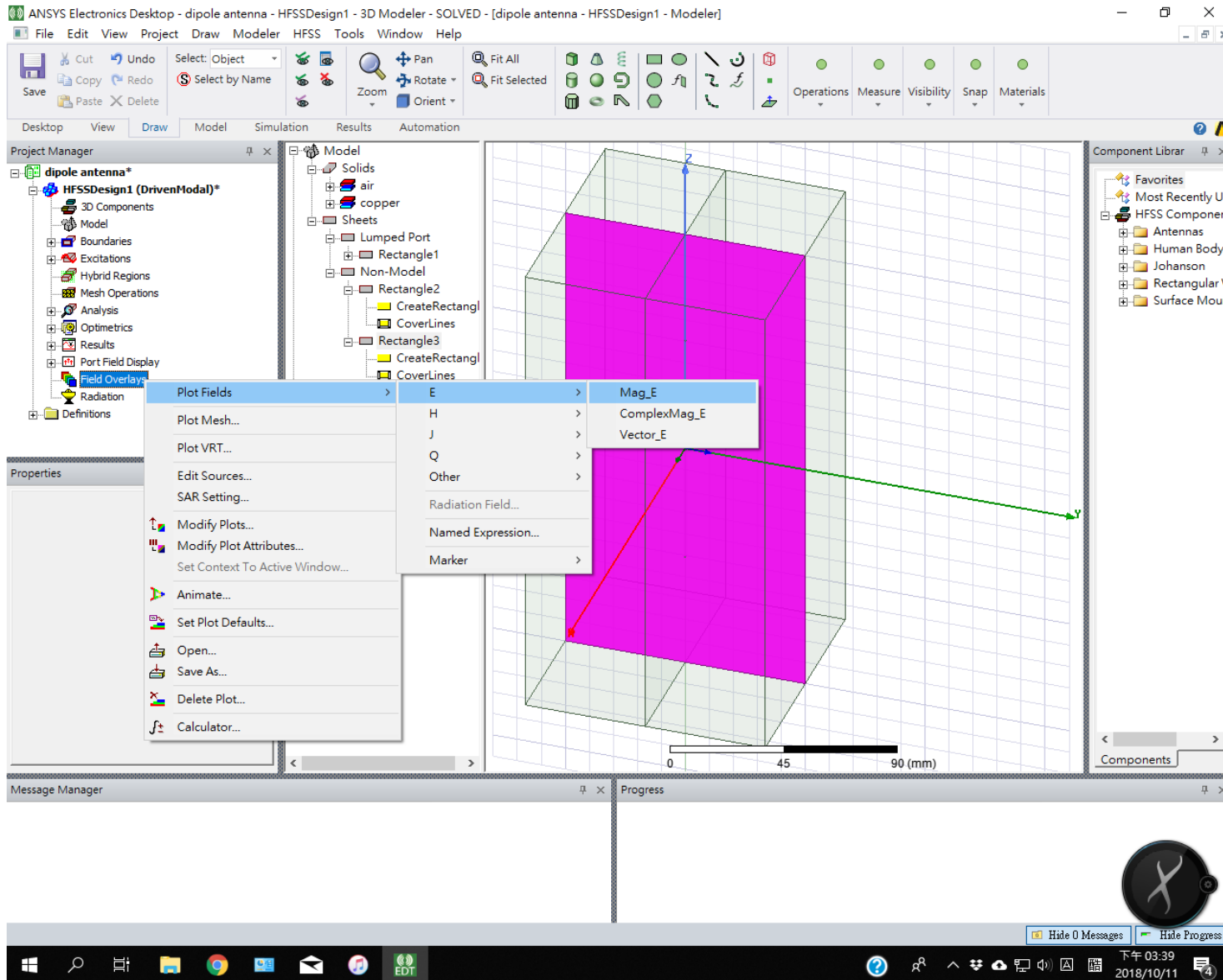
The Message Manager at the bottom shows several messages, including a warning about a variation in length and an error related to the Acis error 96093.

12.1 計算前可以先把要畫的場分佈先設定好。假設我們想觀察在XZ和YZ平面的電磁場，需要先在模型中畫出這兩個面。先畫XZ平面，物件歸類為non-model

The screenshot displays the ANSYS Electronics Desktop interface for a dipole antenna simulation. The main 3D view shows a rectangular box with a pink vertical plane (Rectangle2) representing the XZ plane. The coordinate system is visible with X, Y, and Z axes. The Project Manager on the left shows the hierarchy: dipole antenna* > HFSSDesign1 (DrivenModal)* > Non-Model > Rectangle2. The Properties panel at the bottom left shows the details for Rectangle2, including its name, orientation (Global), and color (pink). The Component Library on the right lists various components like Antennas, Human Body, and Johanson. The status bar at the bottom indicates '1 object is selected'.

Name	Value	Unit	Evaluated
Name	Rectangle2		
Orientati...	Global		
Model	<input type="checkbox"/>		
Group	Model		
Display ...	<input type="checkbox"/>		
Material ...	<input type="checkbox"/>		
Color	<input type="text" value="Pink"/>		
Transpar...	0		

12.2 將YZ平面也畫好，在模型上點選平面後，在Project視窗Field Overlays: Plot fields選 E: Mag_E 為電場強度。



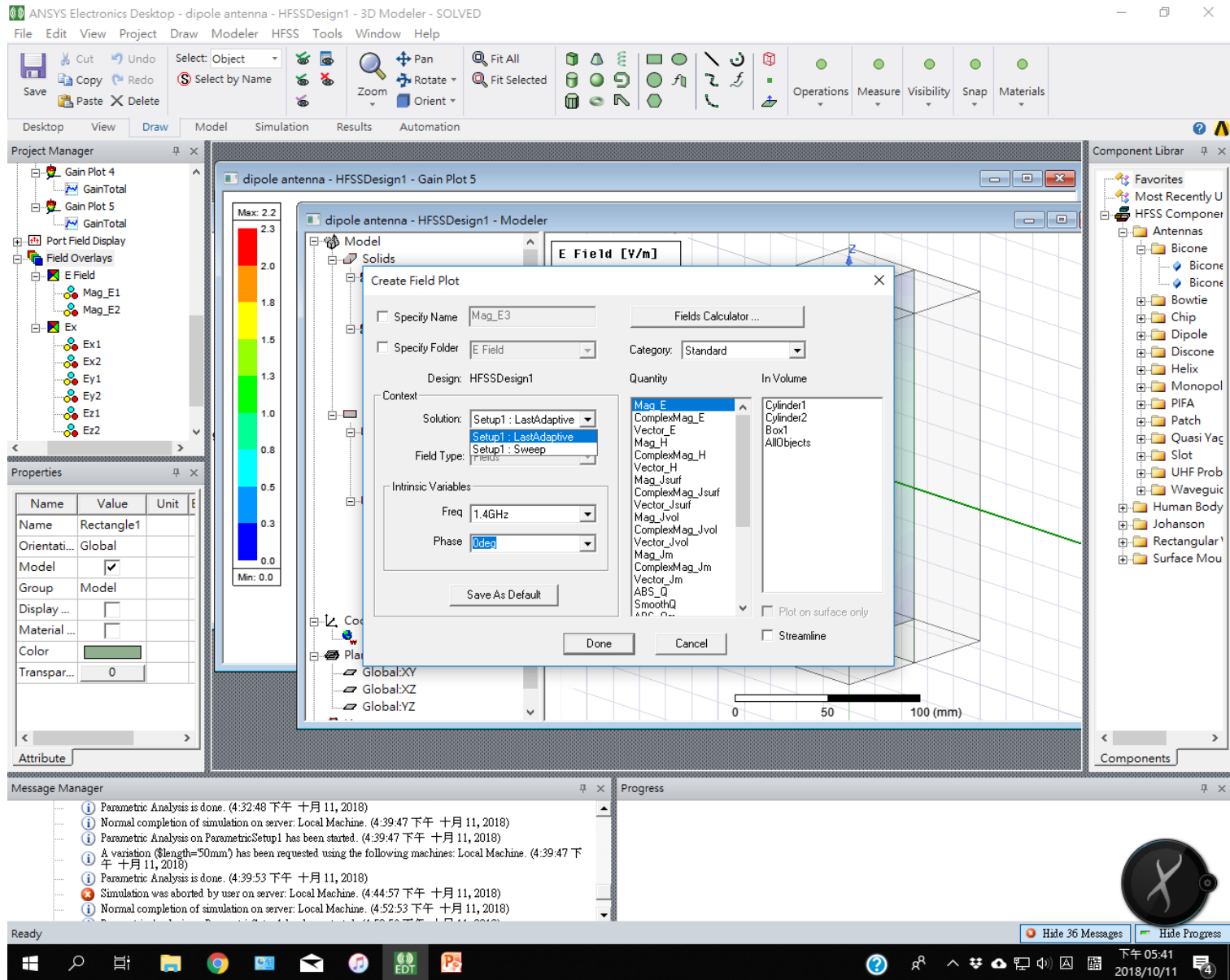
12.3 也可以在 Model 視窗物件上按右鍵選 Plot Fields: E: Mag_E。

The screenshot displays the ANSYS Electronics Desktop interface. The main window shows a 3D model of a dipole antenna structure. A context menu is open over a rectangular component, with the following path selected: **Plot Fields** > **E** > **Mag_E**. The Properties panel on the left shows the selected object is 'Rectangle2' with a color of green and transparency of 0. The Project Manager on the left shows the hierarchy of the model, including 'HFSSDesign1 (DrivenModal)' and 'Rectangle2'. The Message Manager at the bottom shows a message for the current file.

Name	Value	Unit	Evaluated
Name	Rectangle2		
Orientati...	Global		
Model	<input type="checkbox"/>		
Group	Model		
Display ...	<input type="checkbox"/>		
Material ...	<input type="checkbox"/>		
Color			
Transpar...	0		

Hide 3 Messages Hide Progress

12.4 對話視窗需要選擇Solution。可以是LastAdaptive或Sweep。前者只有少數幾個頻率可以選，後者則可以掃頻的範圍中各點。前者結果較準確。



12.5 設完後就會看到左方Field Overlay有兩個圖形。右方則產生對應的結果。

The screenshot displays the ANSYS Electronics Desktop interface for a dipole antenna simulation. The main 3D view shows the antenna structure with a color-coded field overlay. A legend titled "E Field [V/m]" provides the scale for the field magnitude, ranging from 2.1067E+00 (blue) to 2.5203E+04 (red). The 3D view includes a coordinate system with X, Y, and Z axes and a scale bar from 0 to 90 mm.

The Project Manager on the left shows the model hierarchy, including Solids (air, copper, Box1, Cylinder1, Cylinder2), Sheets (Lumped Port, Rectangle1, Rectangle2, Rectangle3), and Coordinate Systems (Global, Global:XY, Global:XZ, Global:YZ). The Properties panel shows the selected object "Mag_E2" with a solution of "Setup1...", phase of 0 deg, and frequency of 3 GHz.

Name	Value	Unit	Evaluated Va...
Name	Mag_E2		
Solution	Setup1...		
Phase	0	deg	
Freq	3	GHz	

Message Manager: dipole antenna (C:/Users/QDL/Documents/Ansoft)

Nothing is selected

下午 03:43
2018/10/11

12.6 點選右方圖例可以調整顏色對比以清晰呈現結果。

The screenshot displays the ANSYS Electronics Desktop interface for a dipole antenna simulation. The main window shows a 3D model of the antenna with a color map plot of the electric field (E Field) in V/m. The plot shows two lobes of high field strength (red) along the vertical axis, with field strength decreasing as the distance from the antenna increases (blue). A color legend on the left indicates the field values, ranging from 0.0000E+00 to 5.0000E+02 V/m. The interface includes a toolbar with various tools like Pan, Rotate, and Fit, and a component library on the right. The Windows taskbar at the bottom shows the system time as 03:45 on 2018/10/11.

ANSYS Electronics Desktop - dipole antenna - HFSSDesign1 - 3D Modeler - SOLVED - [dipole antenna - HFSSDesign1 - Modeler]

File Edit View Project Draw Modeler HFSS Tools Window Help

[dipole antenna] HFSSDesign1 -- E Field

Deformation Scale Plots
Color map Scale Marker/Arrow

Num. 15 Save as default

Auto Min: 0.0000E+00
Use Limits Max: 5.0000E+02
Specify Values Scale Values...
dB Units V_per_meter

Linear Log

Auto Scale Options
Limit Max/Min precision to 4 digits

Number Format
Type: Scientific Width: 12
Precision: 4

Real time mode Apply Close

Field [V/m]

5.0000E+02
4.6667E+02
4.3333E+02
4.0000E+02
3.6667E+02
3.3333E+02
3.0000E+02
2.6667E+02
2.3333E+02
2.0000E+02
1.6667E+02
1.3333E+02
1.0000E+02
6.6667E+01
3.3333E+01
0.0000E+00

Component Librar

Favorites
Most Recently U
HFSS Componer
Antennas
Human Body
Johanson
Rectangular¹
Surface Mou

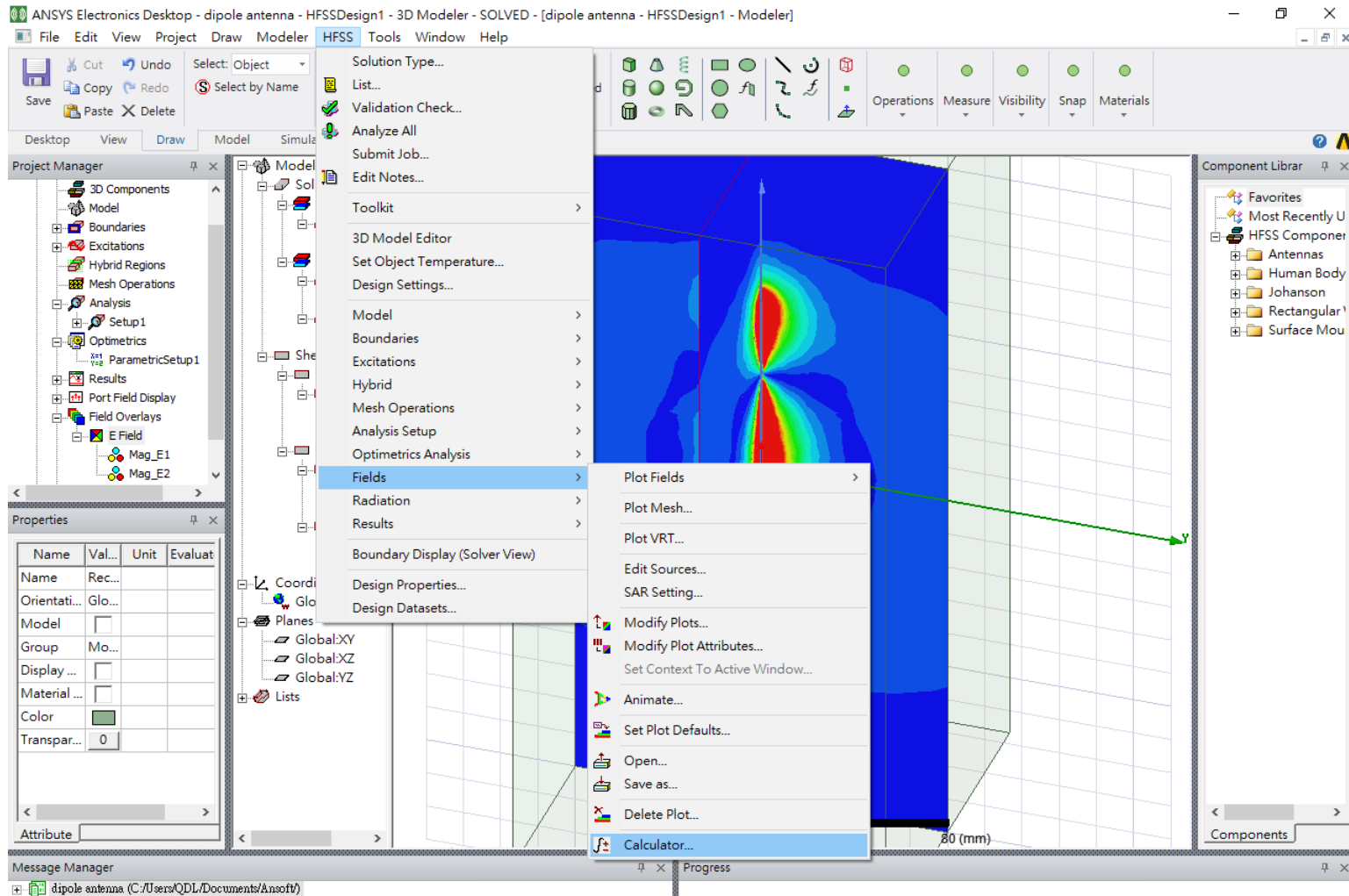
Message Manager
dipole antenna (C:/Users/QDL/Documents/Ansoft)

Progress

Ready Hide 3 Messages Hide Progress

下午 03:45
2018/10/11

13.1 要描繪分量必須自行定義輸出變數。在HFSS下拉選單點 Fields: Calculator...



13.2 Calculator 功能很多，我們先在左上方找到Vector_E 然後下方按 Copy to stack。

The screenshot displays the ANSYS Electronics Desktop interface. The main window shows a 3D model of a dipole antenna. Overlaid on this is the 'Fields Calculator' dialog box. In the 'Named Expressions' list, 'Vector_E' is selected. The 'Copy to stack' button is highlighted with a green arrow. The 'Context' is set to 'HFSSDesign1' and the 'Solution' is 'Setup1: LastAdaptive'. The 'Field Type' is 'Fields', 'Freq' is '1.4GHz', and 'Phase' is '0deg'. The 'Vec: Vector_E' field is visible in the lower section of the dialog. The background shows the 'Project Manager' with 'Gain Plot 4' selected, the 'Properties' panel, and the 'Component Library'.

Name	Val...	Unit	Evaluat
Name	Ma...		
Solution	Set...		
Phase	0	deg	
Freq	1.4	GHz	

13.3 下方可以選擇ScaleX代表取出向量的X分量。現在中間的計算式欄呈現ScaleX(Vector_E)。

ANSYS Electronics Desktop - dipole antenna - HFSSDesign1 - 3D Modeler - SOLVED

File Edit View Project Draw Modeler HFSS Tools Window Help

Save Cut Undo Select: Object Select by Name Copy Redo Paste Delete

Desktop View Draw Model Simulation Re

Project Manager

dipole antenna - HFSSDesign1

Gain Plot 4 GainTotal Gain Plot 5 GainTotal Port Field Display Field Overlays E Field Mag_E1 Mag_E2 Ex Ex1 Ex2 Ey1 Ey2 Ez1 Ez2

Properties

Name	Val...	Unit	Evaluat
Name	Ma...		
Solution	Set...		
Phase	0	deg	
Freq	1.4	GHz	

Message Manager

- Parametric Analysis is done. (4:32:48 下午 十月 11, 2018)
- Normal completion of simulation on server: Local Machine (4:32:53 下午 十月 11, 2018)
- Parametric Analysis on ParametricSetup1 has been started. (4:32:53 下午 十月 11, 2018)
- A variation (length=50mm) has been requested using ParametricSetup1. (4:32:53 下午 十月 11, 2018)
- Parametric Analysis is done. (4:39:53 下午 十月 11, 2018)
- Simulation was aborted by user on server: Local Machine (4:52:53 下午 十月 11, 2018)
- Normal completion of simulation on server: Local Machine. (4:52:53 下午 十月 11, 2018)

Fields Calculator

Context: HFSSDesign1

Solution: Setup1: LastAdaptive

Field Type: Fields

Freq: 1.4GHz

Phase: 0deg

Named Expressions

Name	Expression
ABS_Q	CmplkMag(Sm...
ABS_Qm	CmplkMag(Sm...
Vector_E	AIPhase(Smoo...
Vector_H	AIPhase(Smoo...
Vector_I.vnl	AIPhase(Smnnl...

Library: Load From... Save To...

ScaleX(Vector_E)

Push Pop RIUp RIDn Exch Clear Undo

Quantity	General	Scalar	Vector	Output
Geometry...	+	Vec?	ScaleX	Value
Constant	-	1/x	ScaleY	Eval
Number...	*	Pow	ScaleZ	Write...
Function...	/	√	Dot	Export...
Geom Settings...	Neg	Trig	Cross	
Read...	Abs	d/d?	Divg	
	Smooth	∫	Curl	
	Complex	Min	Tangent	
	Domain	Max	Normal	
		Ln	Unit Vec	
		Log	X Form	
		Mean		
		Std		

Done

Component Library

- Most Recently Used
- HFSS Component

 - Antennas
 - Bicore
 - Bicore
 - Bicore
 - Bowtie
 - Chip
 - Dipole
 - Discore
 - Helix
 - Monopole
 - PIFA
 - Patch
 - Quasi Yag
 - Slot
 - UHF Prob
 - Waveguic
 - Human Body
 - Johanson
 - Rectangular
 - Surface Mou

13.4 當計算式完成後，可以按Add並輸入算式 (expression) 的名稱。我們輸入Ex。
Save to...可以將計算式存檔， Load from...可以載入存檔。

The screenshot displays the ANSYS Electronics Desktop interface for a dipole antenna simulation. The main window shows a 3D model of the antenna with a color scale plot indicating field intensity. The 'Fields Calculator' dialog is open, showing a list of named expressions including 'ABS_Q', 'ABS_Qm', 'Vector_E', 'Vector_H', and 'Vector_Ivnl'. The 'Named Expression' dialog is also open, with the name 'Ex' entered. The calculator shows the formula 'Scal: Scalar*(Vector_E)'. The background shows a 3D model of the antenna with a color scale plot and a component library on the right.

ANSYS Electronics Desktop - dipole antenna - HFSSDesign1 - 3D Modeler - SOLVED

File Edit View Project Draw Modeler HFSS Tools Window Help

Save Copy Paste Undo Redo Select: Object Select by Name

Desktop View Draw Model Simulation Re

Project Manager

- Gain Plot 4
- Gain Total
- Gain Plot 5
- Gain Total
- Port Field Display
- Field Overlays
 - E Field
 - Mag_E1
 - Mag_E2
 - Ex
 - Ex1
 - Ex2
 - Ey1
 - Ey2
 - Ez1
 - Ez2

Properties

Name	Val...	Unit	Evaluat
Name	Ma...		
Solution	Set...		
Phase	0	deg	
Freq	1.4	GHz	

Definition

Message Manager

- Parametric Analysis is done. (4:32:48 下午 十月 11, 2018)
- Normal completion of simulation on server: Local Machine (4:32:48 下午 十月 11, 2018)
- Parametric Analysis on ParametricSetup1 has been started. (4:32:48 下午 十月 11, 2018)
- A variation (\$length=50mm) has been requested using ParametricSetup1. (4:32:48 下午 十月 11, 2018)
- Parametric Analysis is done. (4:39:53 下午 十月 11, 2018)
- Simulation was aborted by user on server: Local Machine (4:39:53 下午 十月 11, 2018)
- Normal completion of simulation on server: Local Machine (4:52:53 下午 十月 11, 2018)

Fields Calculator

Context: HFSSDesign1

Solution: Setup1 : LastAdaptive

Field Type: Fields

Freq: 1.4GHz

Phase: 0deg

Named Expressions

Name	Expression
ABS_Q	CmplkMag(Smc)
ABS_Qm	CmplkMag(Smc)
Vector_E	AIPhase(Smooth)
Vector_H	AIPhase(Smooth)
Vector_Ivnl	AIPhase(Smooth)

Add ... Copy to stack Delete Delete All

Library: Load From... Save To... Change Variable Values...

Scal: Scalar*(Vector_E)

Named Expression

Name: Ex

OK Cancel

Input Geometry... Quantity + Vec? Scal? Output Value

Geometry...	-	1/x	Matt...	Eval
Constant	*	Pow	Mag	Write...
Number...	/	√	Dot	Export...
Function...	Neg	Trig	Cross	
Geom Settings...	Abs	d/d?	Divg	
Read...	Smooth	∫	Curl	
	Complex	Min	Tangent	
	Domain	Max	Normal	
		▽	Unit Vec	
		Ln	X Form	
		Log		
		Mean		
		Std		

Done

Component Library

- Favorites
- Most Recently U
- HFSS Component
 - Antennas
 - Bicone
 - Bicone
 - Bicone
 - Bowtie
 - Chip
 - Dipole
 - Discone
 - Helix
 - Monopole
 - PIFA
 - Patch
 - Quasi Yag
 - Slot
 - UHF Prob
 - Waveguide
 - Human Body
 - Johanson
 - Rectangular
 - Surface Mou

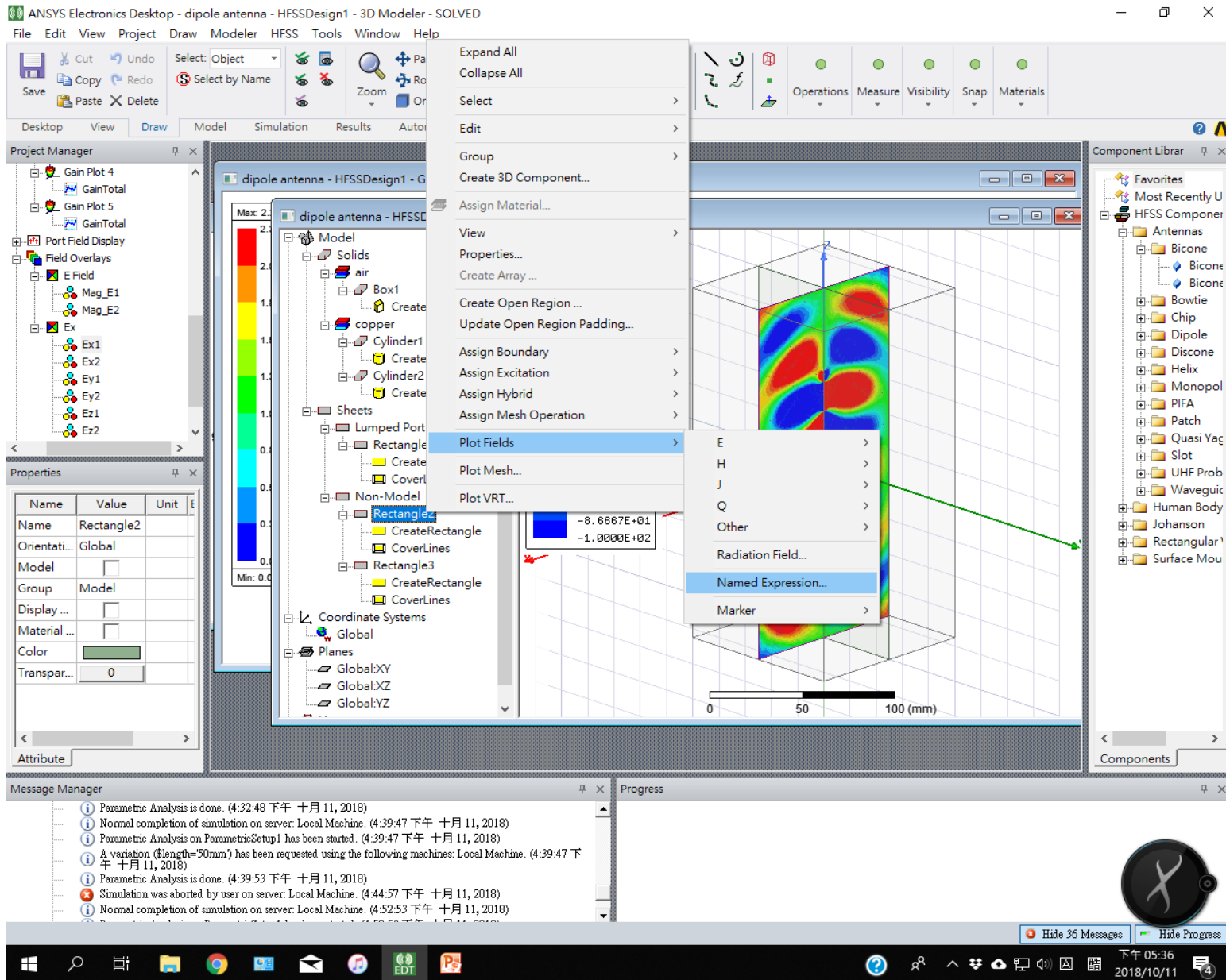
Components

Ready

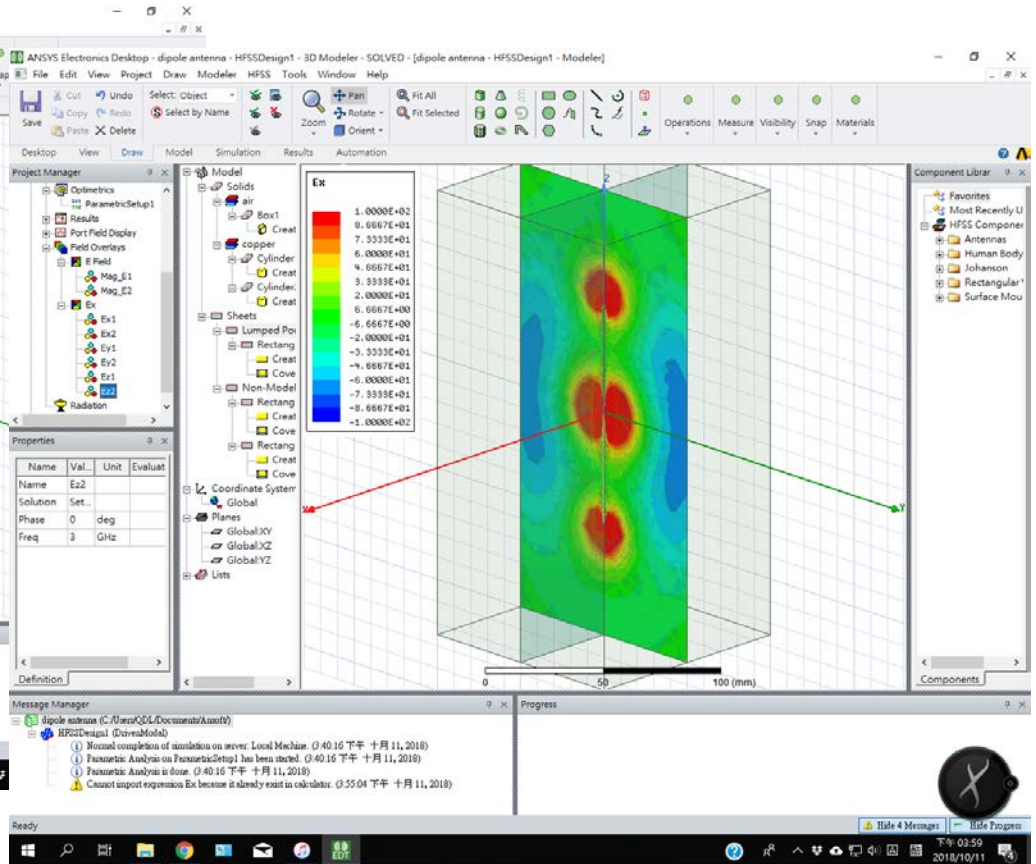
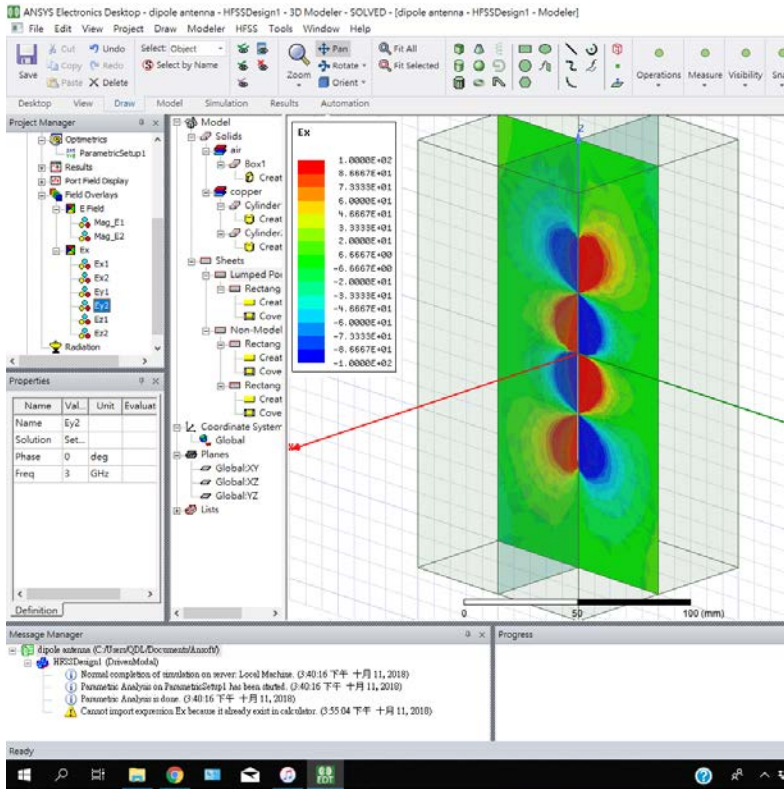
Hide 36 Messages Hide Progress

下午 05:33 2018/10/11

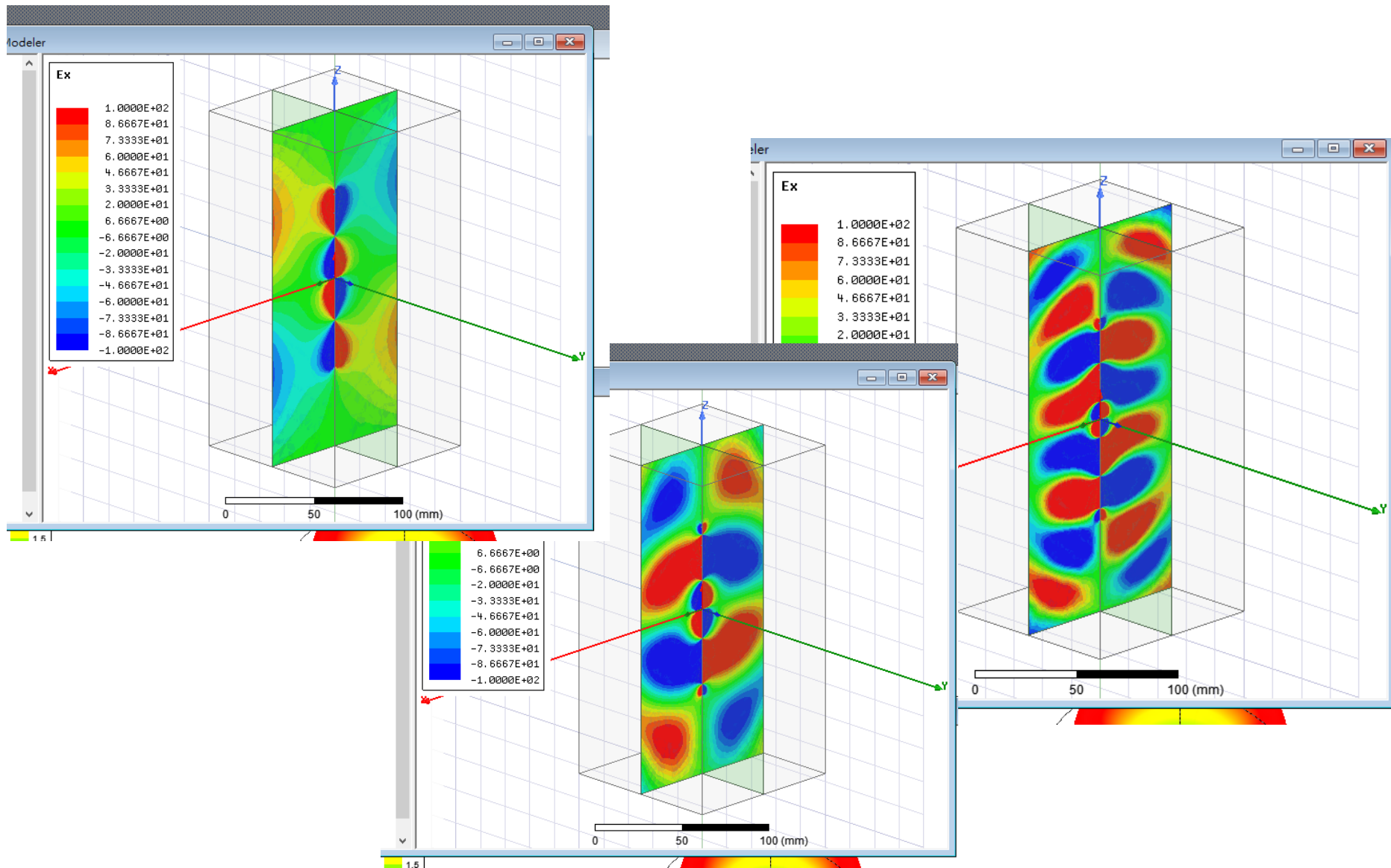
13.5 回到Plot Field 選擇 Named Expression..可以選剛剛建立的計算式Ex。



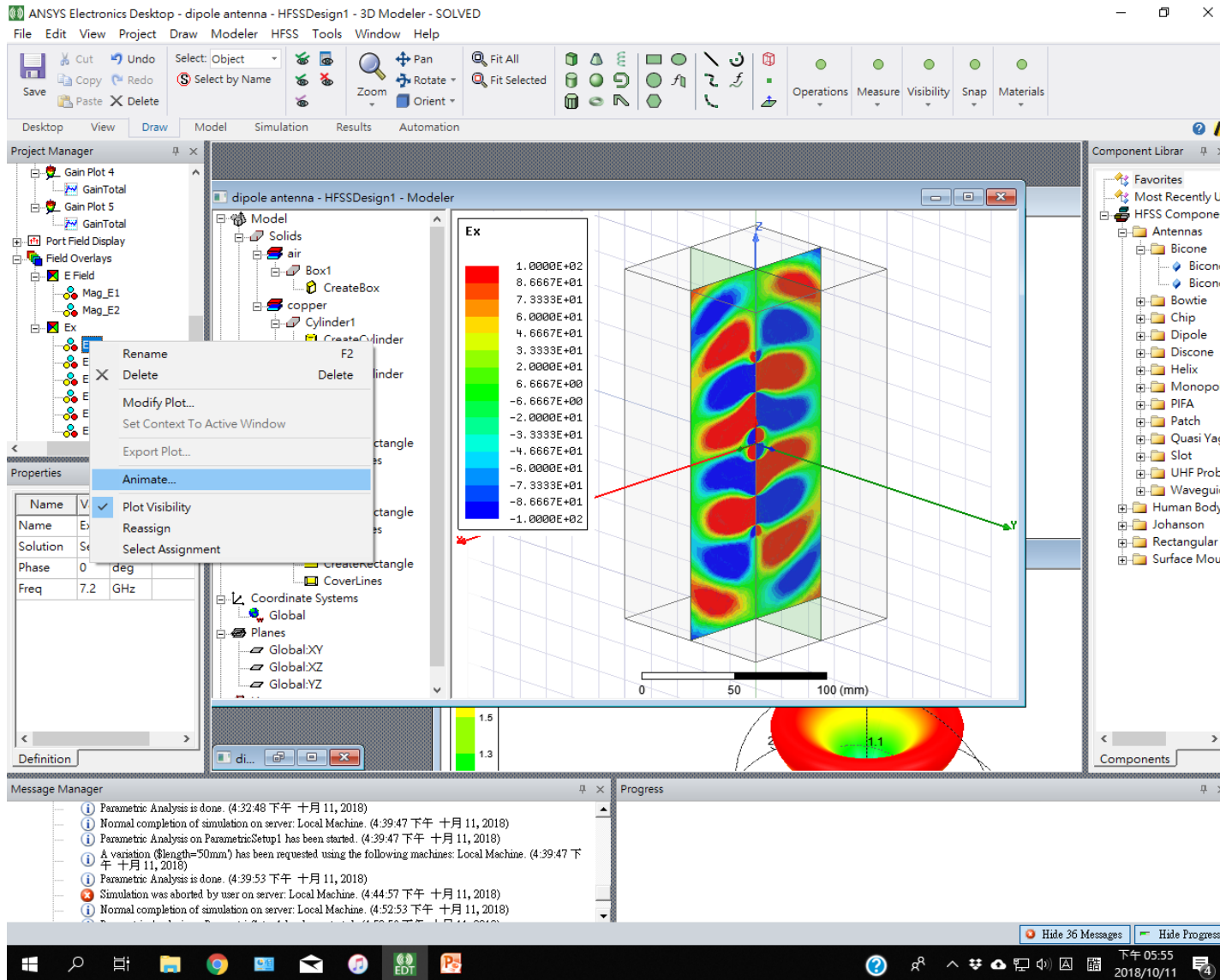
13.6 我們可以將 E_x , E_y 和 E_z 的圖形都建立好。



13.7 重新計算完成後，可以在場分佈圖上按右鍵modify plot改變繪製圖形所使用的頻率。得到三個頻率不同的電場分佈 (Ex分量)



14.1 HFSS結果可以繪製動畫。在場分佈圖上按右鍵 Animate..



14.2 可以選擇的參數有\$length, Freq 和 Phase。我們選擇Phase，範圍是0 deg到 350 deg， steps 35。

The screenshot displays the ANSYS Electronics Desktop interface for a dipole antenna simulation. The main window shows the 3D model of the antenna structure. A 'Setup Animation' dialog box is open, allowing the user to define a swept variable for an animation. The 'Swept Variable' is set to 'Phase', with a 'Start' value of '0deg' and a 'Stop' value of '170deg'. The number of 'Steps' is set to '17'. The 'Name' of the animation is 'Animation1'. The 'Description' field is empty. The 'Swept Variable' dropdown menu is open, showing options for 'Phase', '\$length', and 'Freq'. The 'Start' and 'Stop' fields are also visible, with 'Start' set to '0deg' and 'Stop' set to '170deg'. The 'Steps' field is set to '17'. The 'OK' and 'Cancel' buttons are at the bottom of the dialog box.

The background interface includes the following panels:

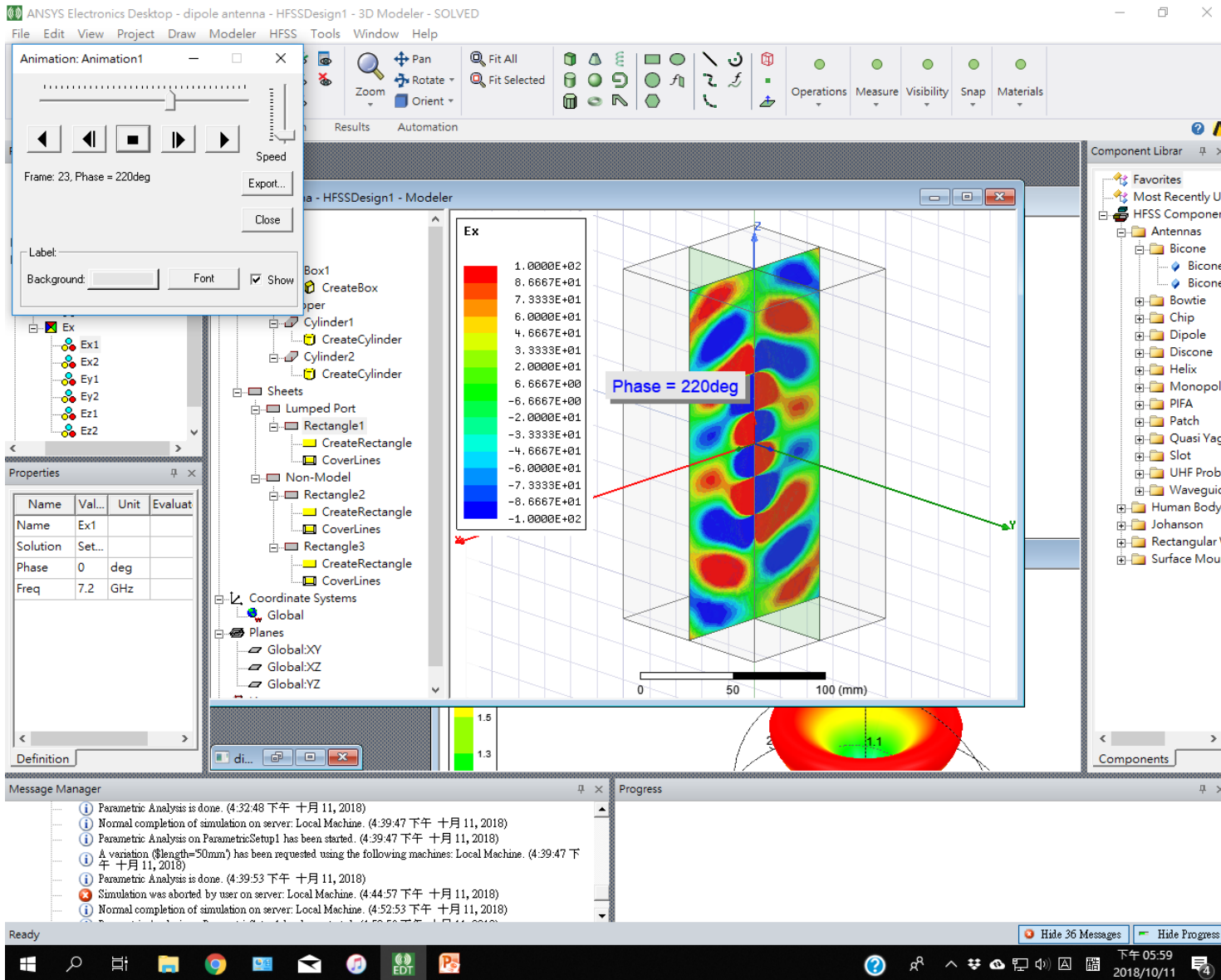
- Project Manager:** Shows the project hierarchy, including Gain Plots, Port Field Display, Field Overlays, E Field, Mag_E1, Mag_E2, Ex, Ey, Ez, and Coordinate Systems.
- Properties:** Shows the properties of the selected object, including Name, Val..., Unit, and Evaluat. The table below shows the current values for the swept variables.
- Message Manager:** Shows the progress of the simulation, including messages about parametric analysis completion and simulation abortion.

Name	Val...	Unit	Evaluat
Name	Ex1		
Solution	Set...		
Phase	0	deg	
Freq	7.2	GHz	

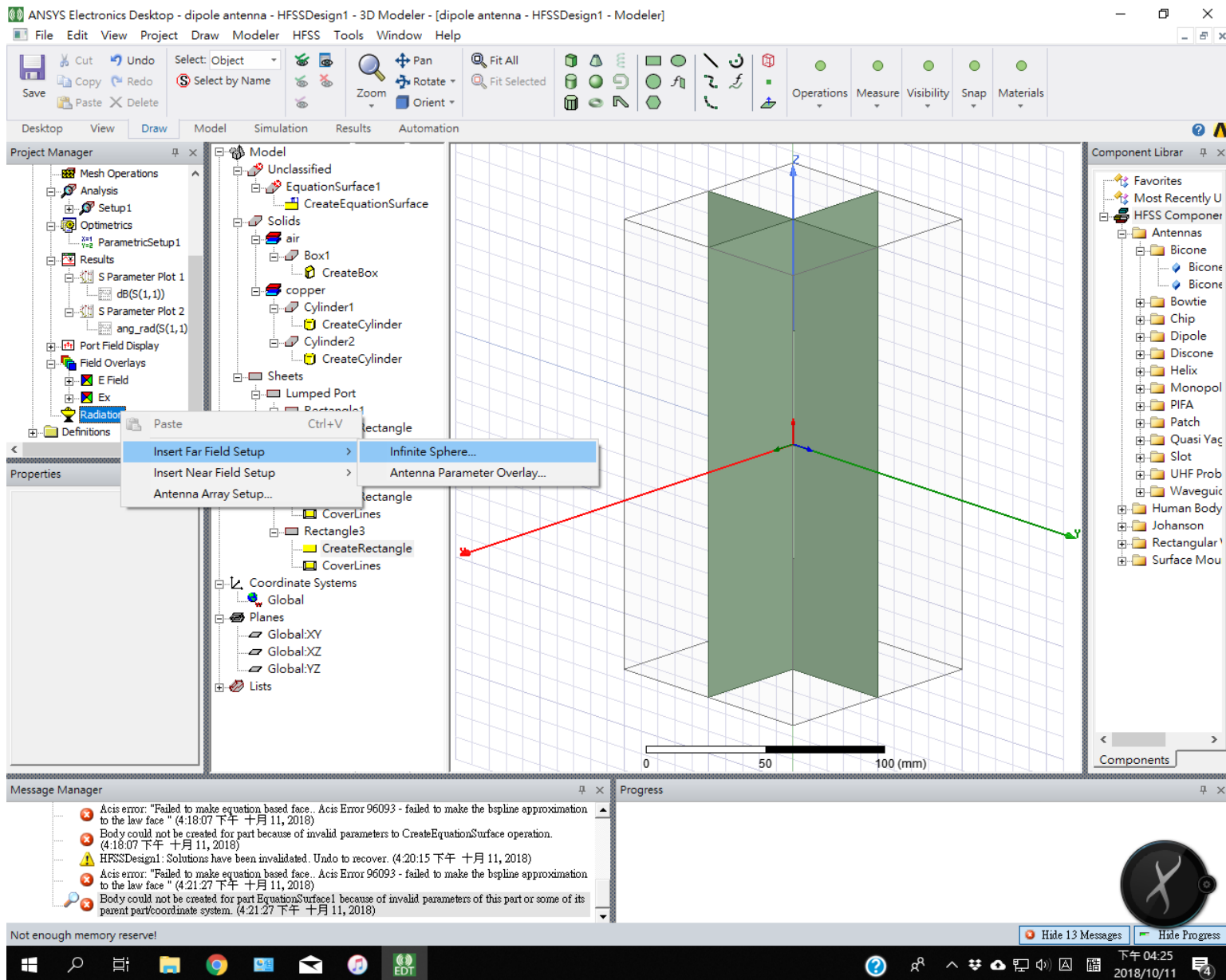
Message Manager logs:

- Parametric Analysis is done. (4:32:48 下午 十月 11, 2018)
- Normal completion of simulation on server: Local Machine. (4:39:47 下午 十月 11, 2018)
- Parametric Analysis on ParametricSetup1 has been started. (4:39:47 下午 十月 11, 2018)
- A variation (\$length=50mm) has been requested using the following machines: Local Machine. (4:39:47 下午 十月 11, 2018)
- Parametric Analysis is done. (4:39:53 下午 十月 11, 2018)
- Simulation was aborted by user on server: Local Machine. (4:44:57 下午 十月 11, 2018)
- Normal completion of simulation on server: Local Machine. (4:52:53 下午 十月 11, 2018)

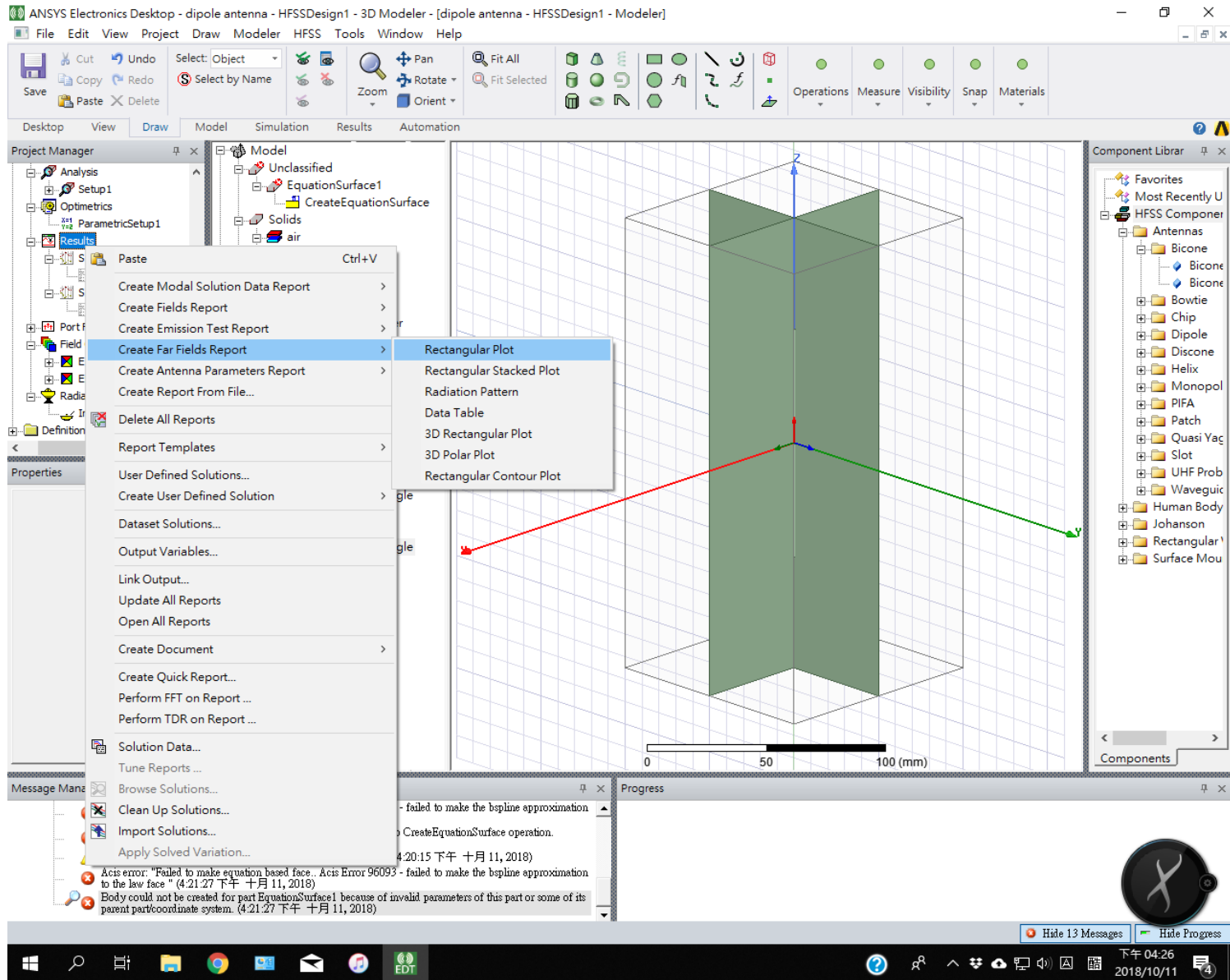
14.3 需要經過一陣子的計算後，會呈現動畫，代表波在一個週期中的變化。左上角按Export可以輸出動畫檔案。



15.1 天線模型可以計算遠場結果。首先在Project視窗點 Radiation: Insert Far Field Setup: infinite Sphere。代表計算無窮遠的球面。



15.2 回到 Results: Create Far Fields Report: Radiation Pattern



15.3 在對話欄中選擇Gain，為天線的增益值。愈大表示訊號傳輸愈好。

The screenshot displays the ANSYS Electronics Desktop interface for a dipole antenna simulation. The main window shows a Gain Plot 2 dialog box with the following configuration:

- Report:** dipole antenna - HFSSDesign1 - Gain Plot 2 - GainTotal
- Context:** Solution: Setup1: Sweep; Geometry: Infinite Sphere1
- Trace:** Families, Families Display
- Primary Sweep:** Theta
- Mag:** GainTotal
- Category:** Gain
- Quantity:** GainTotal
- Function:** <none>

The Properties panel on the left shows the following details for Gain Plot 2:

Name	Value
Name	GainTotal
Primary ...	Theta
Mag Co...	GainTotal
Ang Co...	Theta
Geometry	Infinite Sphere1
Sources	Use Edit Sources
Solution	Setup1: Sweep

The Message Manager at the bottom shows the following log entries:

- Parametric Analysis is done. (4:32:48 下午 十月 11, 2018)
- Normal completion of simulation on server: Local Machine. (4:39:47 下午 十月 11, 2018)
- Parametric Analysis on ParametricSetup1 has been started. (4:39:47 下午 十月 11, 2018)
- A variation (\$length=50mm) has been requested using the following machines: Local Machine. (4:39:47 下午 十月 11, 2018)
- Parametric Analysis is done. (4:39:53 下午 十月 11, 2018)
- Simulation was aborted by user on server: Local Machine. (4:44:57 下午 十月 11, 2018)
- Normal completion of simulation on server: Local Machine. (4:52:53 下午 十月 11, 2018)

The system tray at the bottom right shows the date and time: 2018/10/11 下午 05:00.

15.4 Primary setup 可以設定對Phi, Theta, Freq 或\$length作圖。我們選擇對Theta作圖，Theta是球座標的極角(polar angle)。

The screenshot displays the ANSYS Electronics Desktop interface for a dipole antenna simulation. The main window shows a radiation pattern plot for Gain Plot 3, with a red curve indicating the gain distribution. The plot is a polar plot with the angle in degrees on the horizontal axis (ranging from -180 to 180) and the gain in dB on the vertical axis (ranging from -30 to 0). A red curve is visible, peaking at 0 dB at approximately -120 degrees.

The configuration window for Gain Plot 3 is open, showing the following settings:

- Context: Solution: Setup1 : Sweep; Geometry: Infinite Sphere1
- Trace: Families: Phi; Families Display: All
- Primary Sweep: Phi
- Ang: Default; Theta; Freq
- Mag: GainTotal; length
- Category: Gain
- Quantity: GainTotal
- Function: <none>

The Properties panel on the left shows the following details for Gain Plot 3:

Name	Value
Name	GainTotal
Primary ...	Phi
Components	
Mag Co...	GainTotal
Ang Co...	Phi
Context	
Geometry	Infinite Sphere1
Sources	Use Edit Sources
Solution	Setup1 : Sweep

The Message Manager at the bottom shows the following messages:

- Parametric Analysis is done. (4:32:48 下午 十月 11, 2018)
- Normal completion of simulation on server: Local Machine. (4:39:47 下午 十月 11, 2018)
- Parametric Analysis on ParametricSetup1 has been started. (4:39:47 下午 十月 11, 2018)
- A variation (\$length=50mm) has been requested using the following machines: Local Machine. (4:39:47 下午 十月 11, 2018)
- Parametric Analysis is done. (4:39:53 下午 十月 11, 2018)
- Simulation was aborted by user on server: Local Machine. (4:44:57 下午 十月 11, 2018)
- Normal completion of simulation on server: Local Machine. (4:52:53 下午 十月 11, 2018)

15.5 在Families可以設定其他三個參數。我們設方位角 $\Phi=0$ deg, Freq為1.4GHz和length為50mm都為固定值。

The screenshot displays the ANSYS Electronics Desktop interface for a dipole antenna simulation. The main window shows a Gain Plot 2 with a circular sweep from -120 to 150 degrees. The Families dialog box is open, showing the following configuration:

- Context: Setup1: LastAdaptive
- Geometry: Infinite Sphere1
- Trace: Families Display
- Families: 1 available
- Sweeps: Sweeps, Available variations
- Variables table:

Variable	Value	Edit
Phi	0deg	...
Freq	4.25GHz	...
length	All	...
- Sub-dialog 'Select values':
 - Use all values:
 - Select values: (List: 1.4GHz, 4.25GHz, 7.2GHz)
 - Specify range:
 - Buttons: Select All, Clear All
 - Sweep: Default, Edited
- Nominals: u, v
- Buttons: Output Variables..., Options..., New Report, Apply Trace, Add Trace, Close

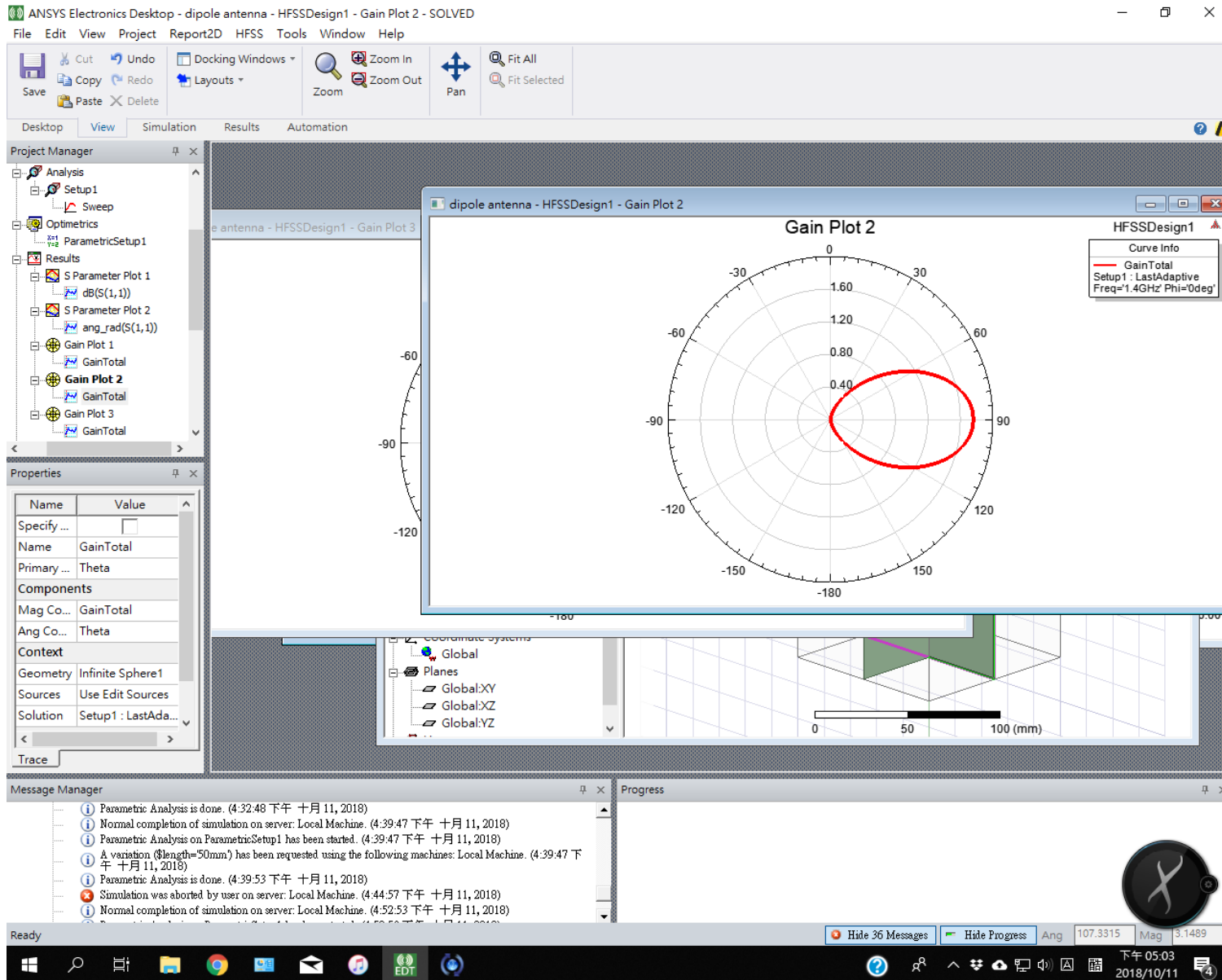
The Properties panel on the left shows the following details for GainTotal:

Name	Value
Name	GainTotal
Primary	Theta
Components	
Mag Co...	GainTotal
Ang Co...	Theta
Context	
Geometry	Infinite Sphere1
Sources	Use Edit Sources
Solution	Setup1: Sweep

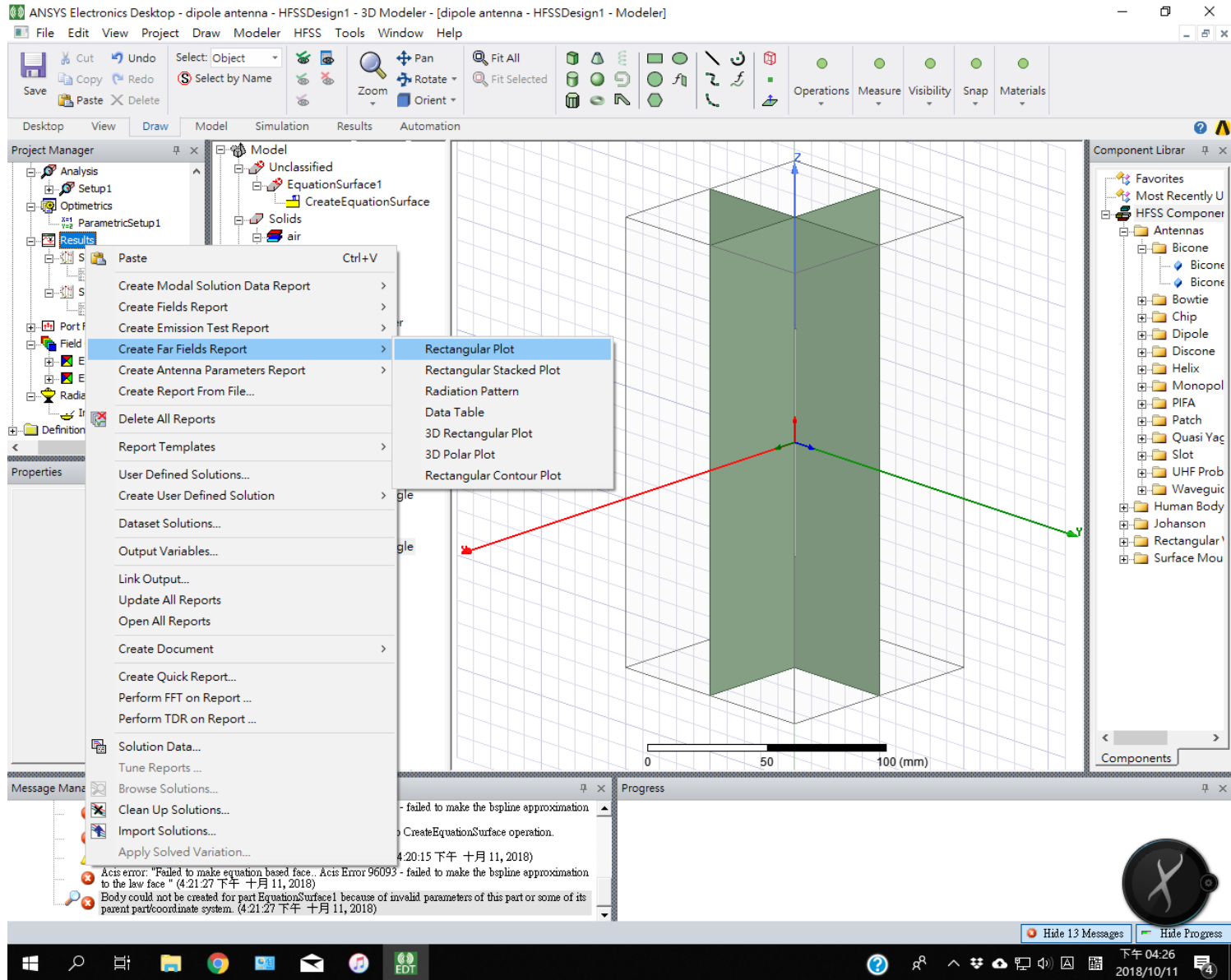
The Message Manager at the bottom shows the following log entries:

- Parametric Analysis is done. (4:32:48 下午 十月 11, 2018)
- Normal completion of simulation on server: Local Machine. (4:39:47 下午 十月 11, 2018)
- Parametric Analysis on ParametricSetup1 has been started. (4:39:47 下午 十月 11, 2018)
- A variation ('length=50mm') has been requested using the following machines: Local Machine. (4:39:47 下午 十月 11, 2018)
- Parametric Analysis is done. (4:39:53 下午 十月 11, 2018)
- Simulation was aborted by user on server: Local Machine. (4:44:57 下午 十月 11, 2018)
- Normal completion of simulation on server: Local Machine. (4:52:53 下午 十月 11, 2018)

15.6 畫出來的稱為雷達圖。結果代表在Theta=90deg時天線增益最大約1.8。0 deg和180deg幾乎為0。



15.7 我們也可以用3D polar plot來呈現。



15.8 設定在1.4GHz和4.25GHz時可以看到天線增益在三維方向的分佈情形。和前面雷達圖的結果一致。

