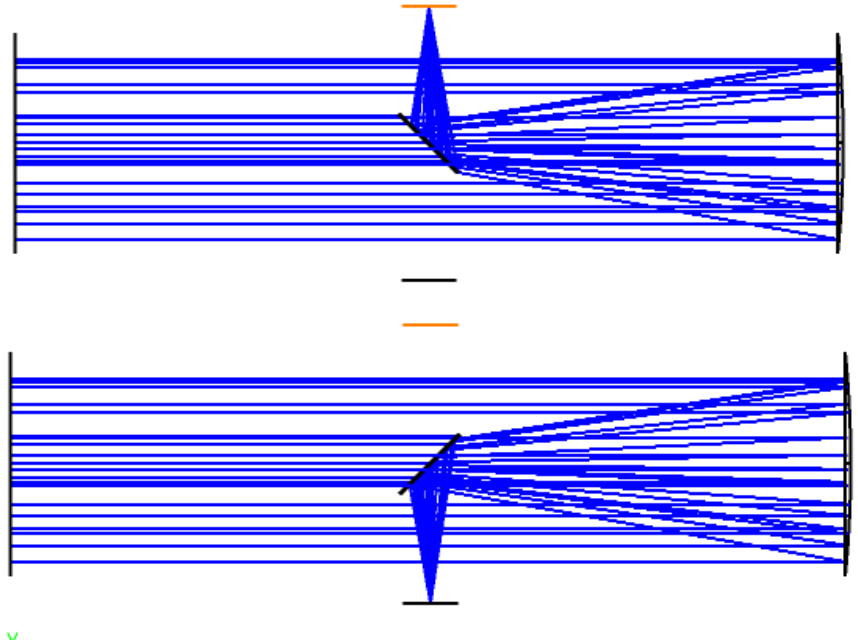
Lectures Notes on Optical Design using Zemax OpticStudio

Lecture 23

MCE in Non-Sequential Mode



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Content

In this chapter, we will see how to use Multiple Configuration Editor in NonSquential Mode.

- MCE
- MCE Operands
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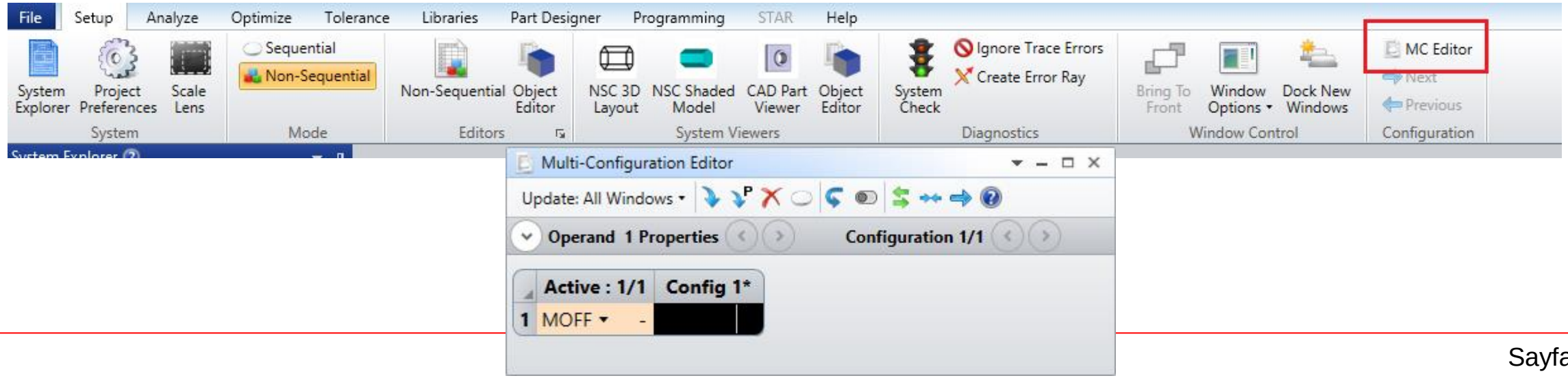
MCE

In some cases, we may have more than one configuation in our system.

As we have seen before, any system can be “switched” via the MCE in Zemax.

We can change

- Aperture size, type
- Material
- Wavelength
- Position
- Angular Position
- etc.



Multi-Configuration Operands

To change the operand type, double click on the type column. A dialog box will appear where the type and number of the multi-configuration operand can be changed.

The operands are also summarized in the following table:

Type	Numbers 1,2,3	Description
AFOC	Ignored	Afocal Image Space mode. For more information, search the help files for "Afocal Image Space".
AICN	Surface, Object	iPartFactory Number for the Autodesk Inventor part. Search the help files for "Autodesk Inventor Part" for details.
APDF	Ignored	System apodization factor. See also APDT.
APDT	Ignored	System apodization type. Use 0 for none, 1 for Gaussian, 2 for cosine cubed. See also APDF.
APDX	Surface #	Surface aperture X- decenter. The surface must have a defined aperture (NOT semi-diameter).
APDY	Surface #	Surface aperture Y- decenter. The surface must have a defined aperture (NOT semi-diameter).
APER	Ignored	System aperture value. If the system aperture type is float by stop size this is the clear semi-diameter or semi-diameter of the stop surface. See also SATP.
APMN	Surface #	Surface aperture minimum value. The surface must have a defined aperture (NOT semi-diameter). This same operand also works to control the first parameter of all surface aperture types, such as the X-Half Width on rectangular and elliptical apertures. However, note that that this operand does not work to control the UDA scale when the surface aperture type is user aperture or user obscuration.
APMX	Surface #	Surface aperture maximum value. The surface must have a defined aperture (NOT semi-diameter). This same operand also works to control the second parameter of all surface aperture types, such as the Y-Half Width on rectangular and elliptical apertures.
APTP	Surface #	Surface aperture type. The integer values indicating the aperture type are 0-10 for none, circular aperture, circular obscuration, spider, rectangular aperture, rectangular obscuration, elliptical aperture, elliptical obscuration, user aperture, user obscuration, and floating aperture; respectively.

Example

The aim of this example is to build a simple system to be used for visible and LWIR imaging.

You can download it from the course web page. (mce_example.zos).

We have

one primary concave mirror (R = 800 mm, aperture 80 mm)

Two detectors (visible and LWIR sensors)

Two rectangle (secondary mirror, the one closer to source absorbs the incoming rays).

Non-Sequential Component Editor

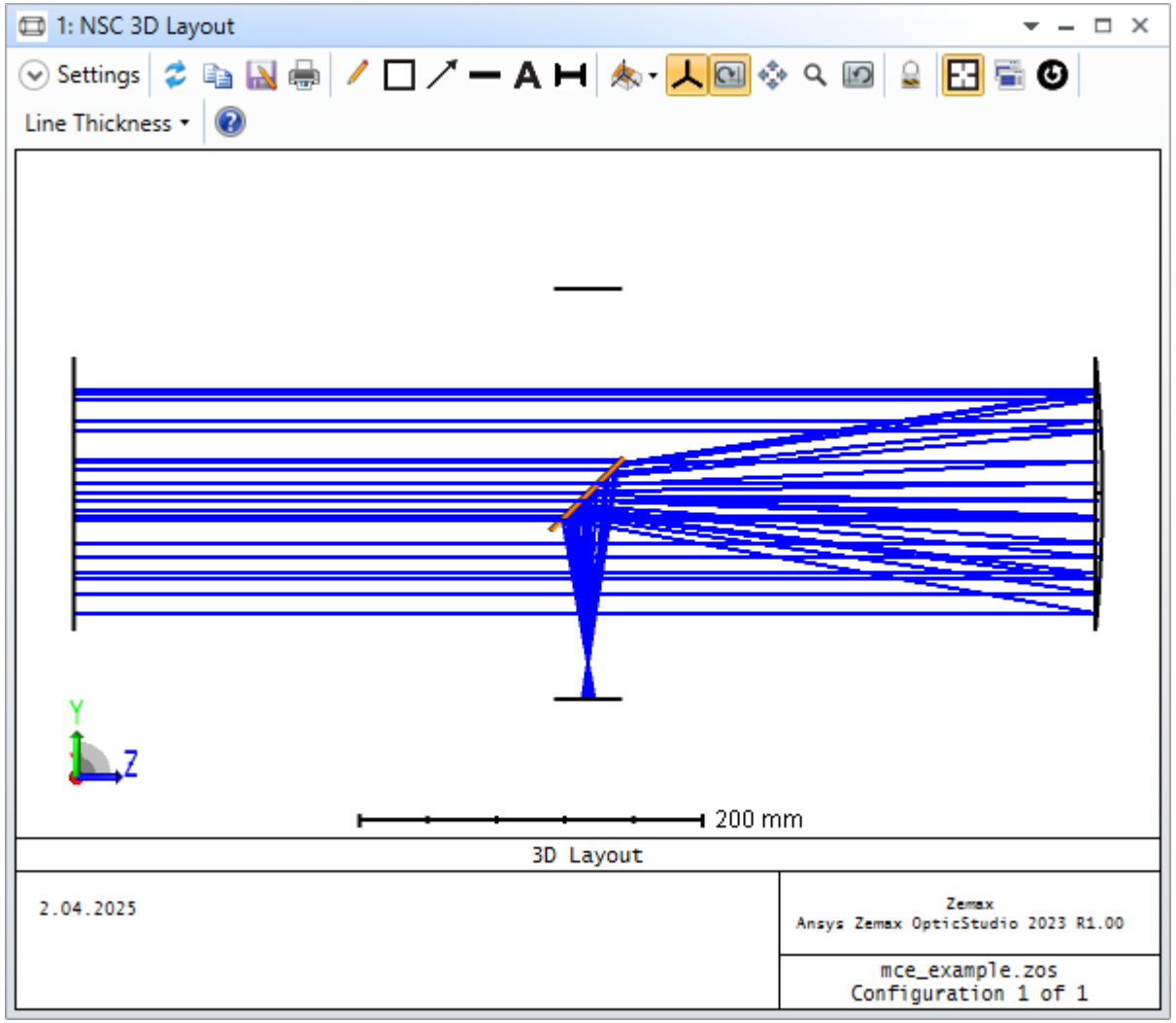
Update: All Windows

Object 4 Properties

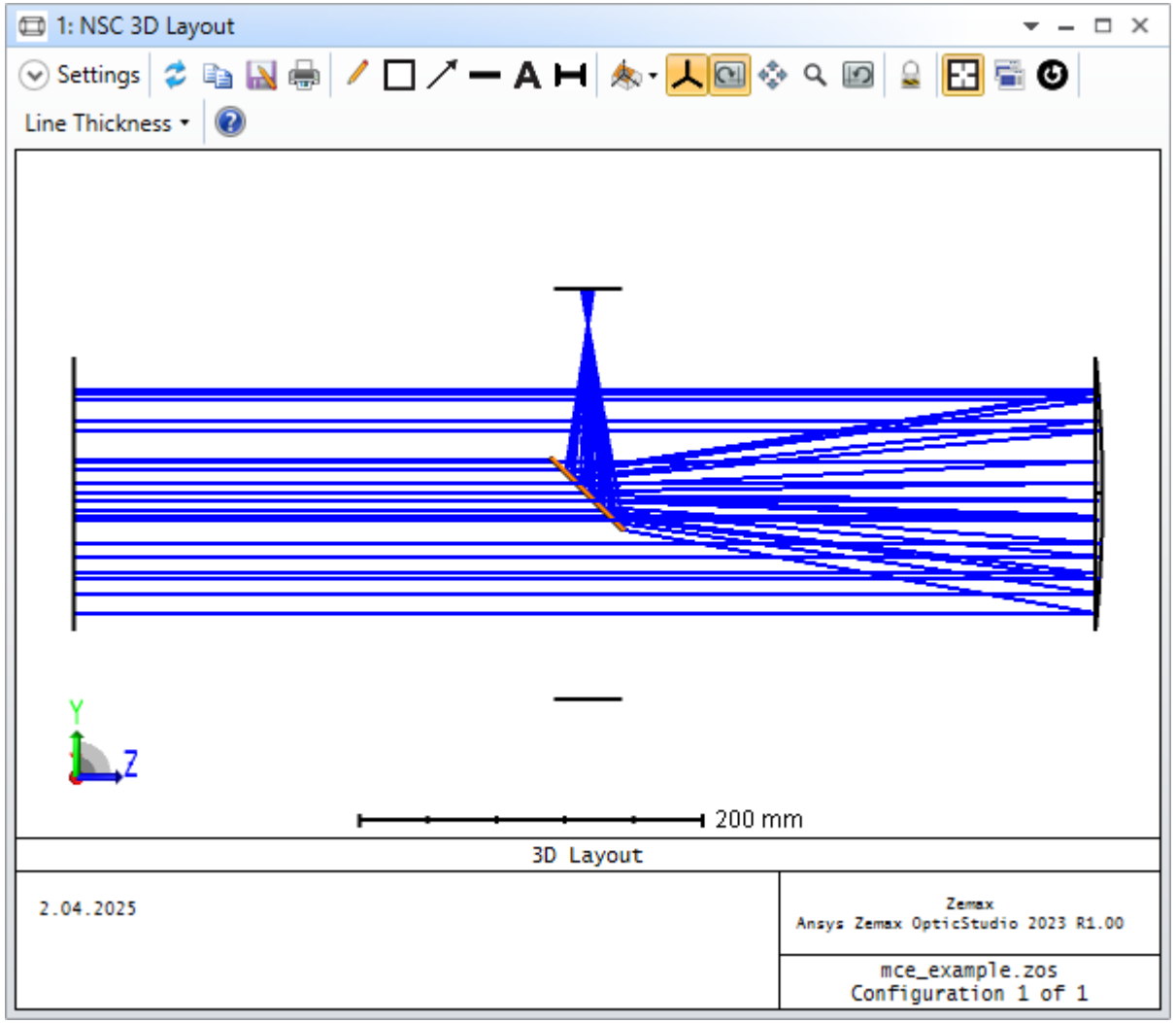
Configuration 1/1

	Object Type	Comment	Ref Object	Inside Of	X Position	Y Position	Z Position	Tilt About X	Tilt About Y	Tilt About Z	Material	X Half Width	Y Half Width	Par 3(unused)	Par 4(unused)	Par 5
1	Source Ellipse		0	0	0.000	0.000	0.000	0.000	0.000	0.000	-	20	1E+05	1.000	0	
2	Standard Surface	primary	0	0	0.000	0.000	600.000	0.000	0.000	0.000	MIRROR	-800.000	0.000	80.000	0.000	
3	Rectangle	absorber	2	0	0.000	0.000	-301.000	45.000	0.000	0.000	ABSORB	30.000	30.000			
4	Rectangle	reflector	2	0	0.000	0.000	-300.000 P	45.000 P	0.000	0.000	MIRROR	30.000	30.000			
5	Detector Rectangle	VISIBLE	2	0	0.000	-120.000	-300.000 P	90.000	0.000	0.000	ABSORB	20.000	20.000	250	250	
6	Detector Rectangle	LWIR	2	0	0.000	120.000 P	-300.000 P	90.000	0.000	0.000	ABSORB	20.000	20.000	250	250	

Visible (λ = 0.55 µm)

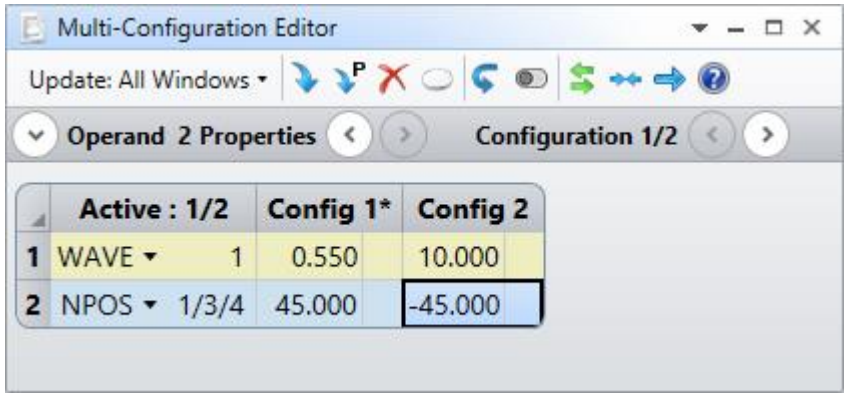


LWIR (λ = 10 µm)

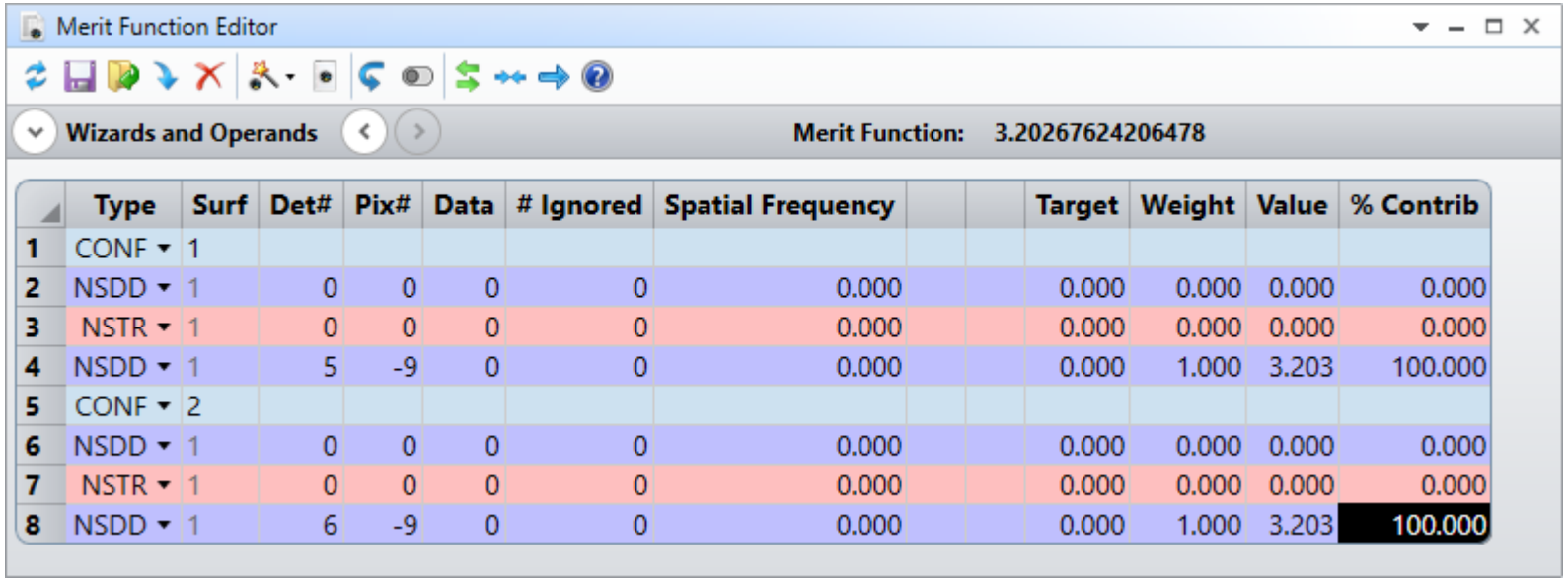


We want to get best spot size for both system. So, y position of both detectors must be variable.

Now, open MCE and Merit function editors and input following data.

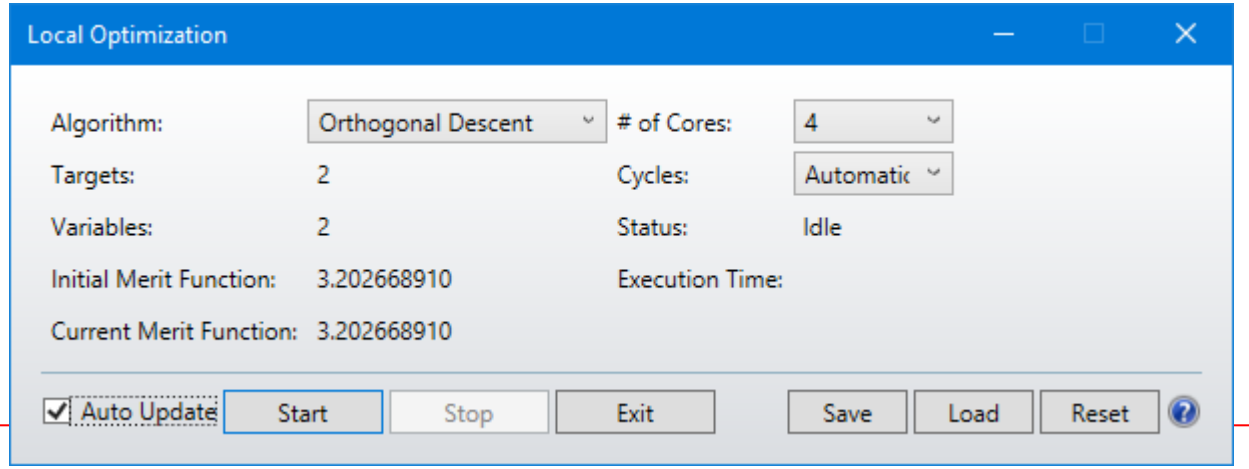


	Active : 1/2		Config 1*	Config 2
1	WAVE	1	0.550	10.000
2	NPOS	1/3/4	45.000	-45.000



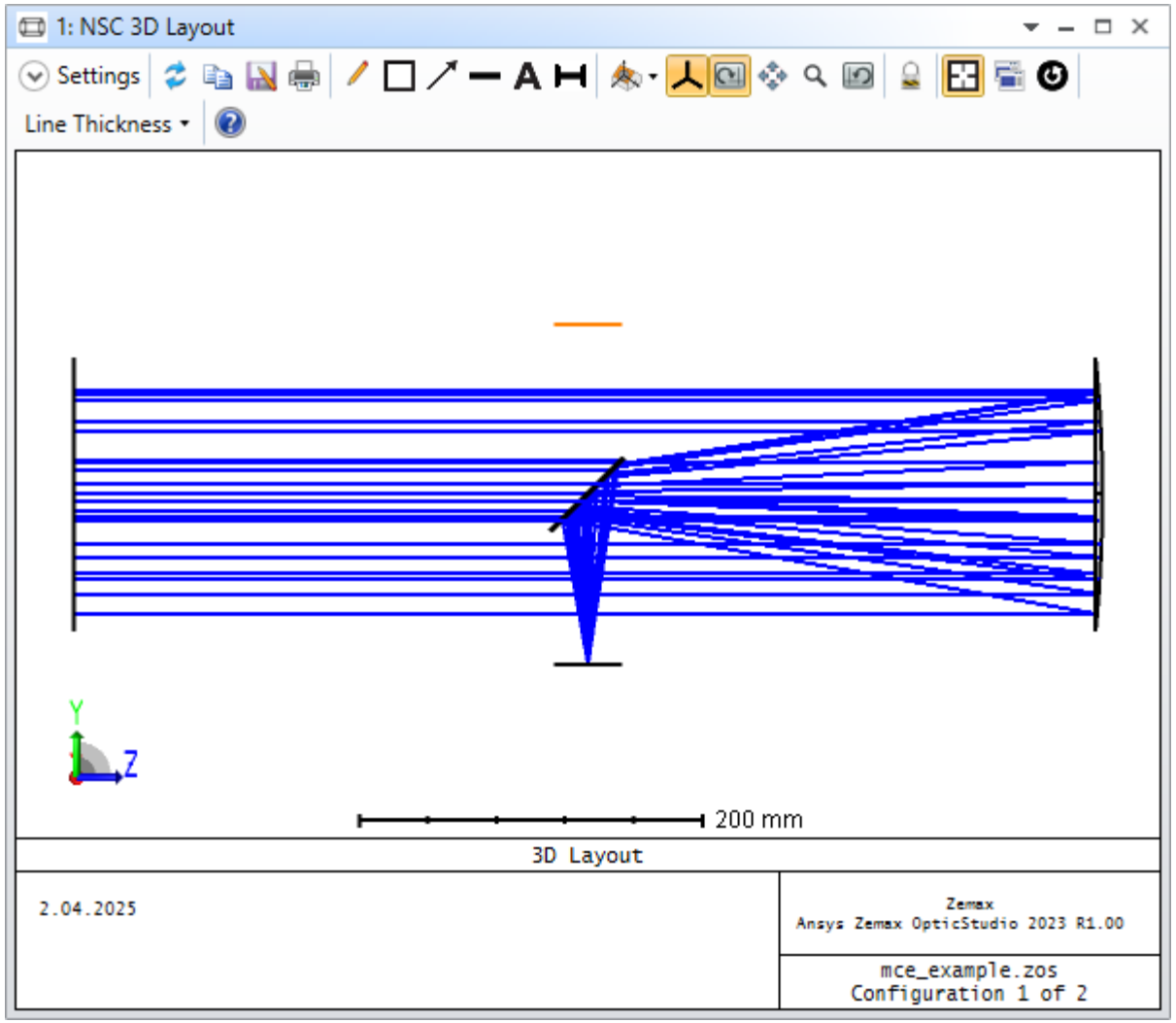
	Type	Surf	Det#	Pix#	Data	# Ignored	Spatial Frequency		Target	Weight	Value	% Contrib
1	CONF	1										
2	NSDD	1	0	0	0	0	0.000		0.000	0.000	0.000	0.000
3	NSTR	1	0	0	0	0	0.000		0.000	0.000	0.000	0.000
4	NSDD	1	5	-9	0	0	0.000		0.000	1.000	3.203	100.000
5	CONF	2										
6	NSDD	1	0	0	0	0	0.000		0.000	0.000	0.000	0.000
7	NSTR	1	0	0	0	0	0.000		0.000	0.000	0.000	0.000
8	NSDD	1	6	-9	0	0	0.000		0.000	1.000	3.203	100.000

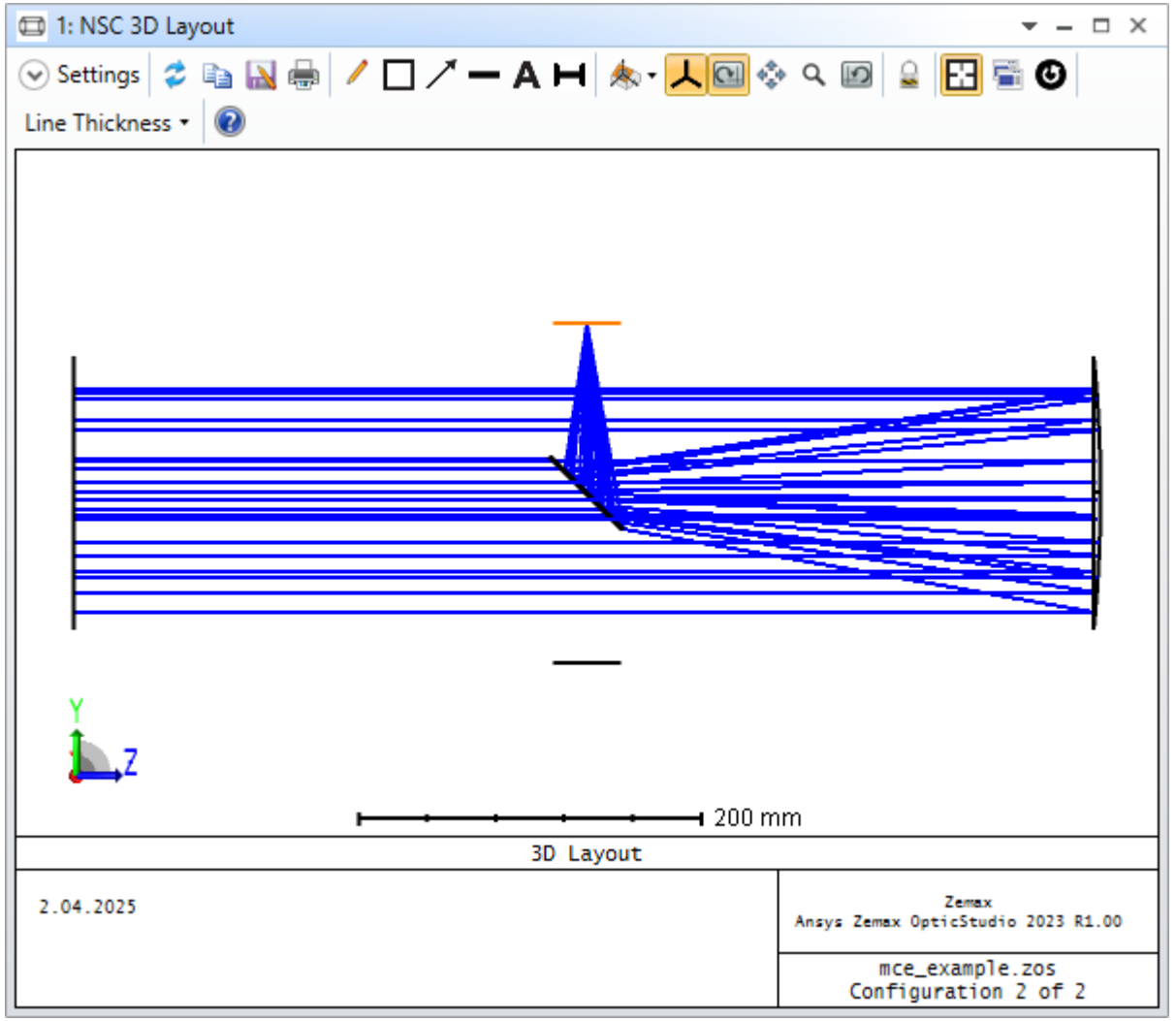
Then, click on optimize button.



After opimization, we will have best focus locations of mirrors for both visible and LWIR ranges.

You can look at detector viewers if you get best foci or not!





Exercise

The figure illustrates an optical system designed to provide two different beam expansion options (2x or 4x). The input HeNe laser beam has a size of 5 mm.
Implement this system in Zemax using the MCE editor.
Hint: You can select suitable lenses from Lens Catalog for beam expanders and
can use flat mirrors to steer beam direction.