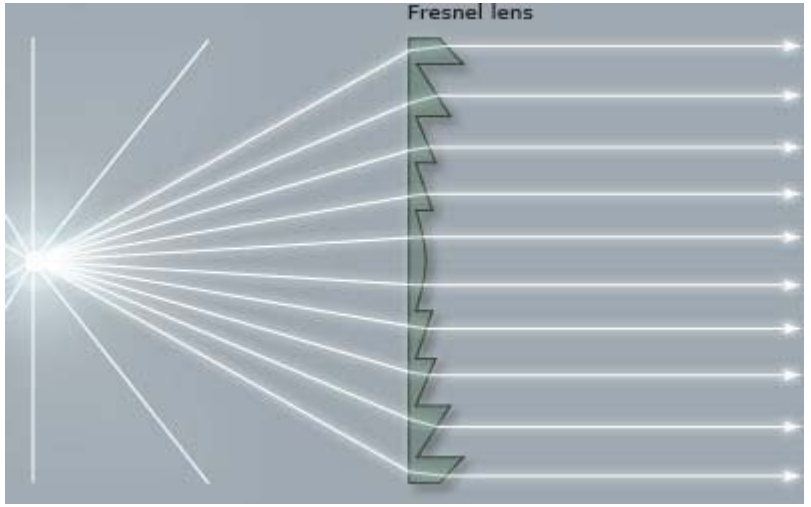
Fresnel Lens



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Introduction

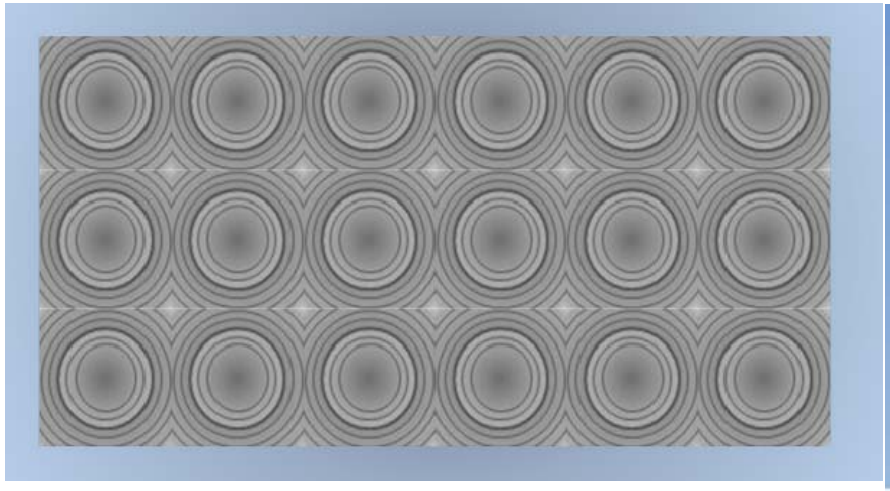
- The Fresnel lens can get VERY hot,so it's very easy to burn food with it.

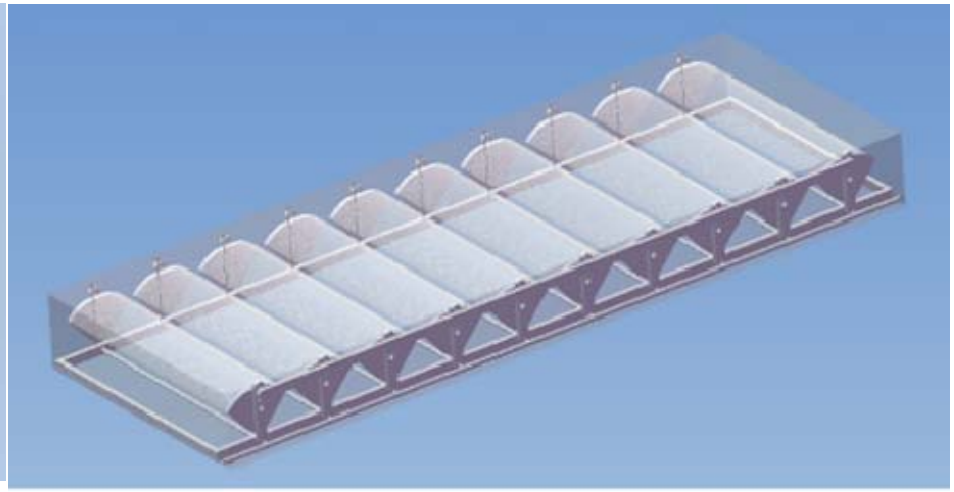
- Fresnel lenses are shaped like a dart board, with concentric rings of prisms around a lens that's a magnifying glass. All of these features let them focus scattered light from the Sun into a tight beam.

- High optical efficiency
- A low cost, high speed manufacturing process
- Precise structure replication
- Design flexibility - up to 40cm edge length
- Low development and tooling cost.
- Tighter focal spot definition
- Shorter focal depth

Types of Fresnel Lens

- Linear : Linear Fresnel lenses focus sunlight in one dimension to a strip. They are used in Thermal Concentrated Solar (CSP) and Low concentration PV applications.
- Radial : Radial Fresnel Lens Focus as Spot. They are an attractive alternative to hot embossed or injection molded lenses in High Concentration Photovoltaic (HCPV) applications.





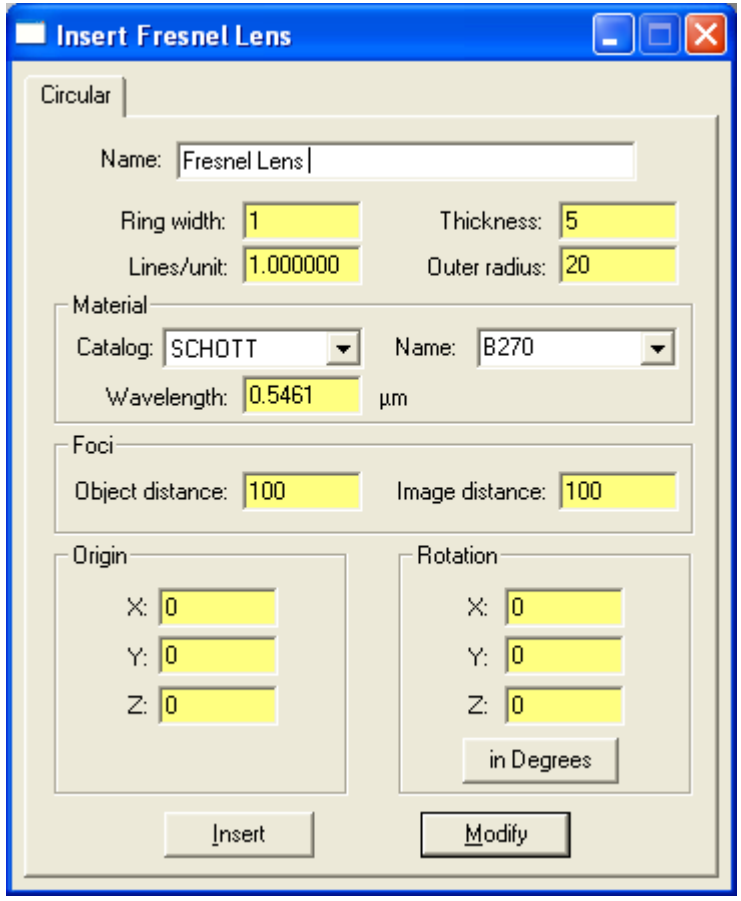
Fresnel Lens Design

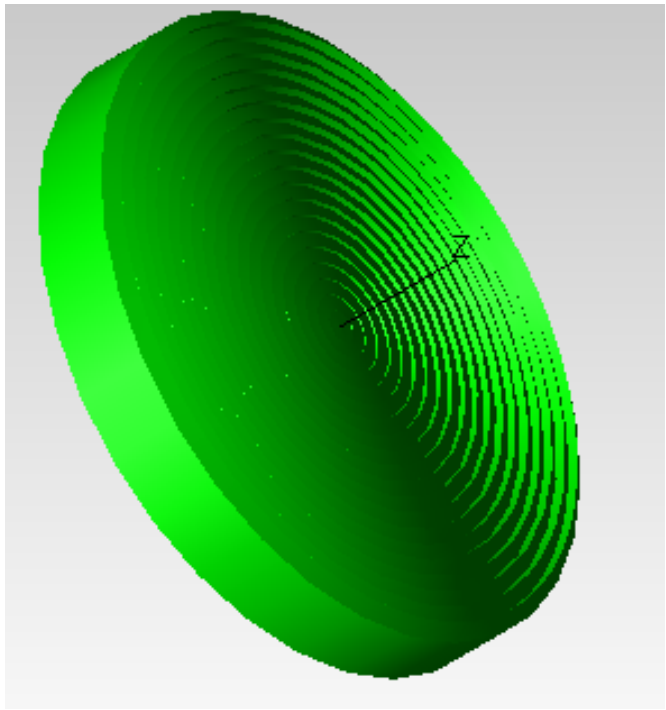
Insert|Fresnel Lens dialog box allows you to enter:

1.Ring width or lines/unit length
2.Thickness of the substrate
3.Radius of the lens substrate
4.Material catalog, name, and design wavelength
5.Object distance
6.Image distance
7.Origin or location of the center of the part
8.Rotation angles specifying the orientation

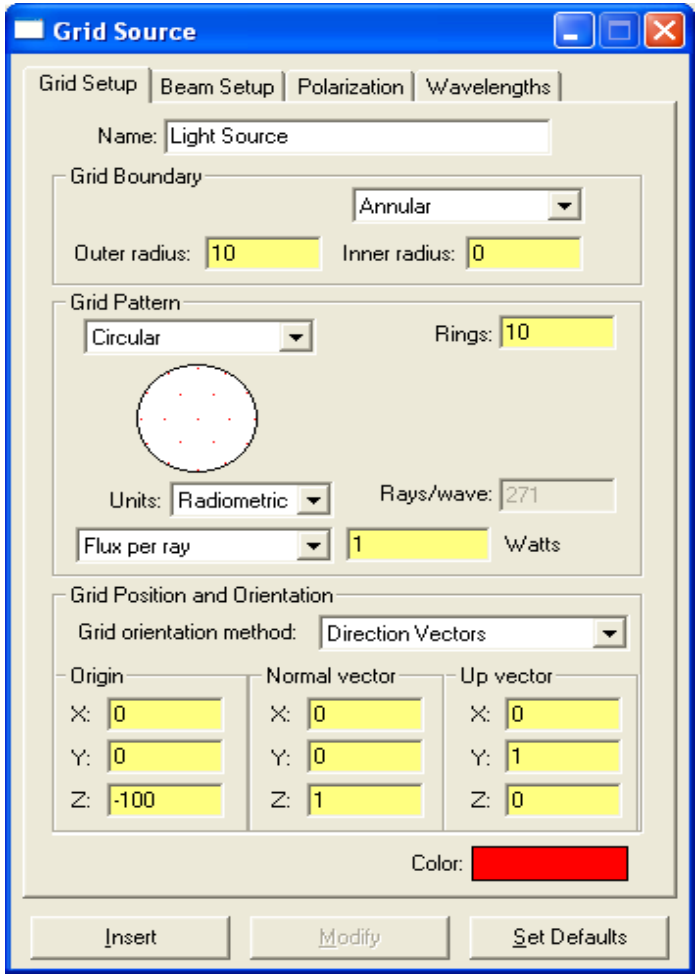
TracePro interprets an object or image distance equal to zero as an infinite distance. Negative distances can also be entered for the case of a virtual object and/or image.

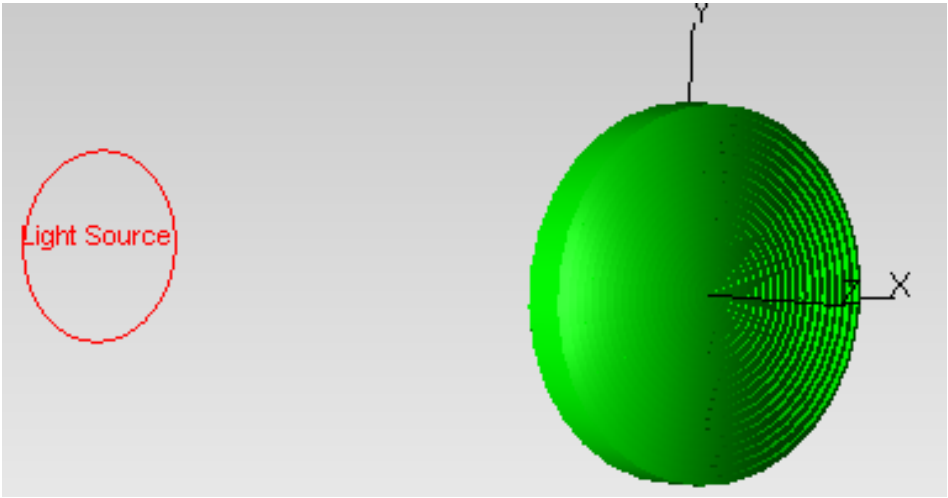
Parameter & Layout





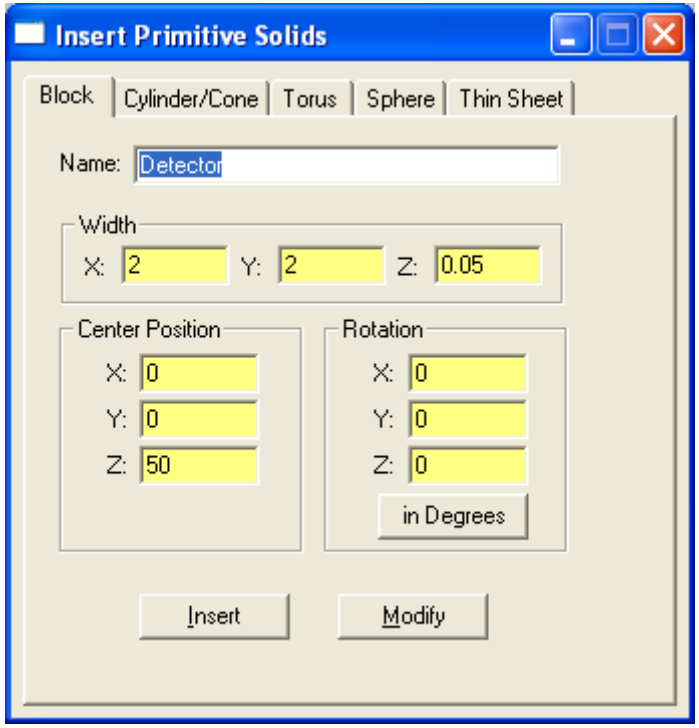
Define Source

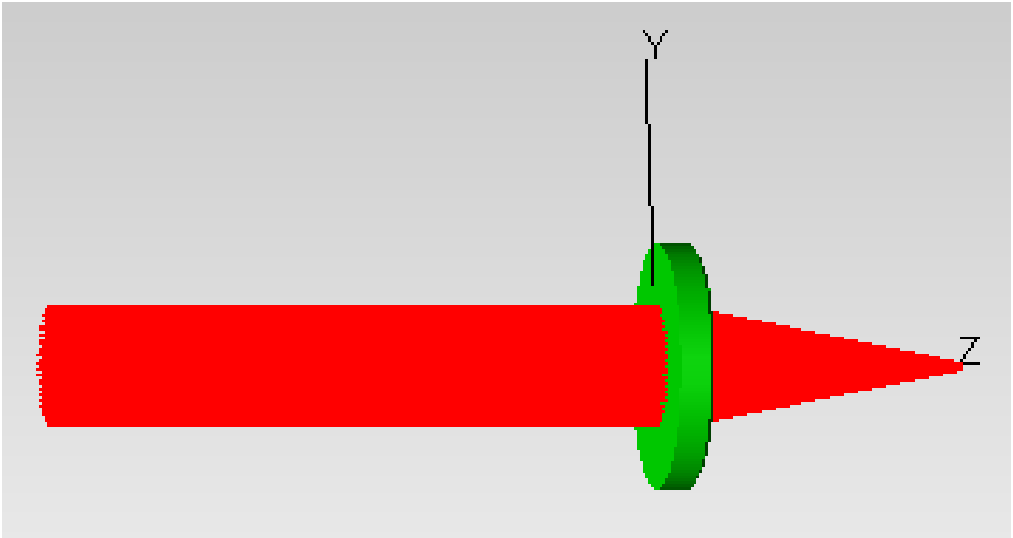




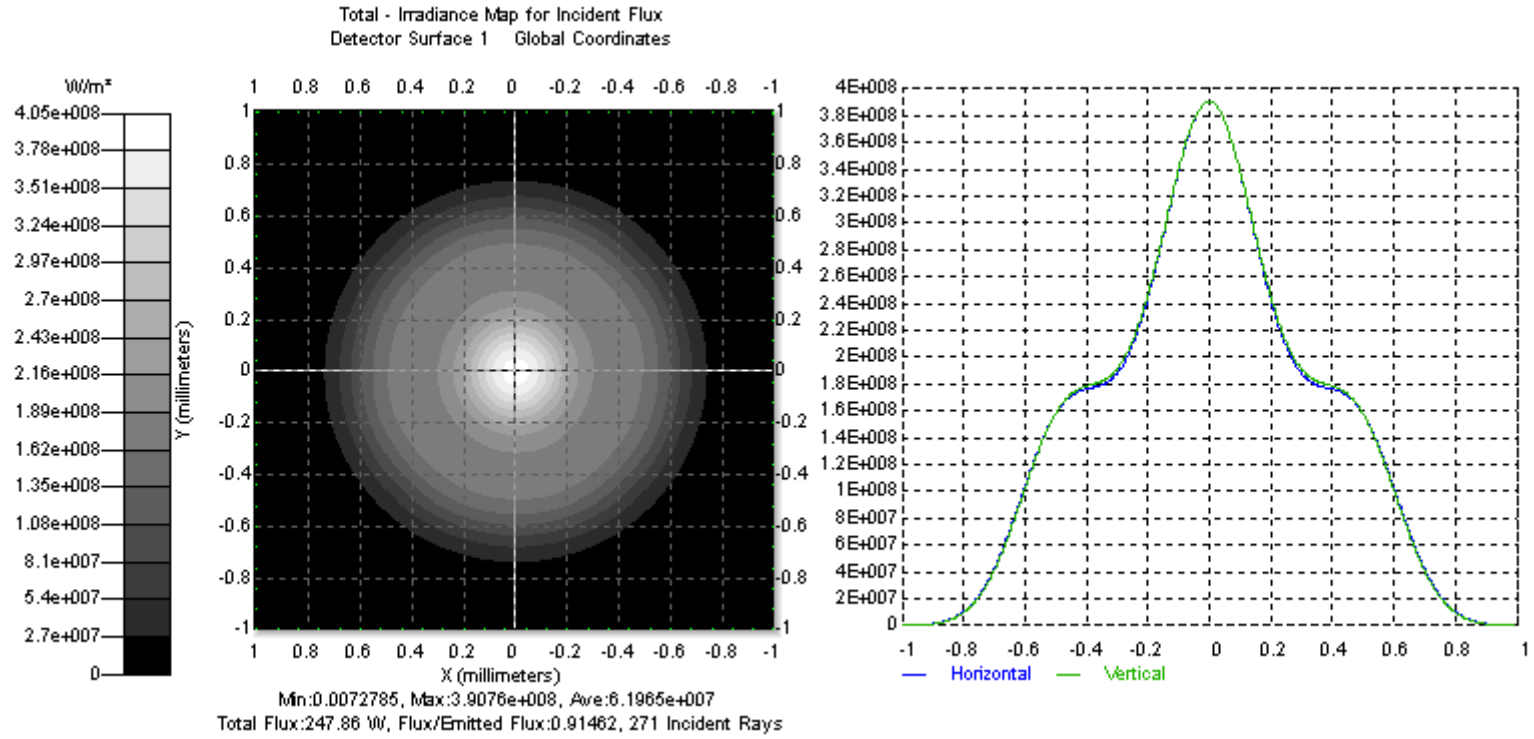
Detector

- Define properties as perfect absorber
- Trace Rays





Analysis


Total - Irradiance Map for Incident Flux
Detector Surface 1 Global Coordinates
W/m²
4.05e+008
3.78e+008
3.51e+008
3.24e+008
2.97e+008
2.7e+008
2.43e+008
2.16e+008
1.89e+008
1.62e+008
1.35e+008
1.08e+008
8.1e+007
5.4e+007
2.7e+007
0
Y (millimeters)
1 0.8 0.6 0.4 0.2 0 -0.2 -0.4 -0.6 -0.8 -1
X (millimeters)
Min:0.0072785, Max:3.9076e+008, Ave:6.1965e+007
Total Flux:247.86 W, Flux/Emitted Flux:0.91462, 271 Incident Rays
4E+008
3.8E+008
3.6E+008
3.4E+008
3.2E+008
3E+008
2.8E+008
2.6E+008
2.4E+008
2.2E+008
2E+008
1.8E+008
1.6E+008
1.4E+008
1.2E+008
1E+008
8E+007
6E+007
4E+007
2E+007
0
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
Horizontal
Vertical

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Summary

- Easy to Design Fresnel Lens
- Complex structure can be design by using reptile properties editor
- Energy is highly concentrated on focus point
- More commonly used for Solar Application