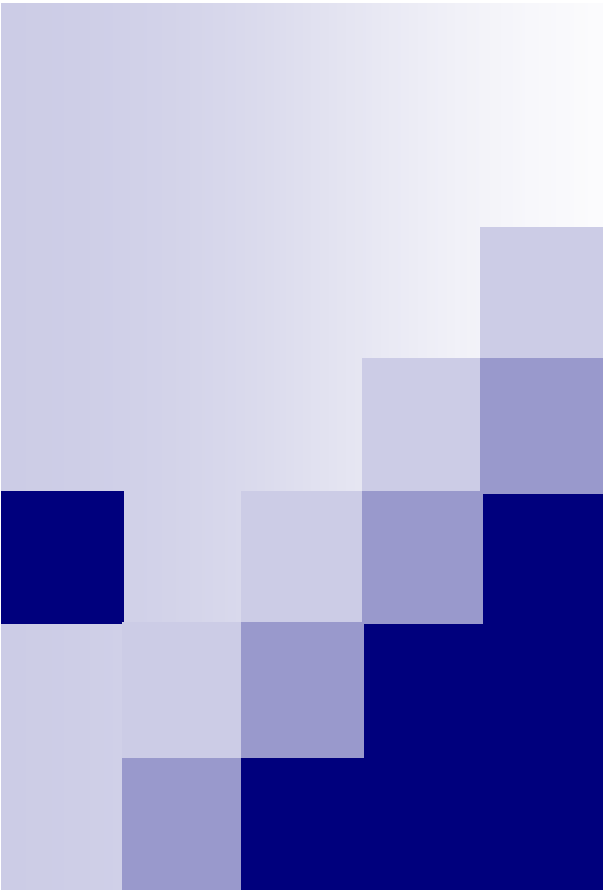




TracePro 教學

建立光源

王智立(JL Wang)

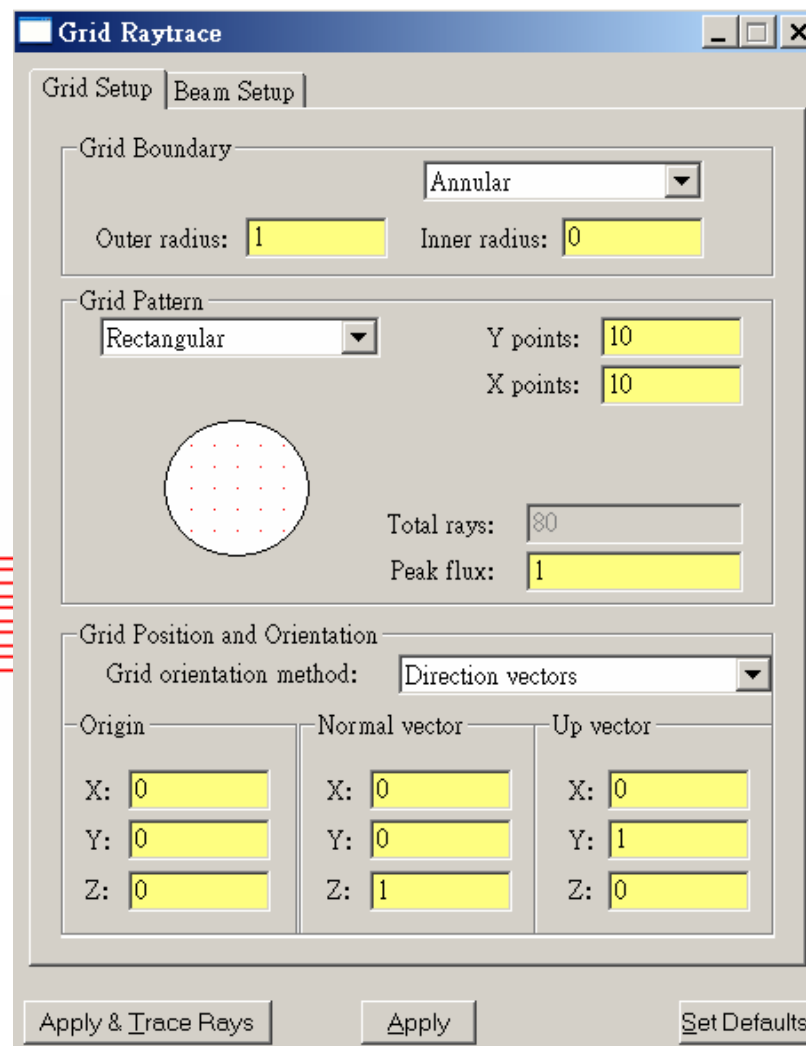
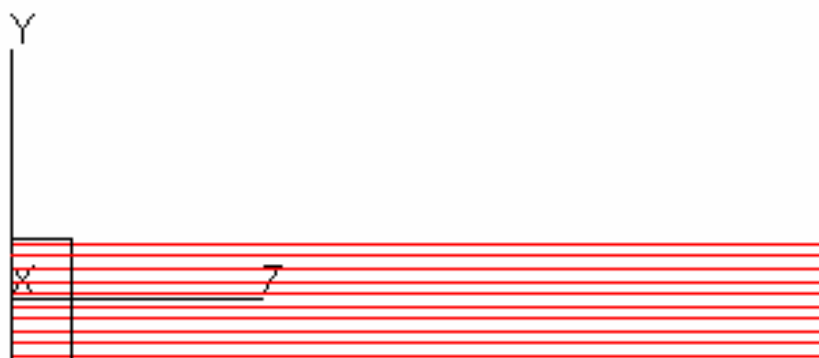


光源介紹

1. 使用格點光源(Grid Raytrace)產生的檔案
光源(Source File)
2. 使用自定表面光源(Surface Source)
3. 多波長光源
4. 合併燈組模型(Merge)

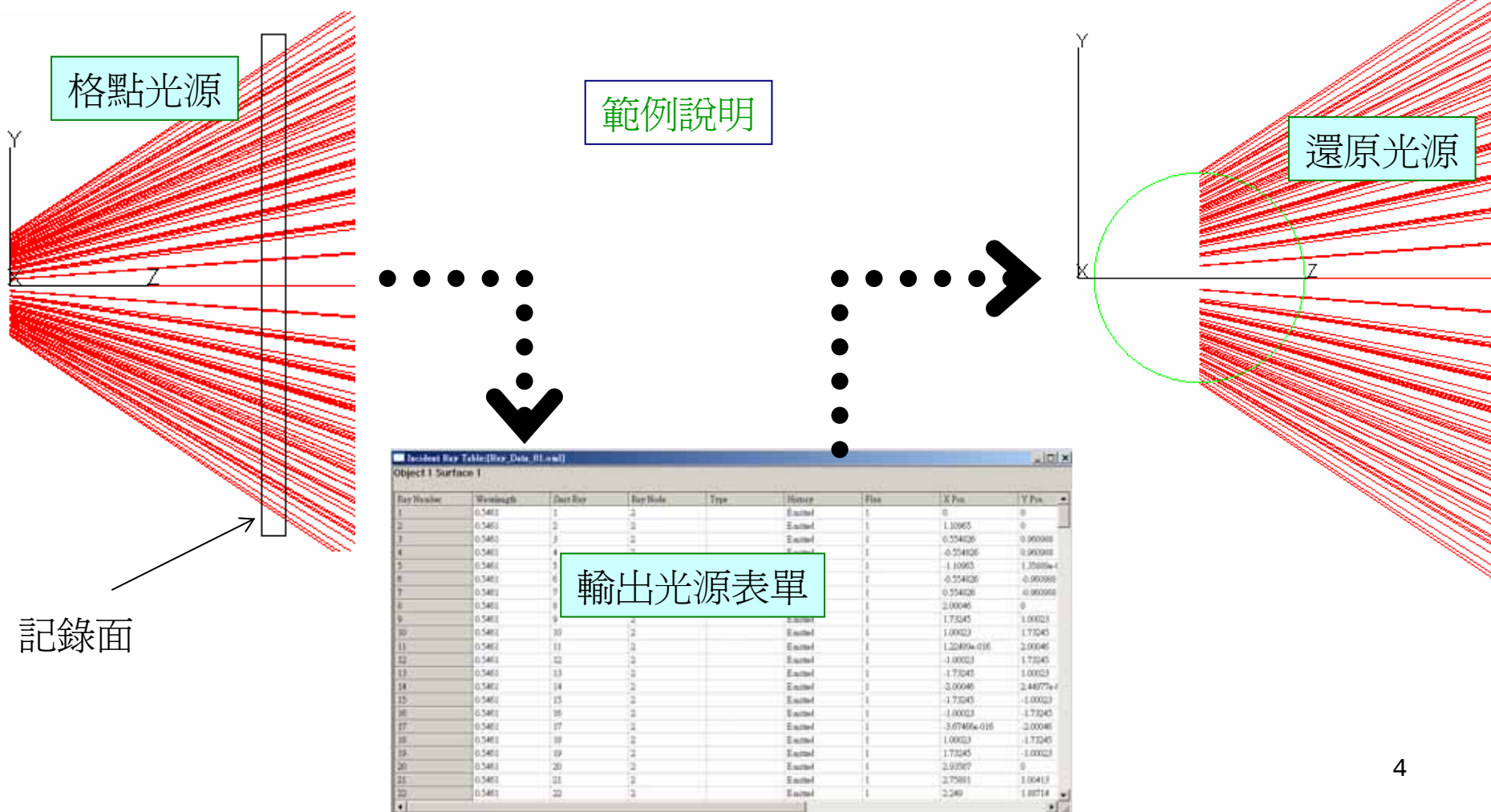
1. 格點光源 (Grid Raytrace)

格點光源是一種簡單的光源產生器



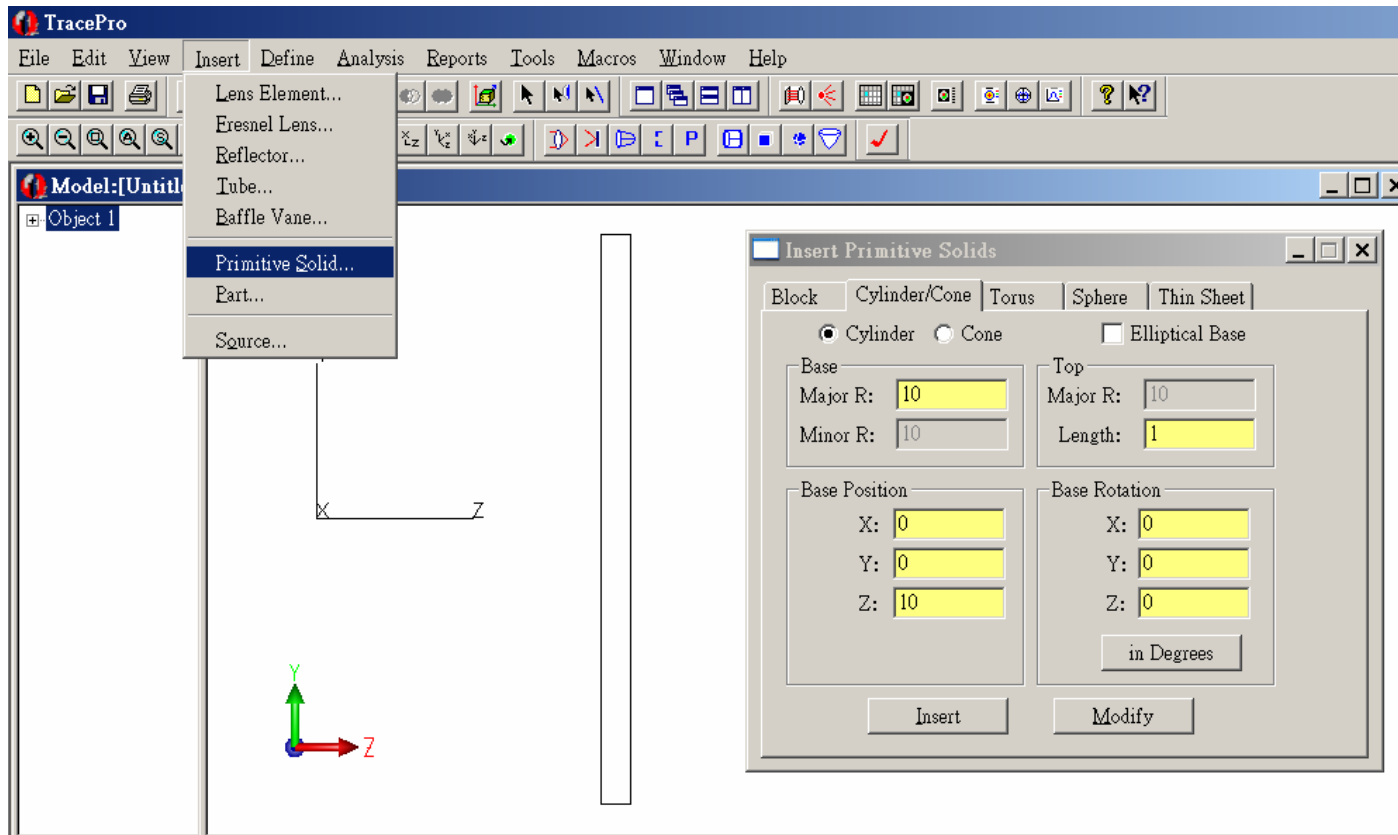
利用Ray Table 記錄光源

原始光源 → 光源表單 → 還原光源



格點光源(Grid Raytrace)

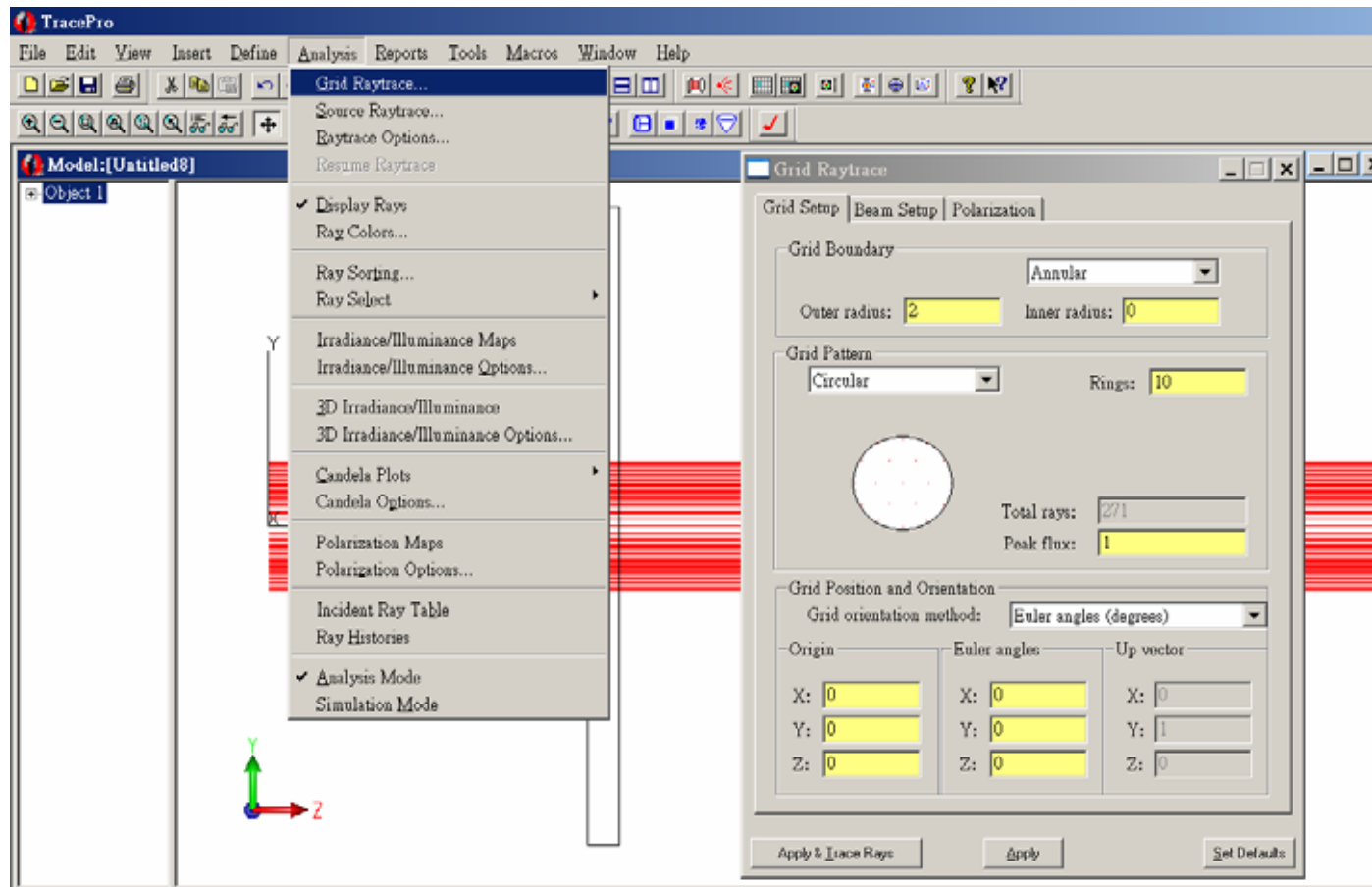
首先建立一個圓柱體物件(半徑10，厚度10，距離z 軸10)



註:如果沒有建立物件，格點光源將無法建立

設定Grid Raytrace(1)

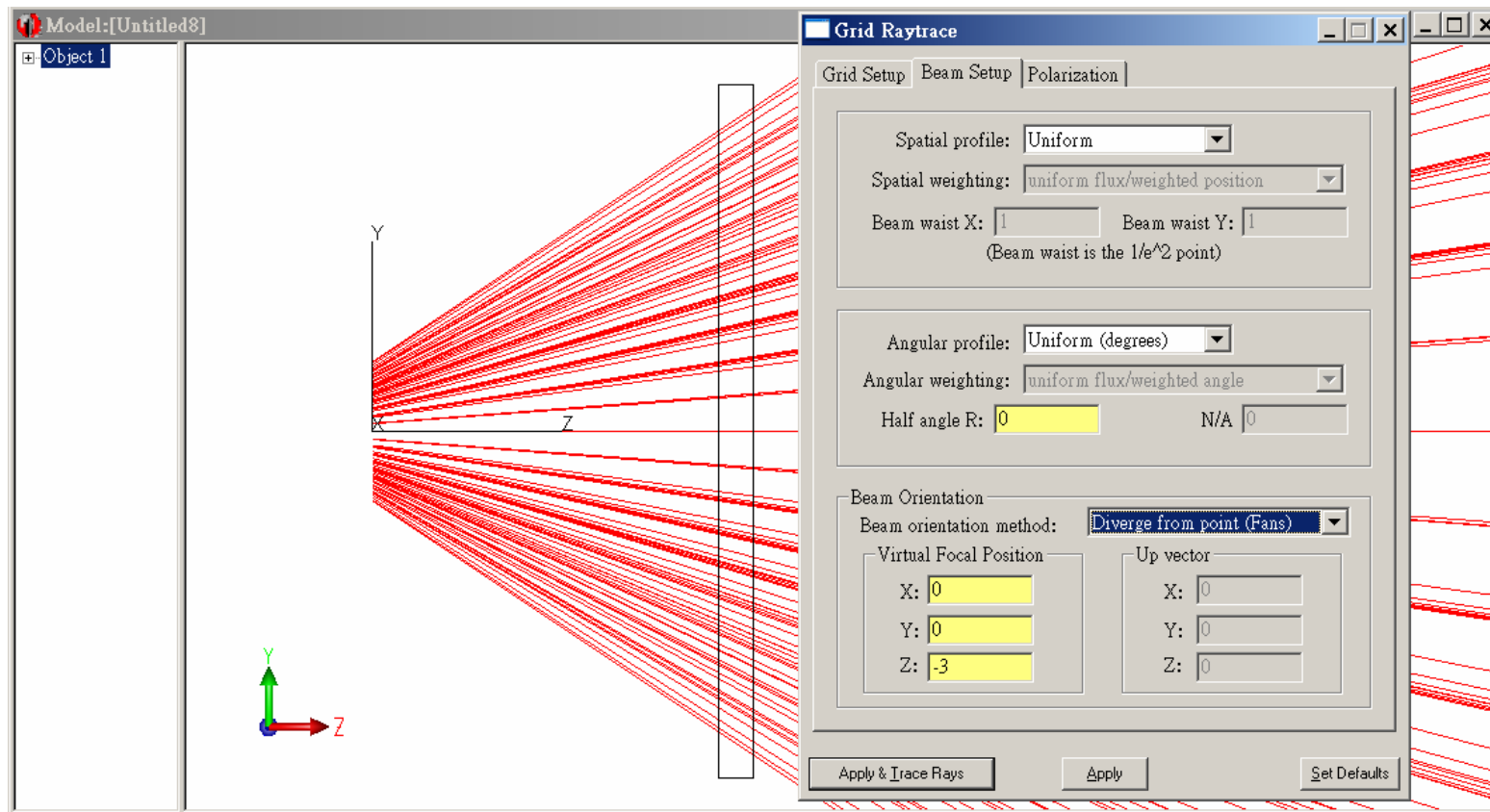
進入格點光源設定 Analysis->Grid Raytrace



設定Grid Raytrace(2)

設定扇狀光源

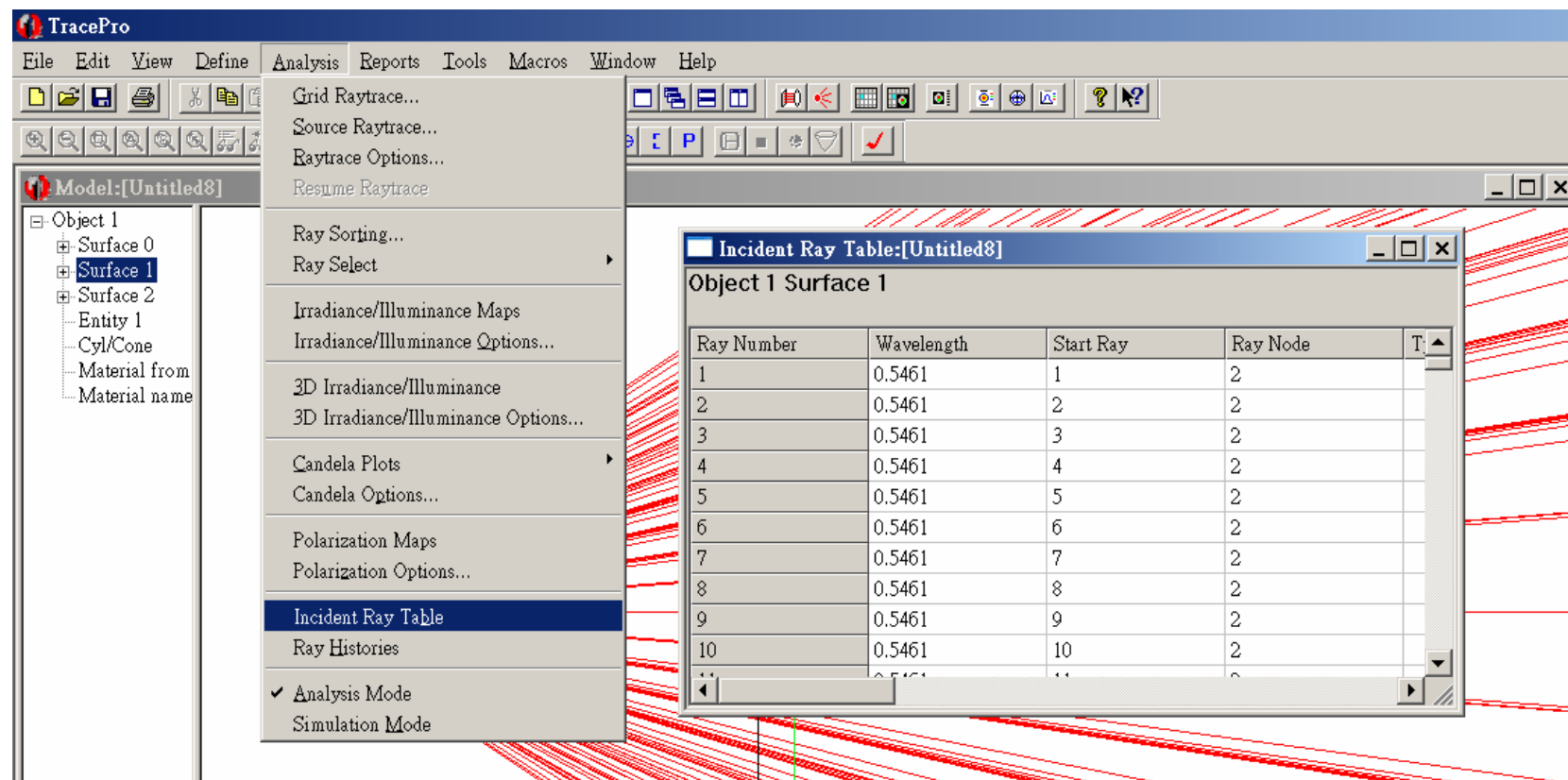
Beam Setup->Diverge from point (Fans) Z:-3



Incident Ray Table

- 1.選Surface 1
- 2.選Analysis ->Incident Ray Table

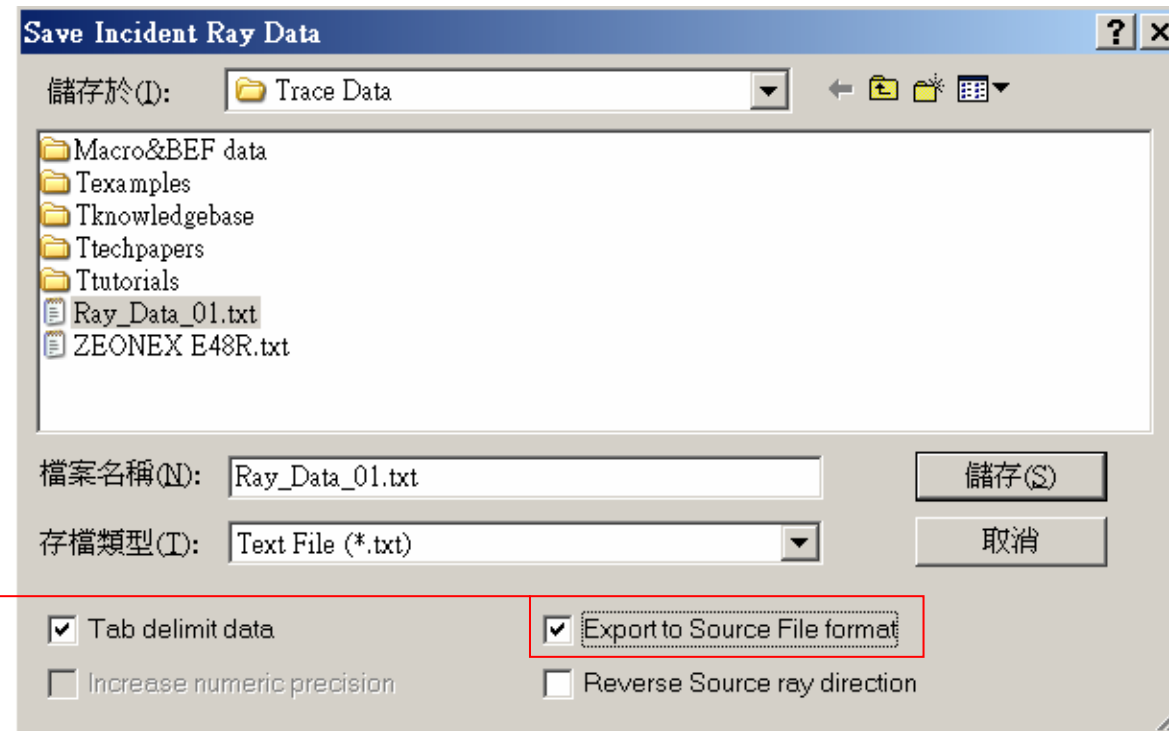
建立光源表單



儲存 Incident Ray Data

1. File->Save As
2. 命名(Ray_Data_01.txt)
3. 勾選Export to Source File Format
4. 儲存

儲存光源表單



一定要勾選

可編輯Ray Data

可透過應用程式(如:Excel、NotePad、等)編輯Ray Data 檔案

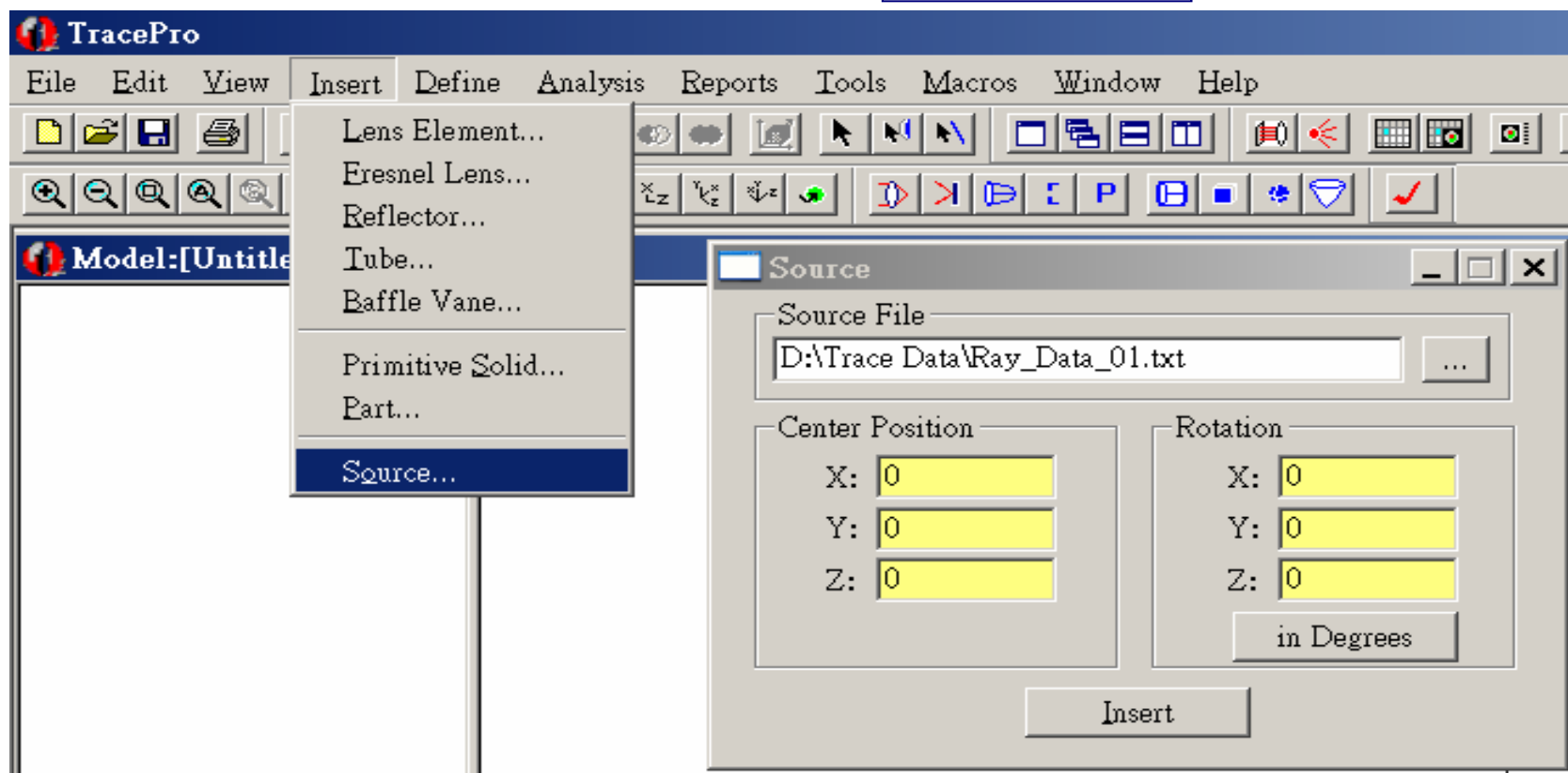
編輯光源表單

Ray_Data_01.txt								
	A	B	C	D	E	F	G	H
1	!! Source file:							
2								
3	TracePro Release: 3 0 5							
4	Data for Object 1 Surface 1							
5	Linear Units in mm							
6	Data generated at 14:01:05 May 25, 2004							
7	X Pos.	Y Pos.	Z Pos.	X Vec.	Y Vec.	Z Vec.	Inc Flux	
8	0.00E+00	0.00E+00	1.00E+01	0.00E+00	0.00E+00	1.00E+00	1.00E+00	
9	1.11E+00	0.00E+00	1.00E+01	8.50E-02	0.00E+00	9.96E-01	1.00E+00	
10	5.55E-01	9.61E-01	1.00E+01	4.25E-02	7.37E-02	9.96E-01	1.00E+00	
11	-5.55E-01	9.61E-01	1.00E+01	-4.25E-02	7.37E-02	9.96E-01	1.00E+00	
12	#####	1.36E-16	1.00E+01	-8.50E-02	1.04E-17	9.96E-01	1.00E+00	
13	-5.55E-01	-9.61E-01	1.00E+01	-4.25E-02	-7.37E-02	9.96E-01	1.00E+00	
14	5.55E-01	-9.61E-01	1.00E+01	4.25E-02	-7.37E-02	9.96E-01	1.00E+00	
15	2.00E+00	0.00E+00	1.00E+01	1.52E-01	0.00E+00	9.88E-01	1.00E+00	
16	1.73E+00	1.00E+00	1.00E+01	1.32E-01	7.60E-02	9.88E-01	1.00E+00	
17	1.00E+00	1.73E+00	1.00E+01	7.60E-02	1.32E-01	9.88E-01	1.00E+00	
18	1.22E-16	2.00E+00	1.00E+01	9.31E-18	1.52E-01	9.88E-01	1.00E+00	
19	#####	1.73E+00	1.00E+01	-7.60E-02	1.32E-01	9.88E-01	1.00E+00	
20	#####	1.00E+00	1.00E+01	-1.32E-01	7.60E-02	9.88E-01	1.00E+00	

載入Ray Data 檔案

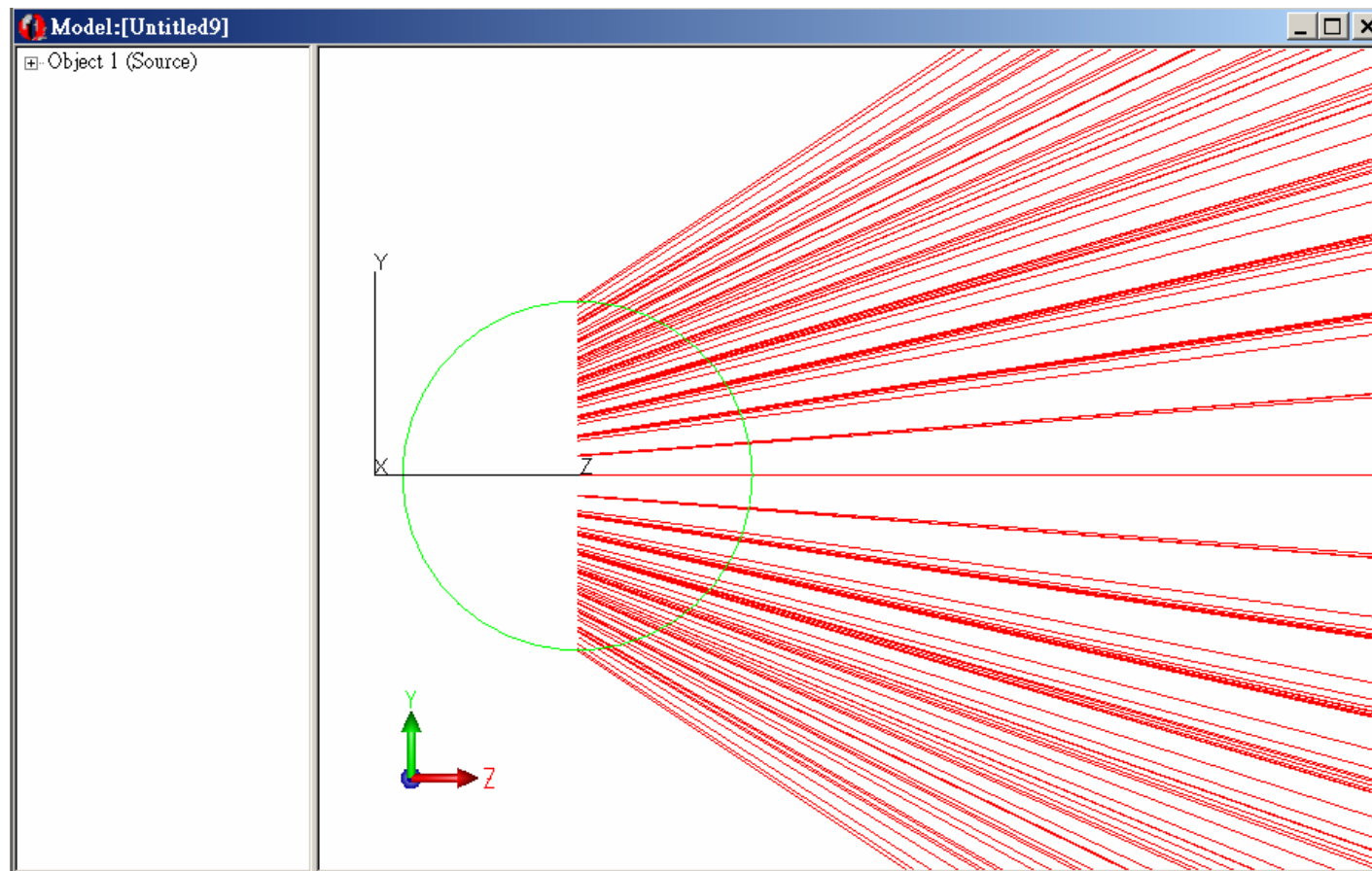
Insert->Source 選擇光源表單的檔案

載入光源表單

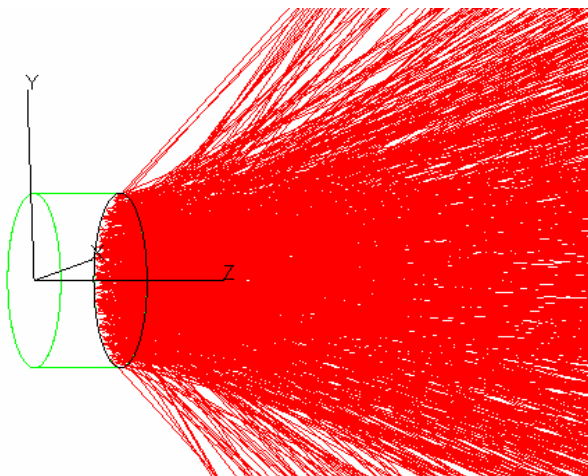


來自檔案的光源

按一下這個按鈕  即可看見光源的軌跡。



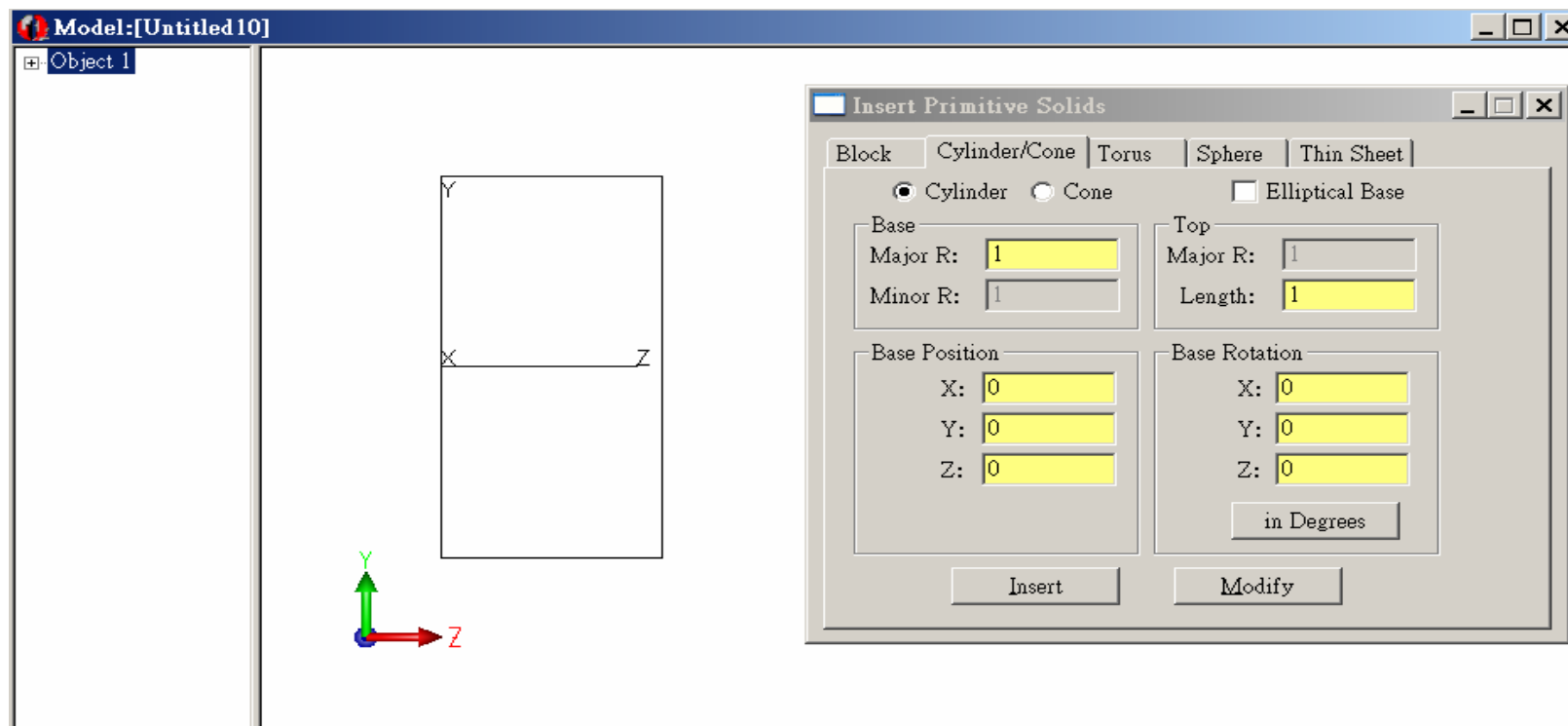
2.表面光源



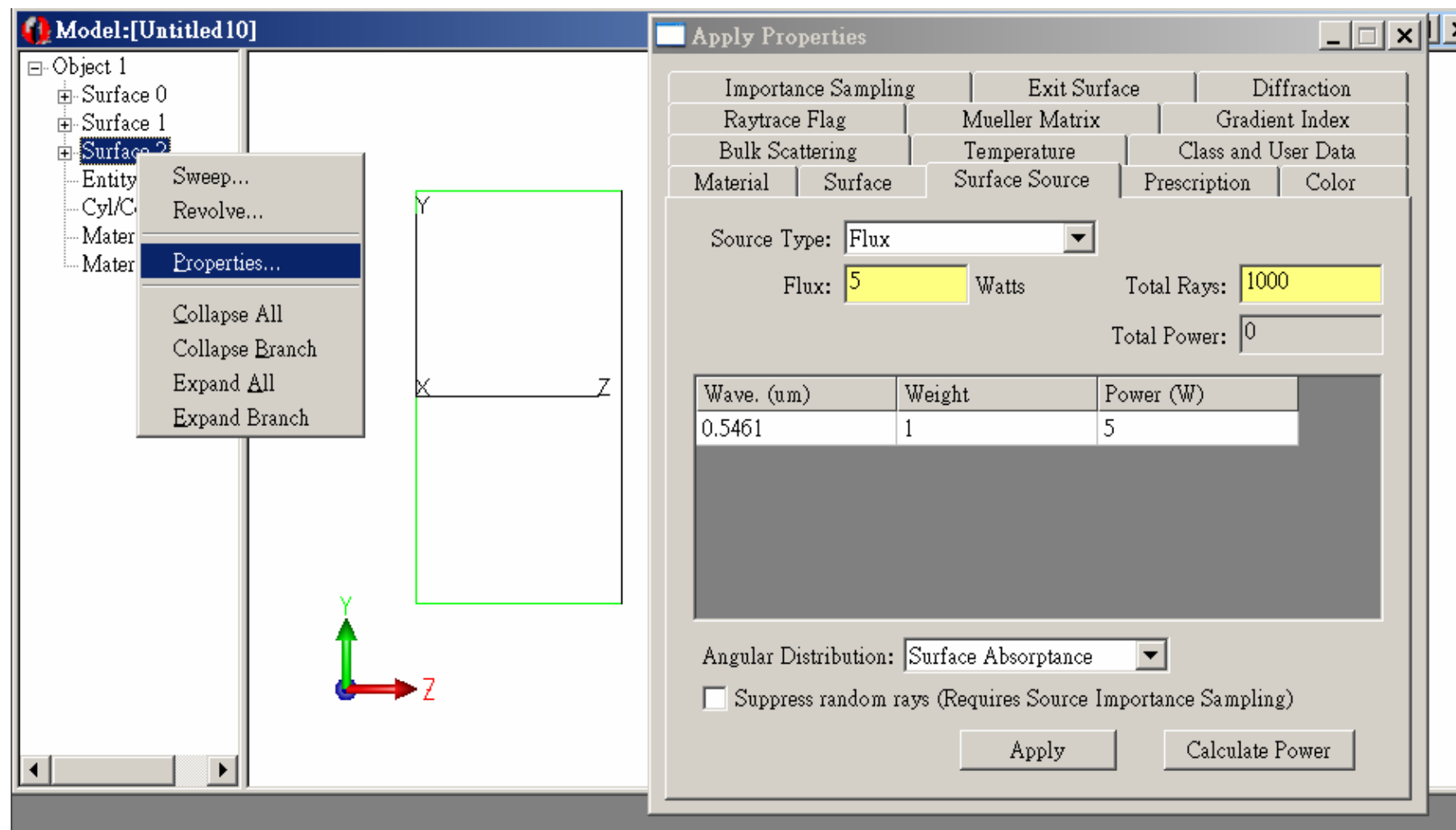
在一個物件表面建立光源，這可為各種不同型態的光源，建立標準的光源模型。

使用表面光源

建立一個圓柱體(半徑1，厚度1，原點座標)

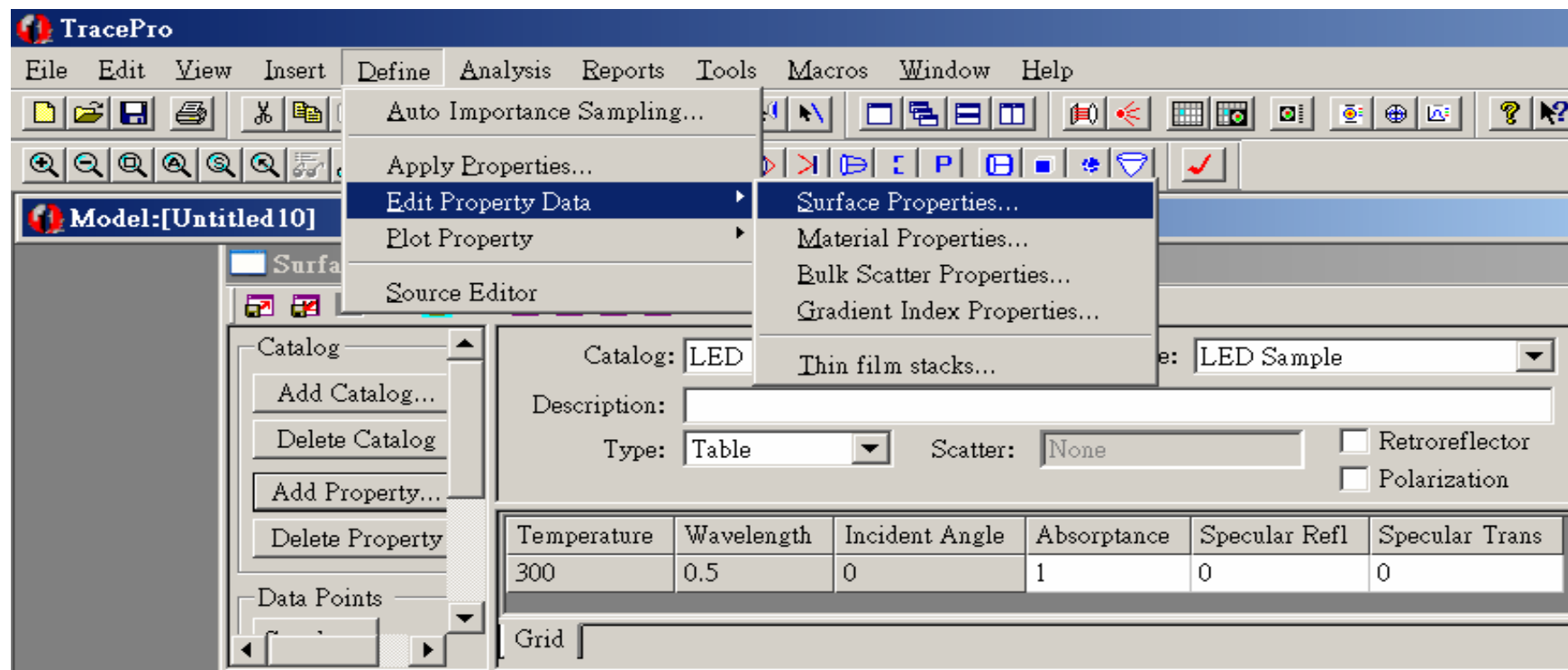


設定Surface表面光源



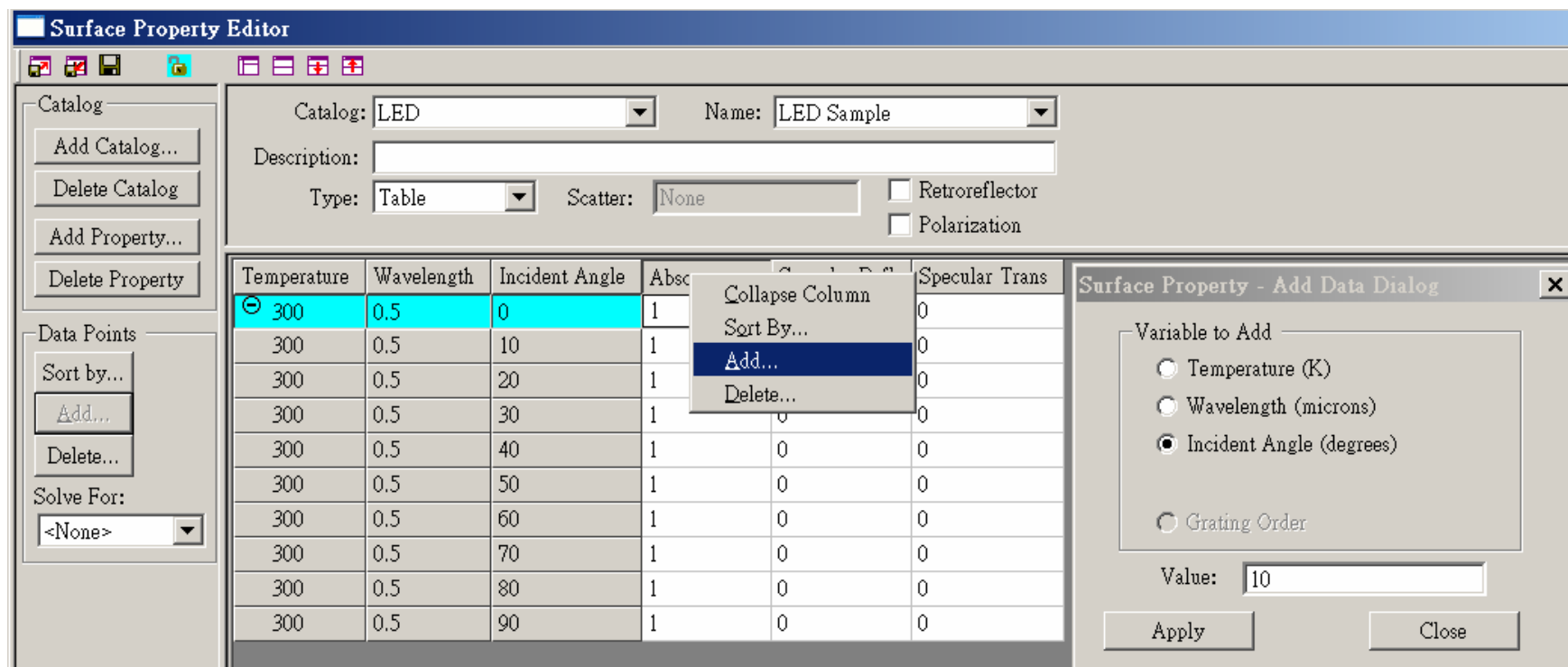
新增一個表面參數

新增一個LED 目錄 及一個LED Sample 材質



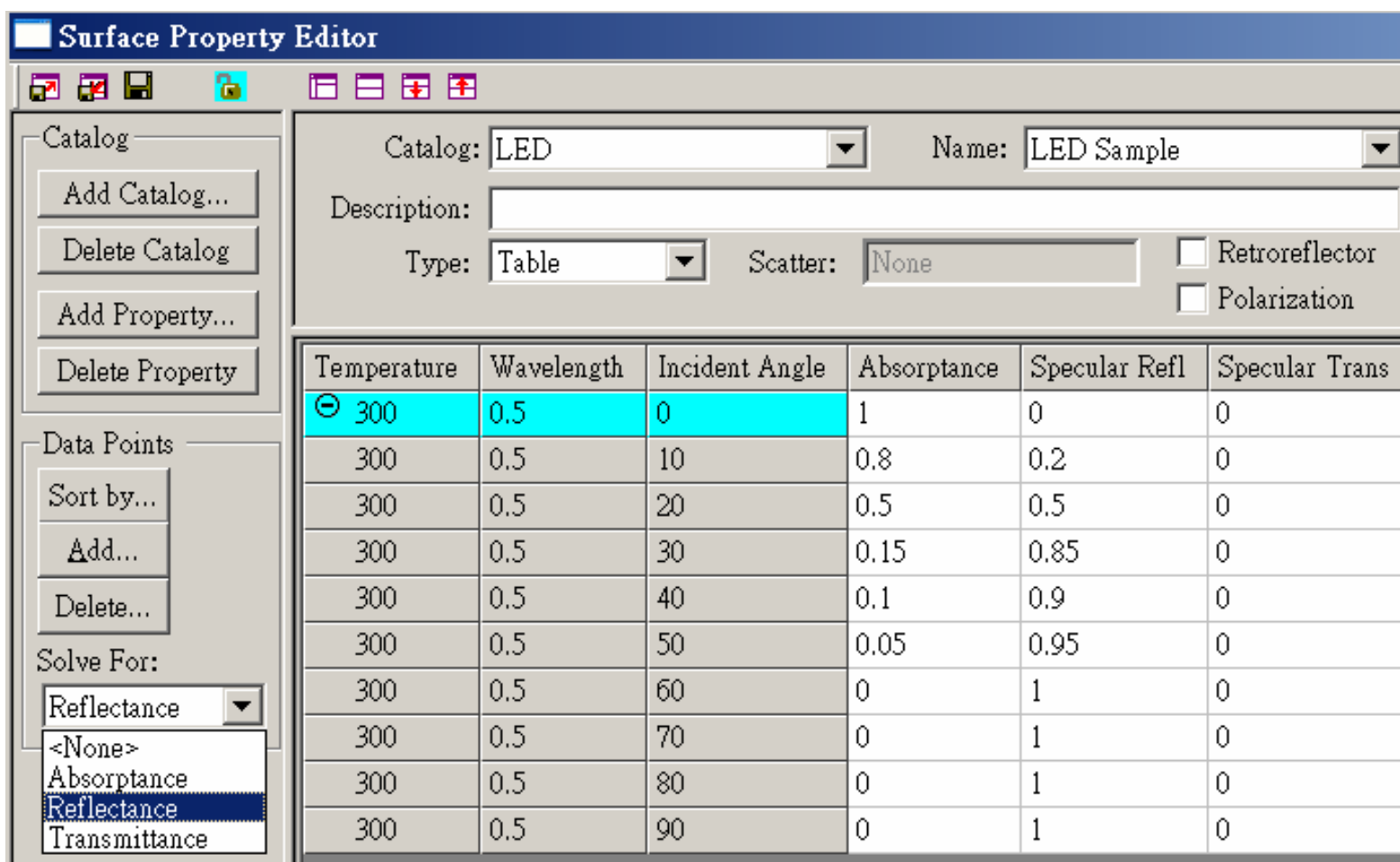
追加入射角度

可在表格上按Mouse 右鍵選Add 或在左邊Data Points 選Add，以增加入射角度。



建立好LED 的表面參數

可在建立好Absorptance(吸收)參數後，按Solve For: Reflectance(反射)即會自動計算好後面參數。建立完成後按Ctrl+S Save。



Surface Property Editor

Catalog: LED Name: LED Sample

Description:

Type: Table Scatter: None ☐ Retroreflector ☐ Polarization

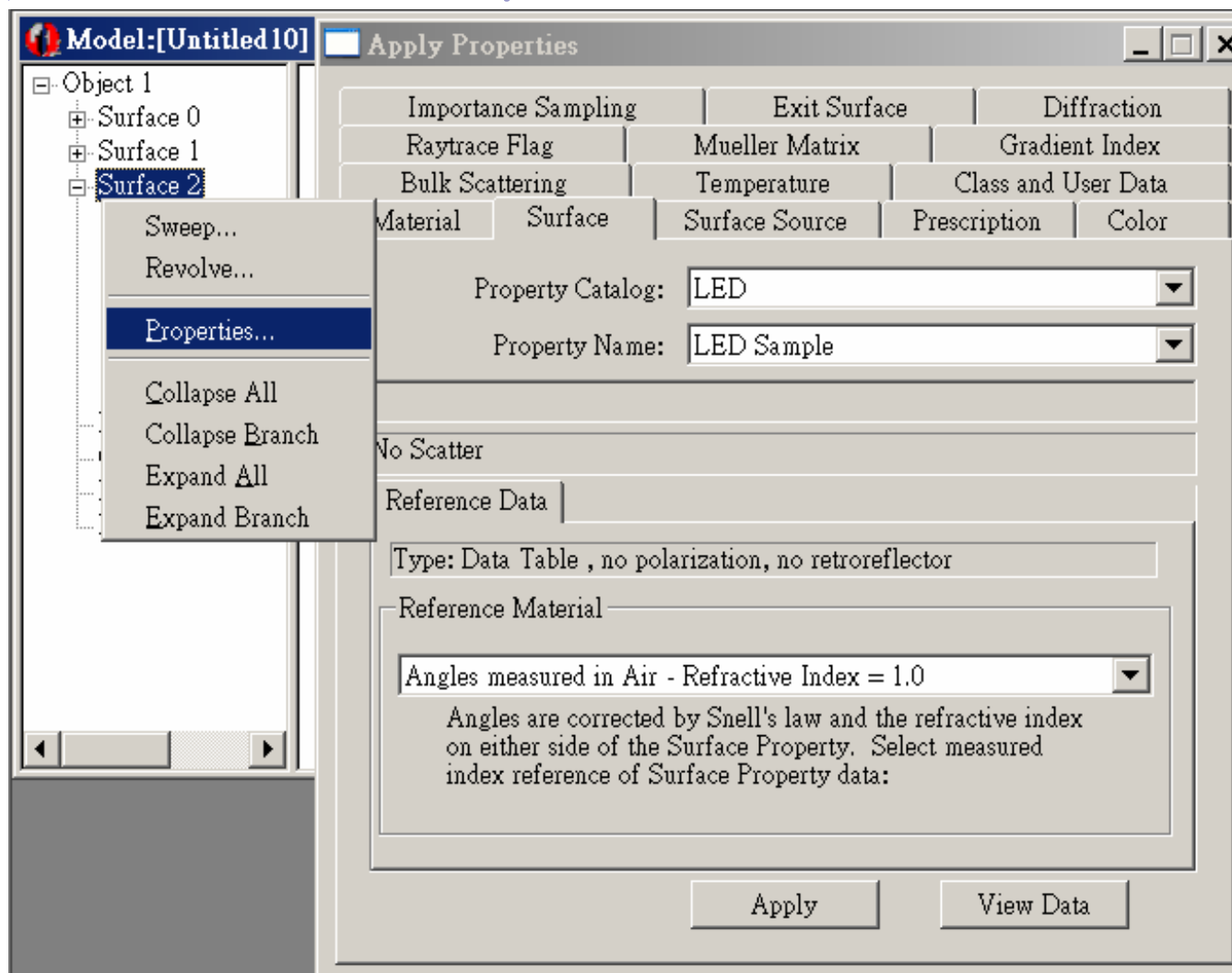
Data Points

Temperature	Wavelength	Incident Angle	Absorptance	Specular Refl	Specular Trans
300	0.5	0	1	0	0
300	0.5	10	0.8	0.2	0
300	0.5	20	0.5	0.5	0
300	0.5	30	0.15	0.85	0
300	0.5	40	0.1	0.9	0
300	0.5	50	0.05	0.95	0
300	0.5	60	0	1	0
300	0.5	70	0	1	0
300	0.5	80	0	1	0
300	0.5	90	0	1	0

Solve For: Reflectance

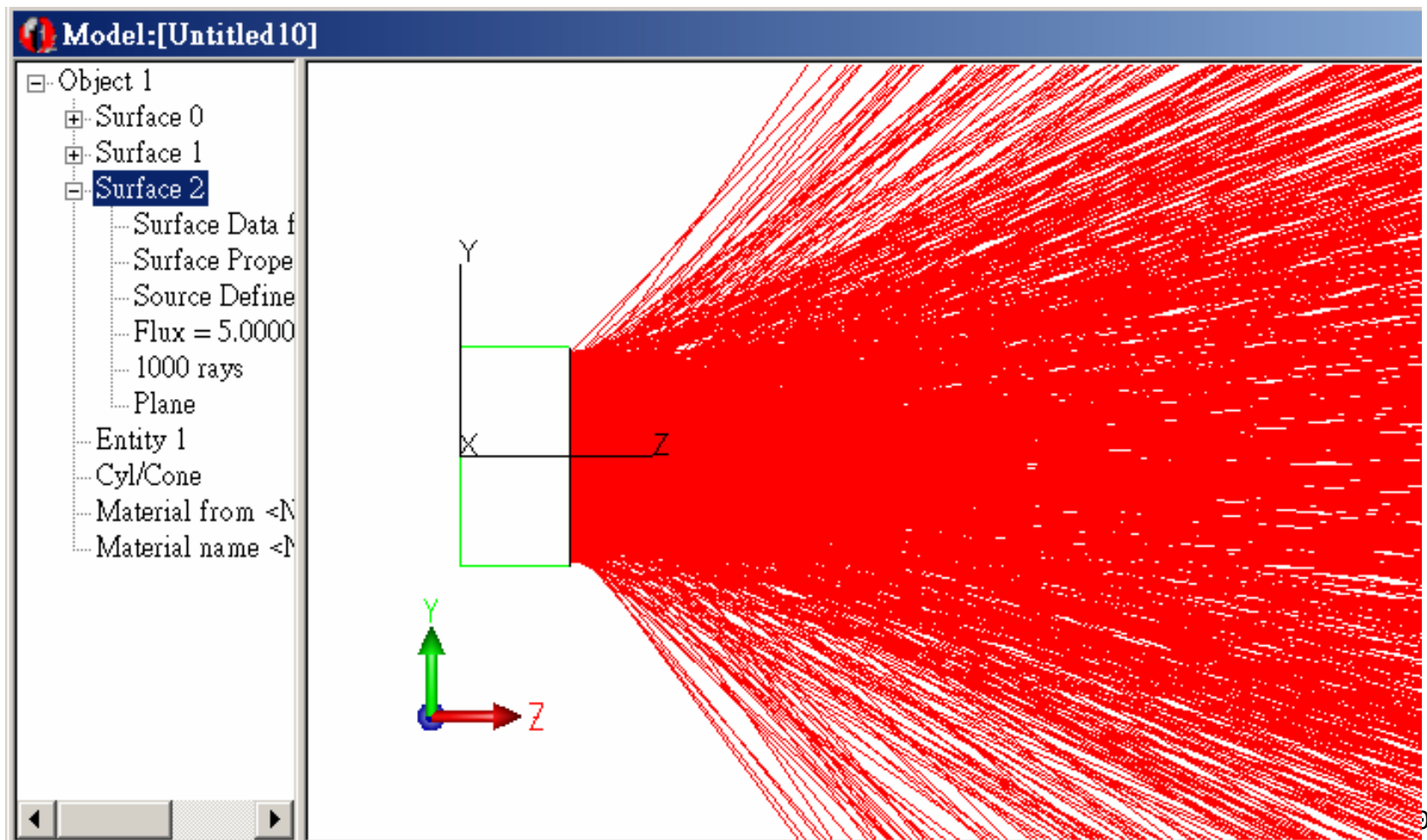
<None>
Absorptance
Reflectance
Transmittance

再設定Surface性質

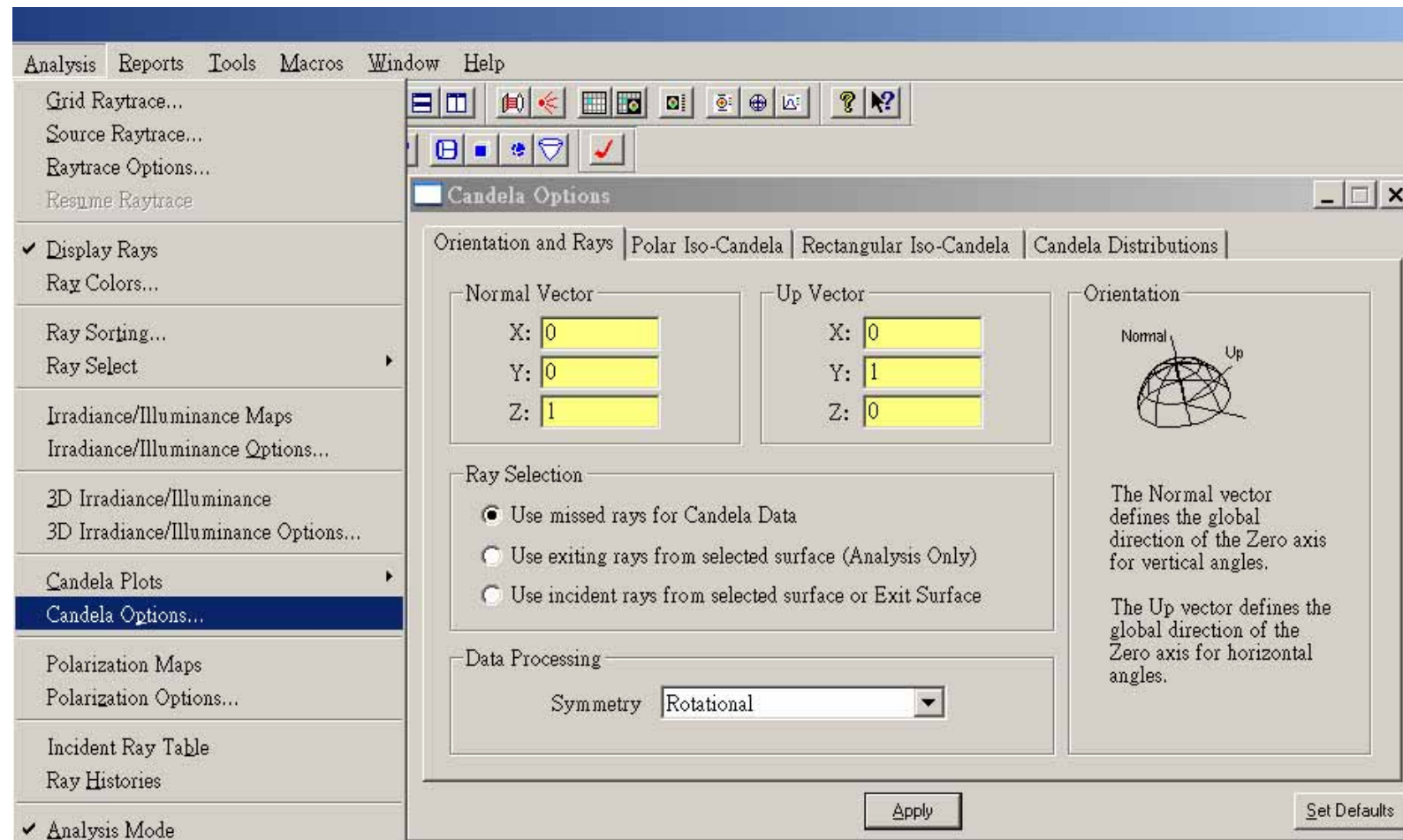


看光跡表現

按一下這個按鈕 



Candela(燭光)分析設定(1)



Candela(燭光)分析設定(2)

Candela Options

Orientation and Rays | Polar Iso-Candela | Rectangular Iso-Candela | **Candela Distributions**

Distribution Data Selection

☒ Smoothing: 25 plot points or smoothing factor

☐ cd/klm

Number of horizontal angles: 1

☐ Set Max: 0 ☐ Set Min: 0

Polar Distribution

☒ Luminaire format

Angular width (deg): 90

Luminaire plot width (deg): 180

Rectangular Distribution

☐ Log plot

Angular width (deg): 90

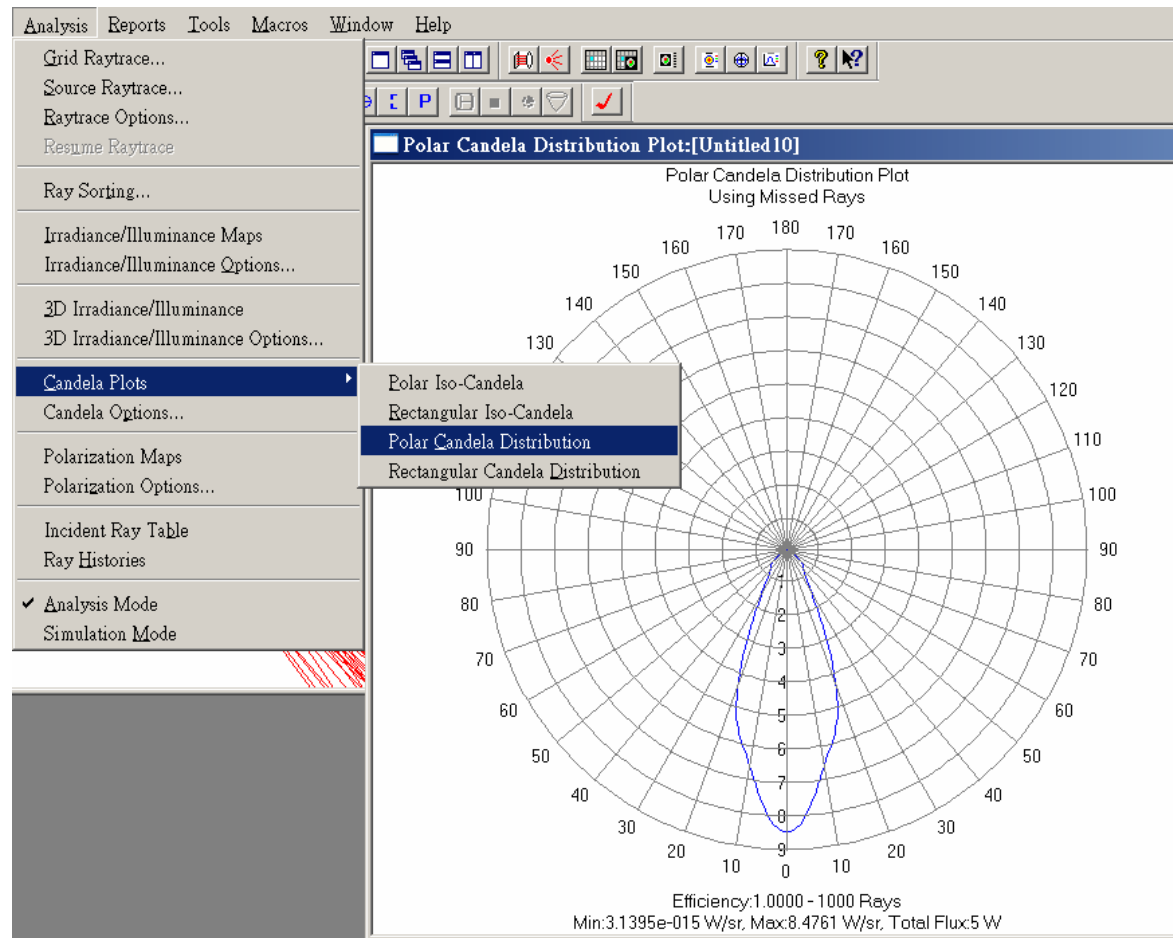
Azimuth angles are converted to horizontal angles for IES output and C angles for LDT output.

Polar or **Luminaire**

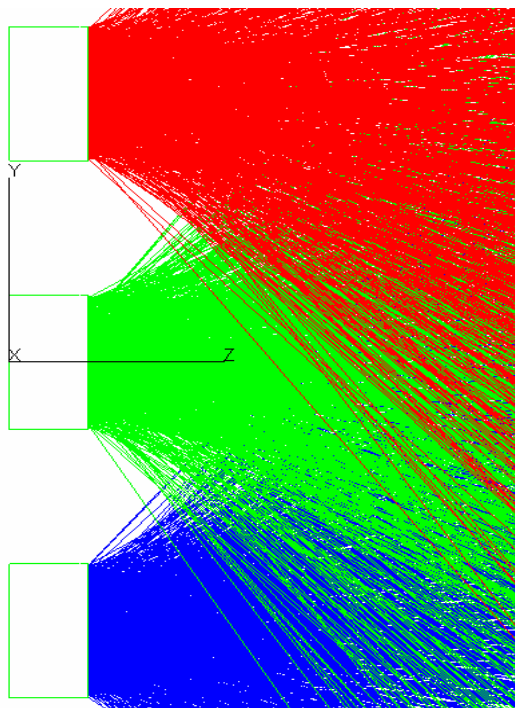
Rect Dist

Apply Set Defaults

Candela(燭光)分析結果

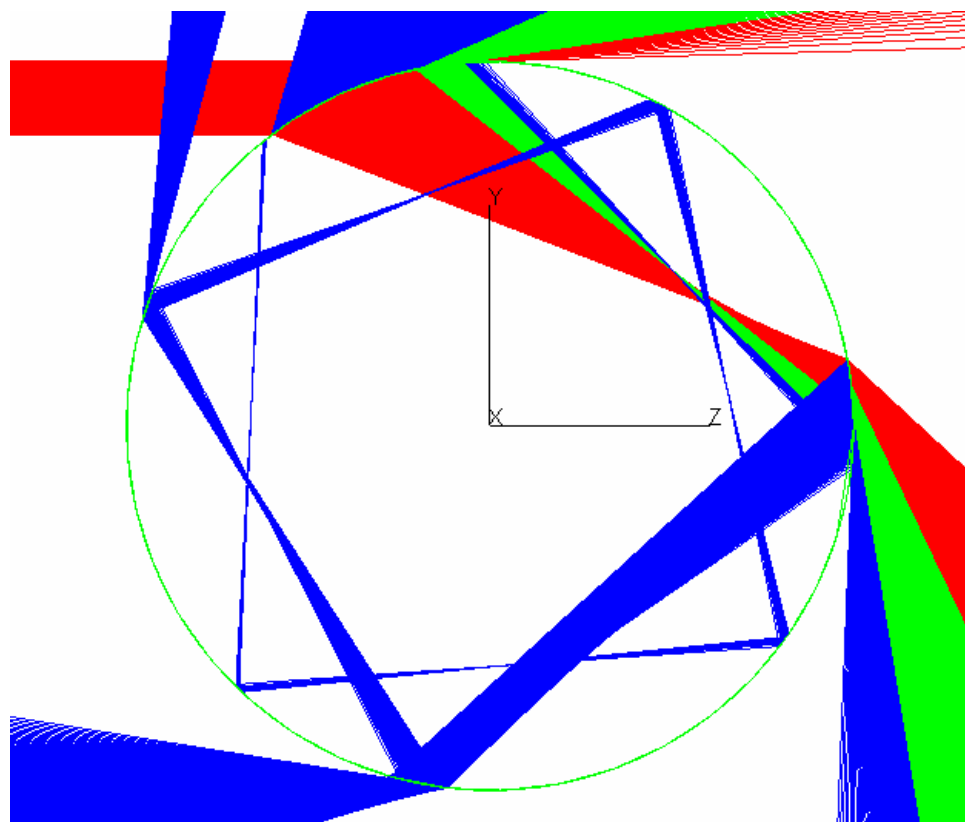


3.使用多種波長光源



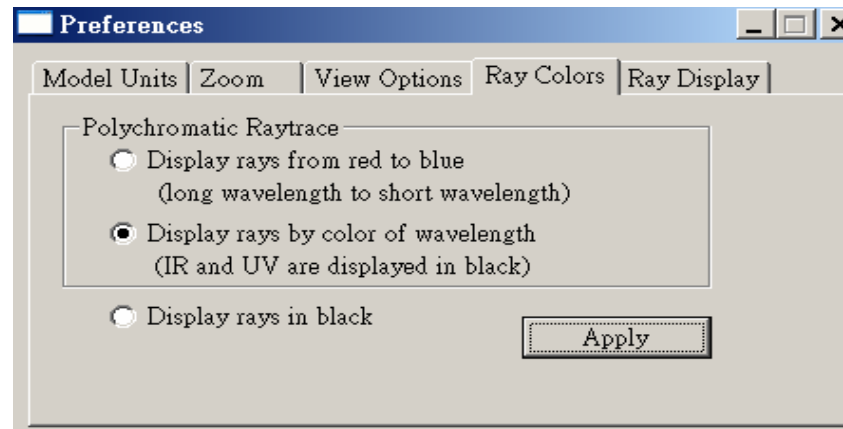
顏色代表

- 當單一波長作為光源時，其光線的颜色分別代表能量的不同
 - 紅色(66%以上)
 - 藍色(33~66%)
 - 綠色(33%以下)



顏色代表

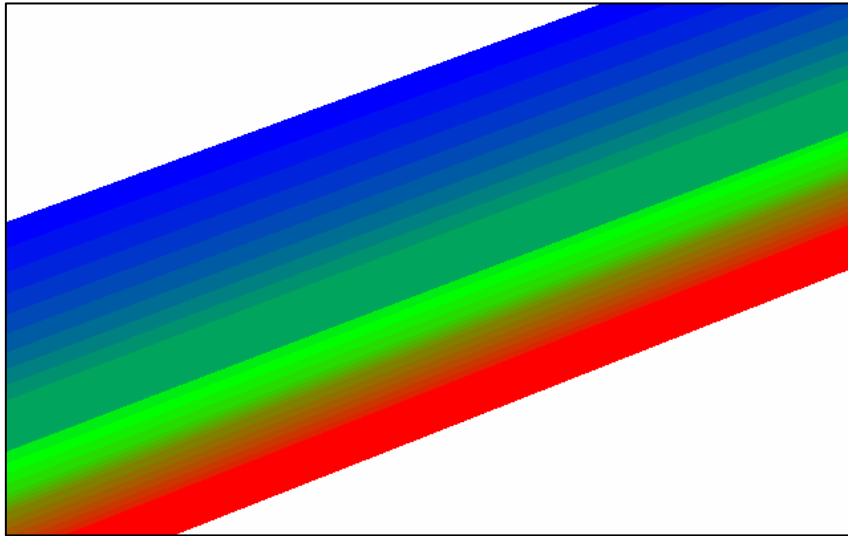
- 當光源設定兩種波長以上(含)時，其線條顏色會以近似波長的顏色表現，並無法直接表示能量的不同。
- 如果將其View->Preferences 的Ray Colors 設定為Display rays by color of wavelength，則會以波長顏色表示。



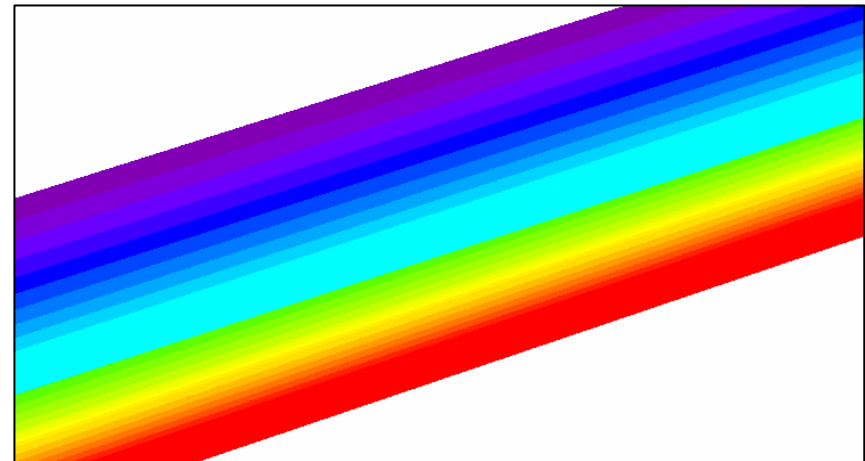


Ray Color

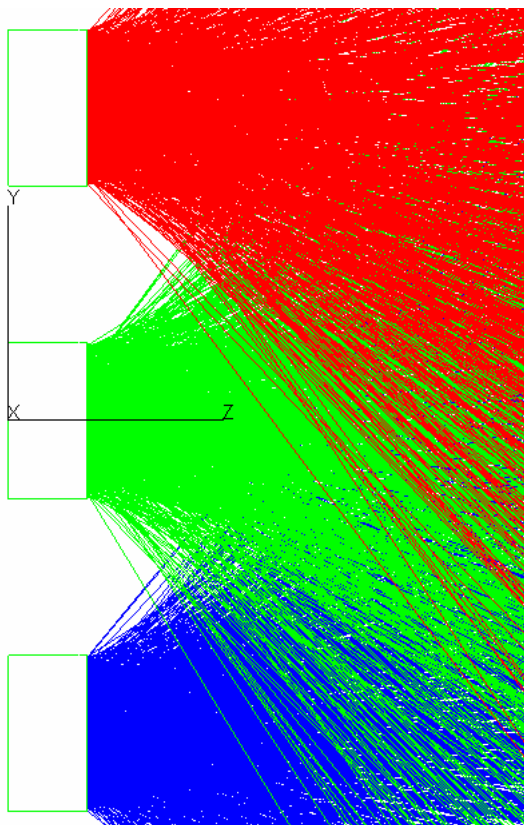
Display ray from red to blue



Display ray by color of wavelength



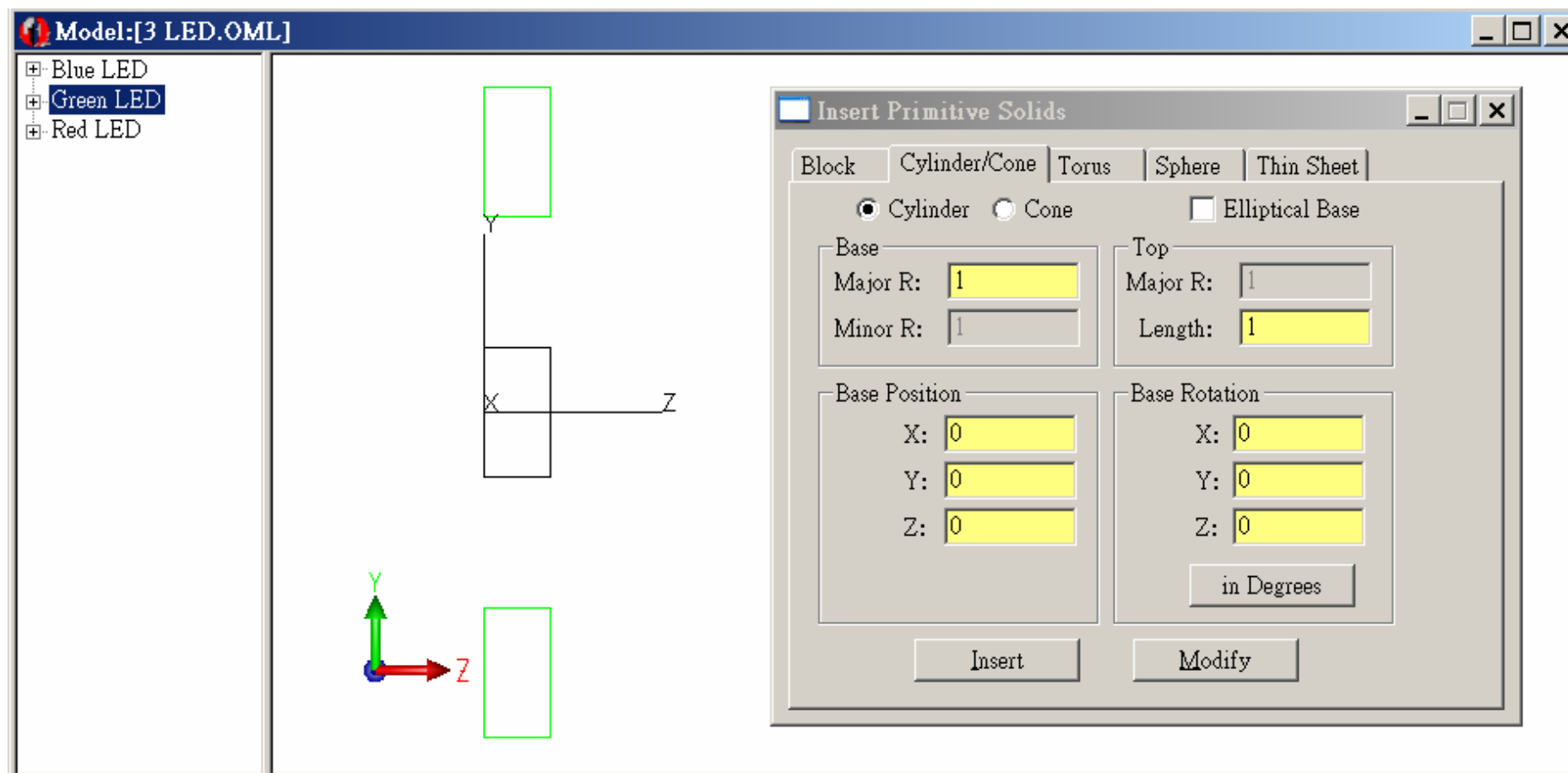
實例練習(RGB LED)



在同一個模組中，建立三種波長的發光源

建之基本發光物件

完成下列物件，其各物件的Base Position (X,Y,Z)分別為(0,0,0) (0,4,0) (0,-4,0)



完成下列的Surface 設定

Define->Edit Property Data->Surface Properties ...

新增一個Lamb Support 目錄及 Blue LED性質

利用Add 新增Wavelength(波長)及Incident Angle(入射角)項目，依下表設定。

Surface Property Editor

Catalog: Lamb Support Name: Blue LED

Description:

Type: Table Scatter: None ☐ Retroreflector ☐ Polarization

Temperature	Wavelength	Incident Angle	Absorptance	Specular Refl	Specular Trans
300	0.45	0	1	0	0
300	0.45	30	0.7	0.3	0
300	0.45	60	0	1	0
300	0.55	0	0	1	0
300	0.55	30	0	1	0
300	0.55	60	0	1	0
300	0.65	0	0	1	0
300	0.65	30	0	1	0
300	0.65	60	0	1	0

Surface Property - Add Data Dialog

Variable to Add

☐ Temperature (K)

☒ Wavelength (microns)

☐ Incident Angle (degrees)

☐ Grating Order

Value: 0.45

Apply Close

Catalog: Lamb Support Name: Red LED

Description:

Type: Table Scatter: None ☐ Retroreflector ☐ Polarization

Temperature	Wavelength	Incident Angle	Absorptance	Specular Refl	Specular Trans
⊖ 300	0.45	0	0	1	0
300	0.45	30	0	1	0
300	0.45	60	0	1	0
300	0.55	0	0	1	0
300	0.55	30	0	1	0
300	0.55	60	0	1	0
300	0.65	0	1	0	0
300	0.65	30	0.7	0.3	0
300	0.65	60	0	1	0

同理，完成Red LED
及Green LED

Catalog: Lamb Support Name: Green LED

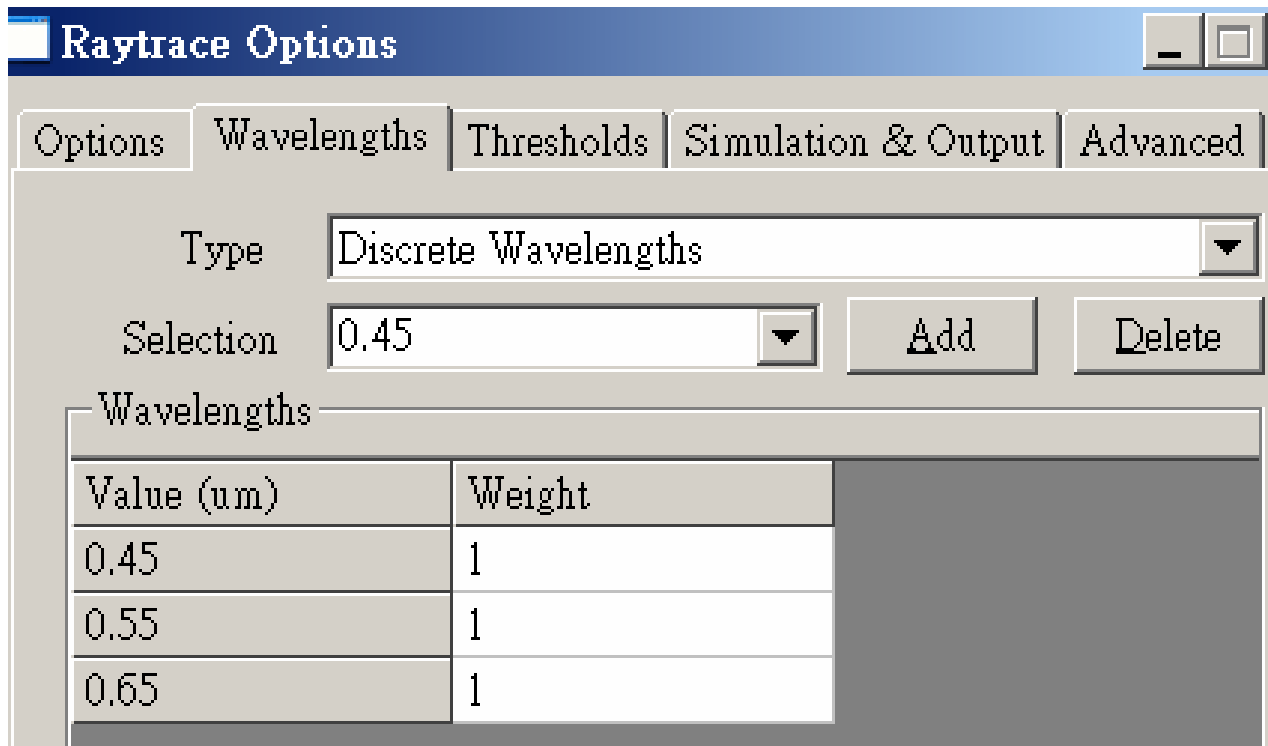
Description:

Type: Table Scatter: None ☐ Retroreflector ☐ Polarization

Temperature	Wavelength	Incident Angle	Absorptance	Specular Refl	Specular Trans
⊖ 300	0.45	0	0	1	0
300	0.45	30	0	1	0
300	0.45	60	0	1	0
300	0.55	0	1	0	0
300	0.55	30	0.7	0.3	0
300	0.55	60	0	1	0
300	0.65	0	0	1	0
300	0.65	30	0	1	0
300	0.65	60	0	1	0

設定Raytrace Options

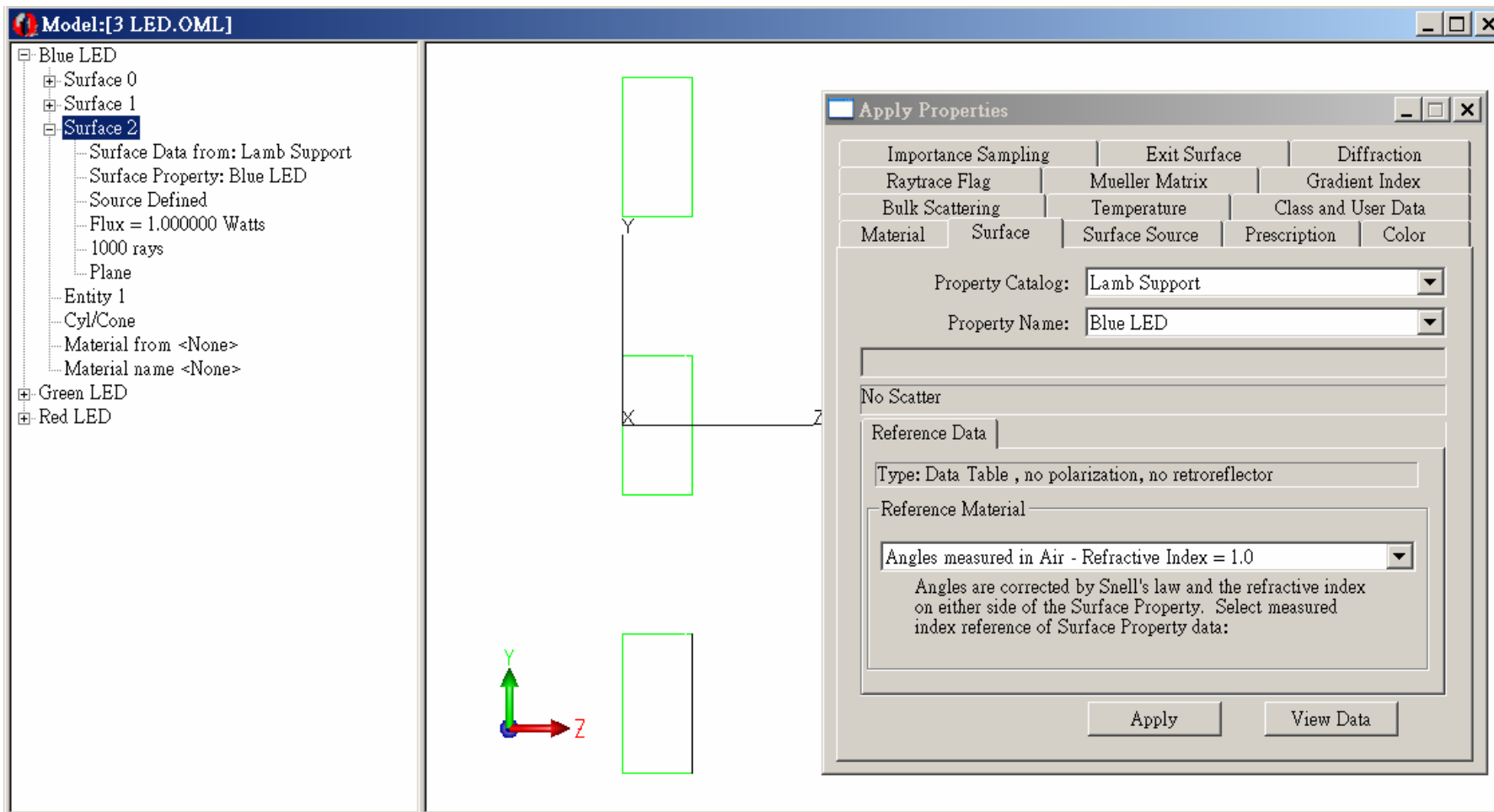
將Analysys->Raytrace Options 的Wavelengths(波長)設定如下表。
這裡Weight(權重)，如果設0，其該波長光線不使用。



The screenshot shows the 'Raytrace Options' dialog box with the 'Wavelengths' tab selected. The 'Type' is set to 'Discrete Wavelengths'. The 'Selection' dropdown shows '0.45'. Below this is a table with two columns: 'Value (um)' and 'Weight'. The table contains three rows of data: 0.45 with weight 1, 0.55 with weight 1, and 0.65 with weight 1. There are 'Add' and 'Delete' buttons next to the 'Selection' dropdown.

Value (um)	Weight
0.45	1
0.55	1
0.65	1

設定物件Surface 性質



設定物件Surface Source

The screenshot shows a software interface for setting surface source properties. The left pane displays a tree view of the model structure, including 'Green LED' and 'Red LED' entities, each with 'Surface 0', 'Surface 1', and 'Surface 2'. The center pane shows a 3D model with three rectangular surfaces (green, yellow, and red) and a coordinate system (X, Y, Z). The right pane is the 'Apply Properties' dialog box, which is currently set to 'Flux' source type. The 'Flux' is set to 1 Watts, and 'Total Rays' is 1000. The 'Total Power' is 0. The 'Angular Distribution' is set to 'Surface Absorbance'. The 'Suppress random rays' checkbox is unchecked. The 'Apply' and 'Calculate Power' buttons are visible at the bottom of the dialog.

Model:[3 LED.OML]

- Flux = 1.000000 Watts
- 1000 rays
- Plane
- Entity 1
- Cyl/Cone
- Material from <None>
- Material name <None>
- Green LED
 - Surface 0
 - Surface 1
 - Surface 2
 - Surface Data from: Lamb Support
 - Surface Property: Green LED
 - Source Defined
 - Flux = 1.000000 Watts
 - 1000 rays
 - Plane
- Entity 2
- Cyl/Cone
- Material from <None>
- Material name <None>
- Red LED
 - Surface 0
 - Surface 1
 - Surface 2
 - Surface Data from: Lamb Support
 - Surface Property: Red LED
 - Source Defined
 - Flux = 1.000000 Watts
 - 1000 rays
 - Plane
- Entity 3

Apply Properties

Importance Sampling | Exit Surface | Diffraction

Raytrace Flag | Mueller Matrix | Gradient Index

Bulk Scattering | Temperature | Class and User Data

Material | Surface | Surface Source | Prescription | Color

Source Type: Flux

Flux: 1 Watts | Total Rays: 1000

Total Power: 0

Wave. (um)	Weight	Power (W)
0.45	1	0
0.55	1	0
0.65	1	0

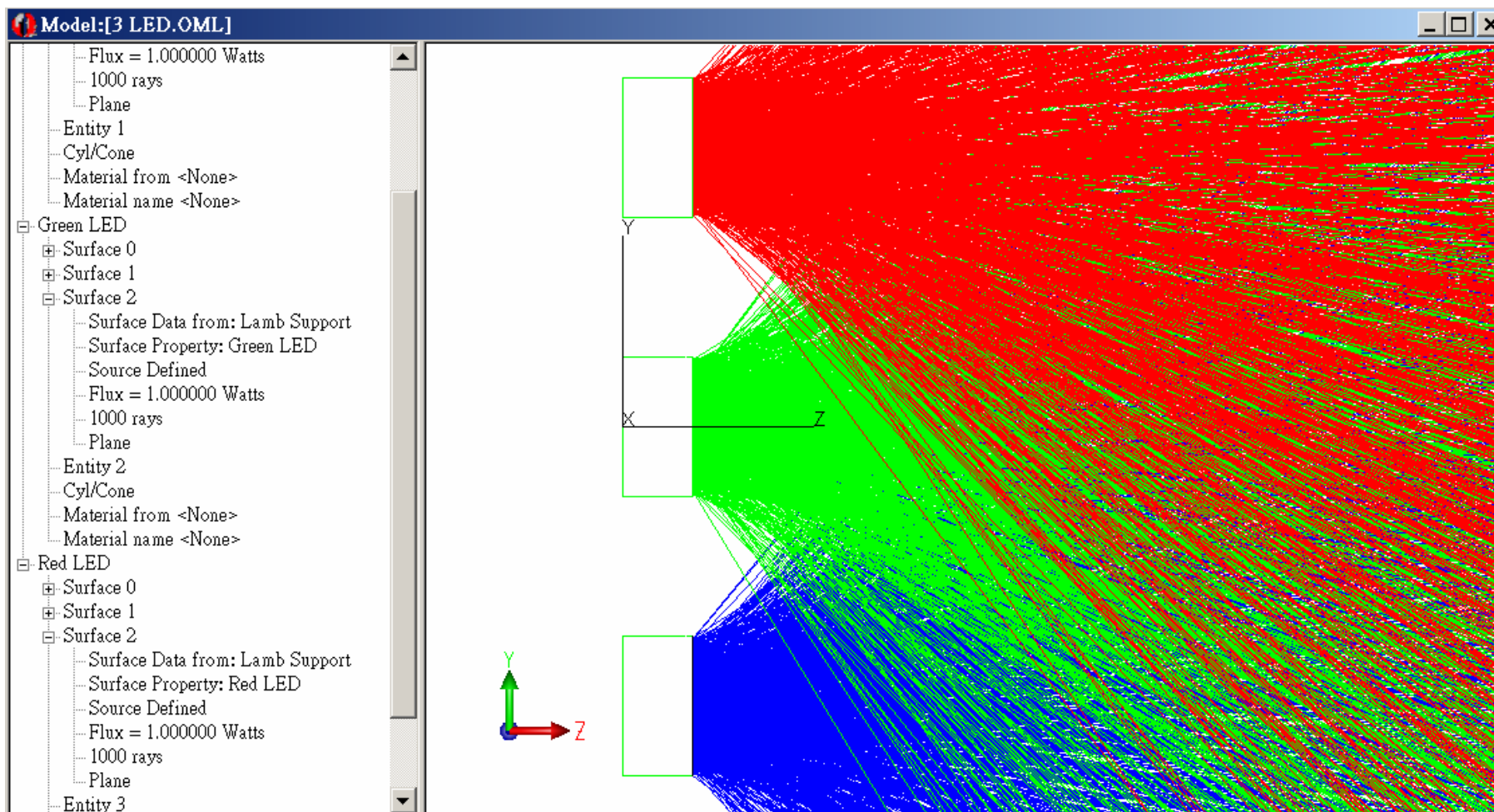
Angular Distribution: Surface Absorbance

☐ Suppress random rays (Requires Source Importance Sampling)

Apply | Calculate Power

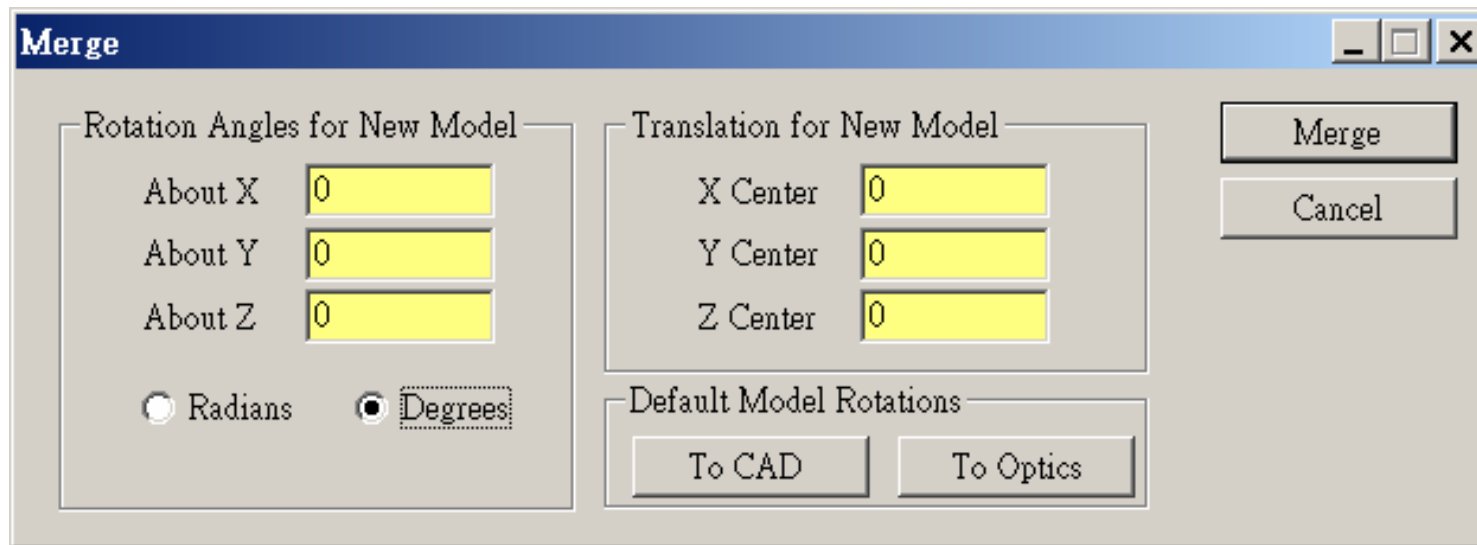
RGB LED結果

按一下這個按鈕 



4. 合併其它燈組模型(Merge)

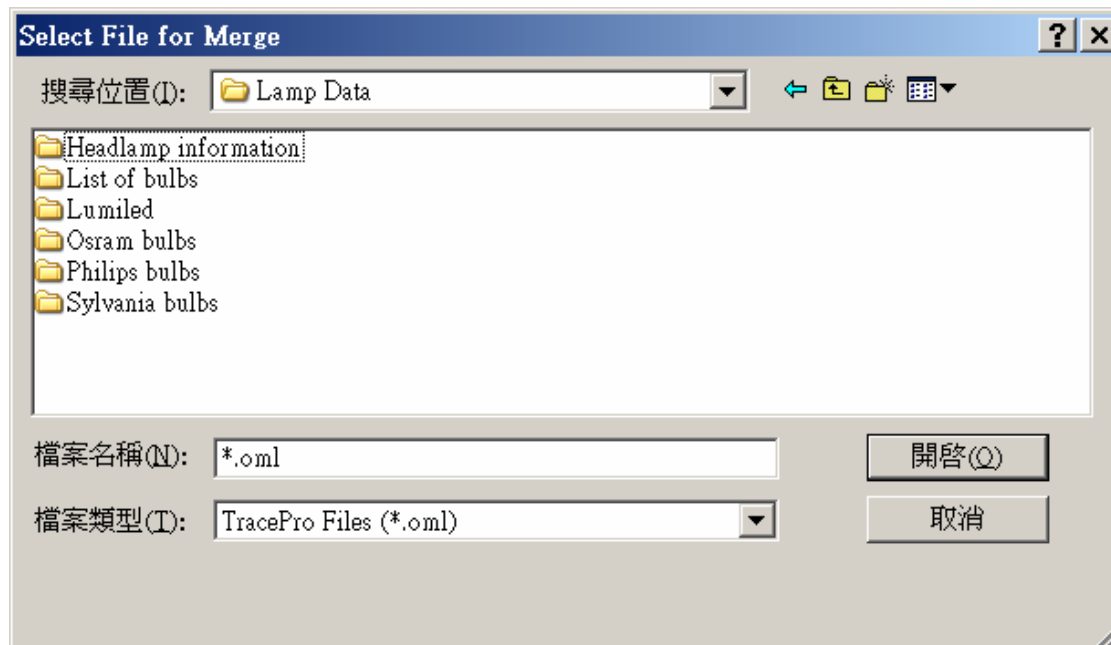
TracePro 可利用Merge 功能，將其它建立好的模型直接合併進來。



使用File->Merge 設定好要合併進來模型的座標位置，按Merge 指令

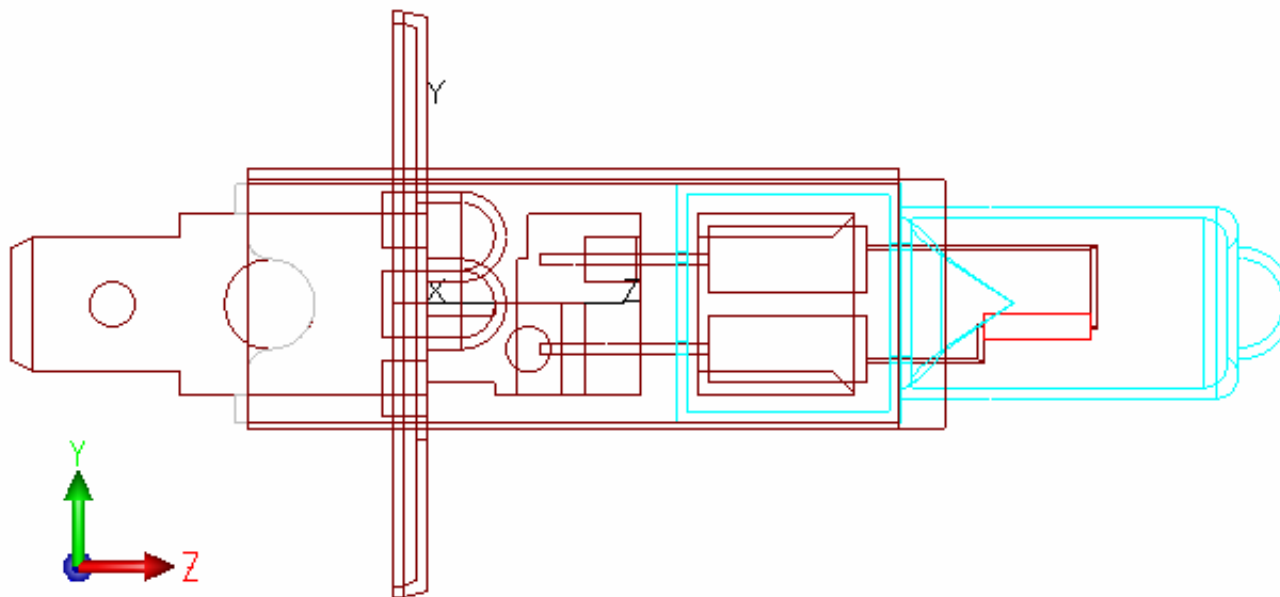
合併其它燈組模型(Merge)

在TracePro 所附的光碟裡面，Lamp Data 目錄裡就放置著廠商所給予的TracePro 燈源模型檔案。



合併其它燈組模型(Merge)

可以在\\Lamp Data\\Osram bulbs\\Automotive lamps\\Headlamps\\Halogen
裡找到一顆64155.oml，來試試看Merge。





■ Thank You!