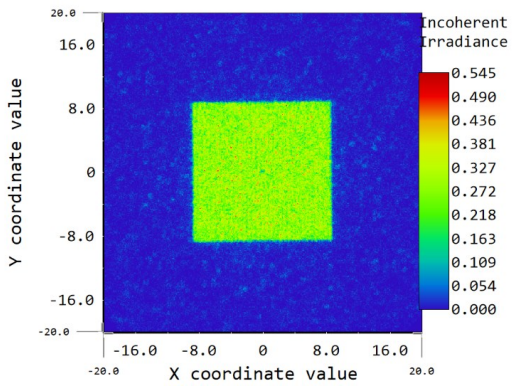
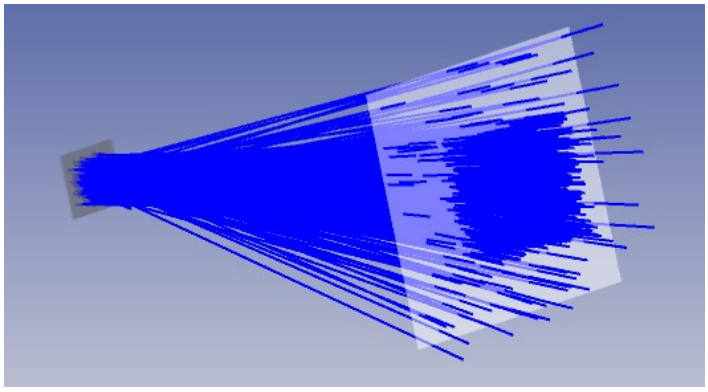




Manual for BSDF files for diffractive Homogenizers

1. What is a BSDF file?
2. How to use BSDF files?
3. What are the limitations of BSDF files?
4. How are HOLO/OR's files made?

1. Holo/Or has developed a method that enables our customers to integrate Diffractive Homogenizers into Zemax™ by using BSDF files. BSDF files describe the scattering functionality of an optical surface by using only the geometrical properties of the light, and can thus be integrated into any ray tracing simulation.

You can read more on BSDF in the following links:
https://en.wikipedia.org/wiki/Bidirectional_scattering_distribution_function
http://www.zemax.com/os/resources/learn/knowledgebase/bsdf-data-interchange-file-format-specification

2. How to use Holo/Or's BSDF files

To simplify work with BSDF files, we have prepared a zmx file with a basic optical setup that includes a Gaussian source, a Homogenizer surface and a detector in non-sequential mode.

Three common steps are required to start:

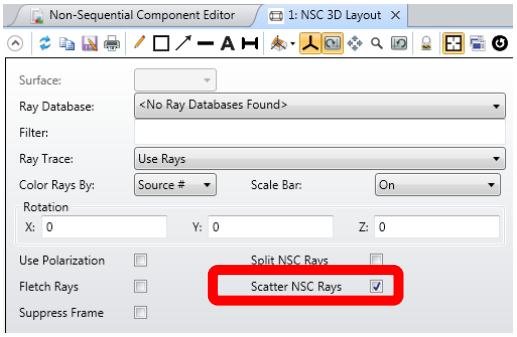
a. Choose and download the specific model of diffractive Homogenizer you wish to simulate at a specific wavelength from the web catalogue:

http://holoor.co.il/Diffractive_Optics_Products/Diffractive_Beam_Homogenizers/homogenizer-diffuser.php

b. Open the ZIP file and copy the BSDF file to the scattering folder of ZEMAX. For example, here:

C:\Users\<UserName>\Documents\Zemax\ScatterData

c. Open unzipped ZEMAX file and check "Rays scattering" in analysis methods (for example, Layouts and RayTracing). Parameters of Scattering appear at Scatter property of surface 2 (see figure in next page).



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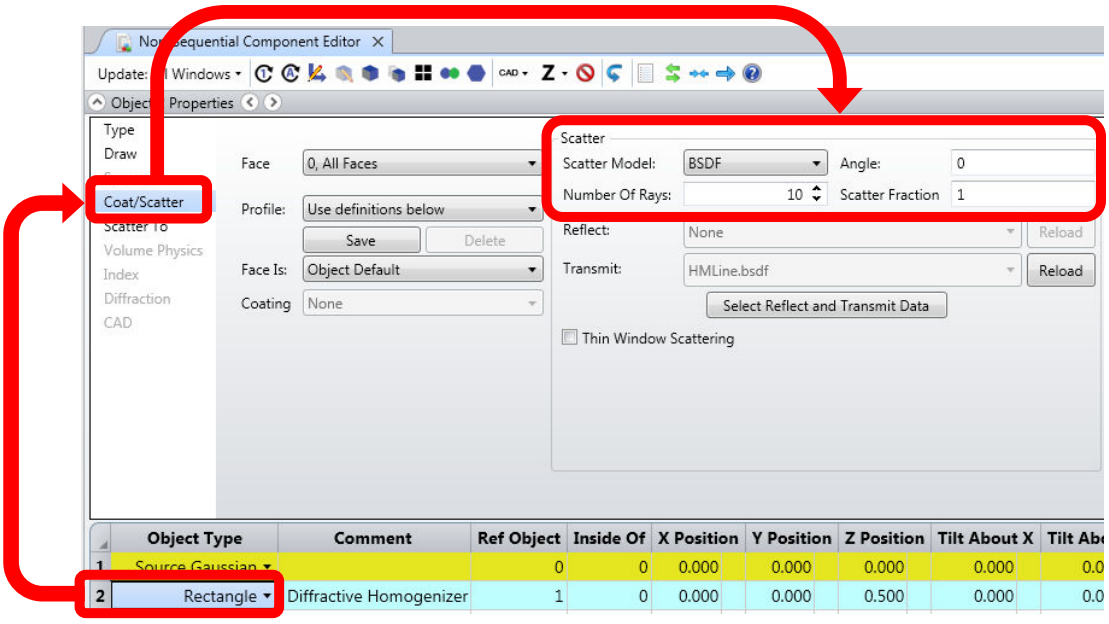


3. Limitation of the BSDF files:

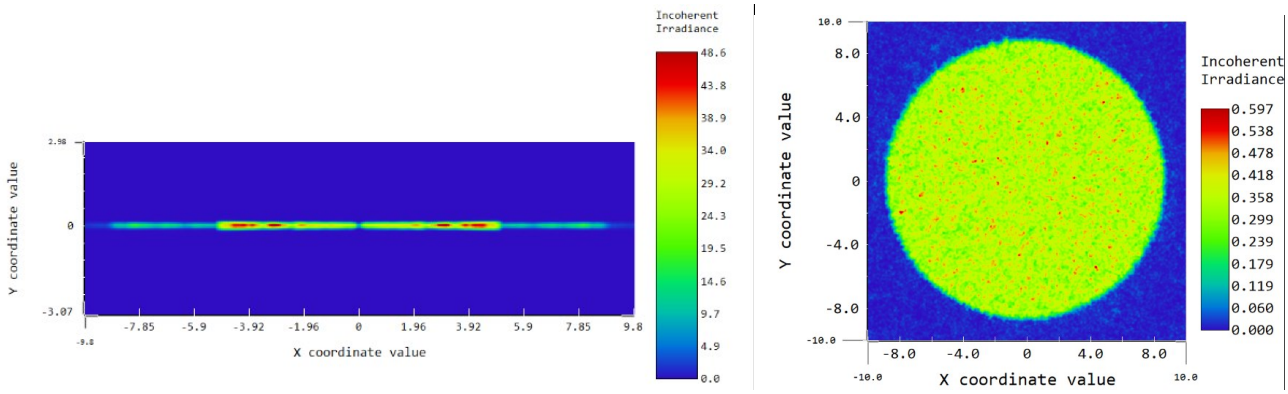
a) The files are saved for zero incident angle in a single orientation in the XY plane. For certain tolerances and input ray angles, especially for non-radial symmetries, the simulation will show incorrect results. For example a square shaped homogenizer will become round.

b) The scattering function isn't sensitive to wavelength. In other words, the diffusion angle will not change if one changes the system's primary wavelength or uses several wavelengths in the simulation, contrary to what will occur for real diffractive elements.

c) Zero Order effect isn't present in this geometrical simulation.

d) The Diffractive Homogenizers has a recommended minimum incident beam size. BSDF doesn't include this condition, and will not show the effects of too small beams.

4. Holo/Or's BSDF files are prepared from paraxial simulation in physical optics that included diffraction and interference properties of the light in far field. Afterwards intensity map converted to ZEMAX BSDF format.



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