

How to simulate Vortex Phase Plate in Zemax

Introduction: The Vortex Phase Plate can be modeled in Zemax with special DLL file. A topological charge parameter is available on the Vortex Phase Plate surface as the first input parameter in Lens Data editor. Only Physical Optics Propagation can be applied for simulation of the Vortex Phase Plate.

Step by Step:

1. <u>Download</u> the 64-bit .dll kindly published by Dr. Moore and add it to DLL folder of ZEMAX. Example of DLL folder view:

✓ Local Disk (D:) ▼ Progr	ram Files 🔻 Z	Zemax OpticStudio	o ▼ DLL ▼ Surfaces			
brary 🔻 Share with 🔻	Burn	New folder				
Name			Date modified 🔶	Туре	Size	
🖄 Spiral Phase Plate			7/1/2013 11:02 PM	DLL File	76 KB	
Qbfs_recur			10/19/2015 8:24 AM	DLL File	152 KB	
Qcon_recur			10/19/2015 8:24 AM	DLL File	149 KB	
us_anamr			10/19/2015 8:24 AM	C Source	14 KB	
US_ANAMR			10/19/2015 8:24 AM	DLL File	61 KB	

2. The DLL file should be loaded in "User Defined" surface and the user must enter the OAM charge (Topological charge) value into the first parameter of the surface.

Lens Dat	а									
Jpdate: Edi	tors Only - 🕂 🔮 🔢	½½ \$ ∌ \$ ()• 🛫 🧲	🔲 😫 🕶 🚽	0					
Surface	1 Properties 🔇 📎			h ann ann an A	Configuration	n 1/1 🕜 (2			
1	Surf:Type	Comment	Radius	Thickness	Material	Coating	Semi-Diameter	Conic	TCE x 1E-6	OAM:1
4	e ere e to the e									
OBJECT	Standard V		Infini	Infini			0.000	0.000	0.000	
OBJECT	Standard V	Spiral Phase Plate	Infini Infini	Infini 0.000			0.000	0.000	0.000	5.000

- 3. Add the other important fields of your system such as wavelength, lenses and thickness.
- 4. Open the "Physical Optics Propagation" (POP) window, enter your Gaussian beam radius and other parameters related to your system.

eam Type:	Gaussian Waist	•	Automatic	
-Sampling:	1024	X-Width:	284	
-Sampling:	1024	Y-Width:	284	
Total Power	1	C Peak Irradiance		
/aist X	5	Waist Y	5	
ecenter X	0	Decenter Y	0	
perture X	0	Aperture Y	0	
rder X	0	Order Y	0	

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Notes: The effect of the Vortex Phase Plate can be seen only with Physical Optics Propagation

<u>Conclusions</u>: The Vortex phase plate Diffractive Optical Element can be modeled in ZEMAX. A full set of complex field is presented: Amplitude, Phase, and Polarization. The concept allows integrating and analyzing functionality in multi element optical systems.

Download Example file: Vortex m5 example in Zemax Archive File extension

References:

>>><u>http://forum.zemax.com/Topic1739.aspx</u>
>>><u>http://www.zemax.com/support/resource-center/knowledgebase/how-to-compilea-user-defined-surface
>>><u>http://www.zemax.com/support/resource-center/knowledgebase/exploringphysical-optics-propagation-in-opticstud</u></u>