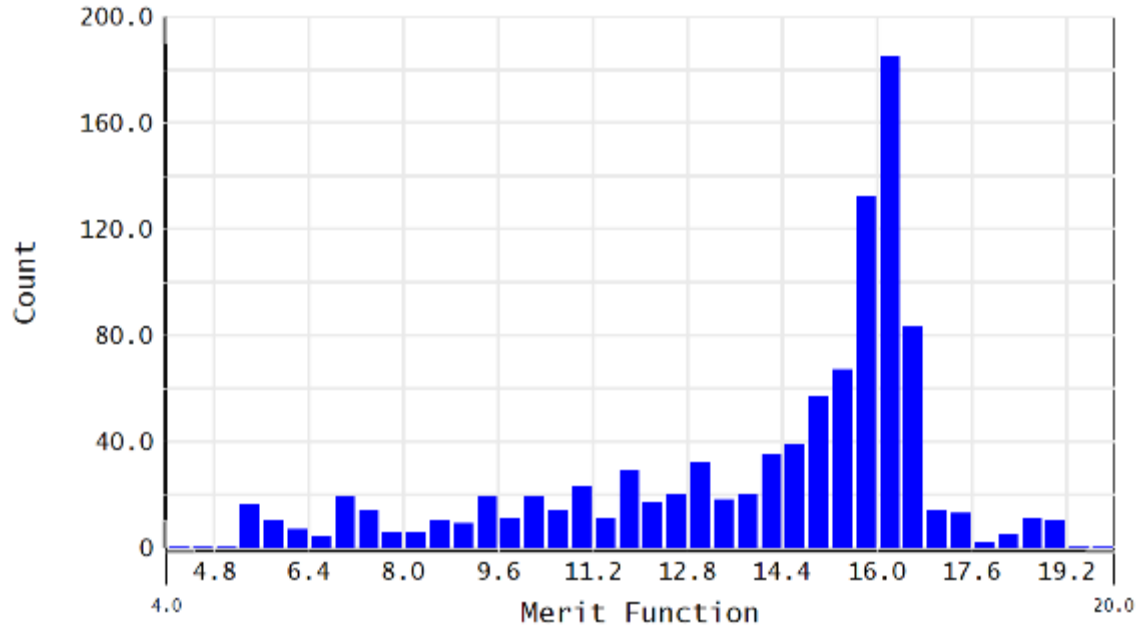
Lectures Notes on Optical Design using Zemax OpticStudio

Lecture 24

Tolerancing in Non-Sequential Mode



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Content

In this chapter, we will see Tolerance Analysis in NonSquential Mode.

- Tolerancing
- Tolerance Operands
- Example

Tolerance Analysis

As we seen before in imaging system design, **Tolerance Analysis** is simply an analysis used to ensure that the desired optical performance does not degrade significantly due to fabrication and placement tolerances (uncertainties).

In Non-Squentail mode, we see Tolerance Analysis using

- Merit Function Editor (NSDD, NSTR)
- Tolerence Data Editors (TNPS, TNPA)

OpticStudio 2023 R1

Gizle | Geri | İleri | Yazdır | Seçenekler

İçindekiler | Dizin | Ara | Sık Kullanılanlar

Aranacak sözcükleri yazın:

"Afocal Image Space"

Konuları Listele | Görüntüle

Konu seçin: Bulunan: 0

Başlık	Konum	Derece

Önceki sonuçlarda ara
Benzer sözcükleri eşleştir
Yalnızca başlıklarda ara

Tolerance Operands

A tolerance operand has a four letter mnemonic, such as TRAD for Tolerance Radius. Three integer values, abbreviated Int1, Int2, and Int3, are associated with the mnemonic to identify the surface or surfaces of the lens to which the tolerance applies. Some tolerance operands use the Int numbers for purposes other than defining surface numbers as indicated in the following table.

Each tolerance operand also has a minimum and maximum value. These values refer to the maximum acceptable change from the nominal value. Each operand also has space for an optional comment to make the tolerance set easier to read. The available tolerance operands are listed in the following table, and are described in detail below.

Summary of Tolerance Operands

TRAD Tolerance on surface radius of curvature in lens units

TCUR Tolerance on surface curvature in inverse lens units

TFRN Tolerance on surface radius of curvature in fringes

TTHI Tolerance on thickness or position in lens units

TCON Tolerance on conic constant (dimensionless)

TSDI Tolerance on clear semi-diameter or semi-diameter in lens units

Example

Non-Sequential Component Editor

Update: All Windows

Object 2 Properties

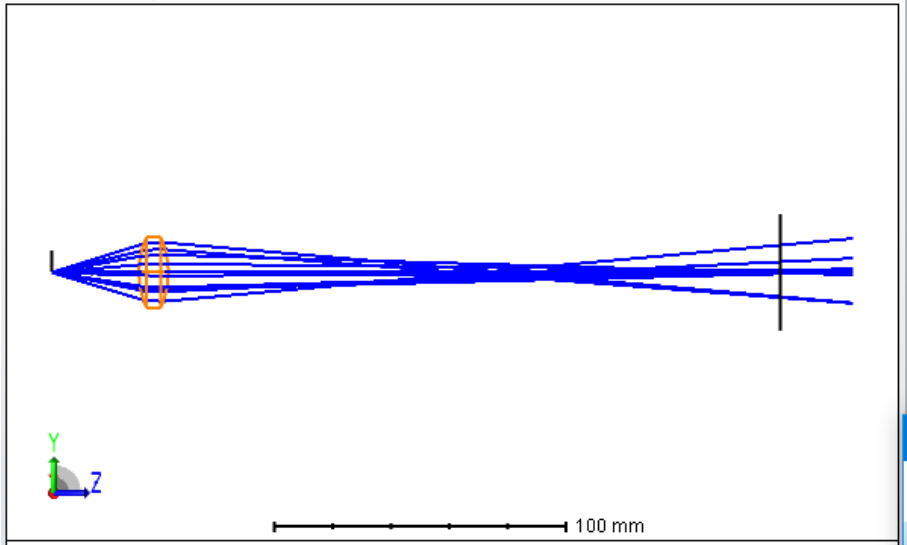
Configuration 1/1

	Object Type	Cor	Ref	Insi	X Position	Y Position	Z Position	Tilt About X	Tilt About Y	Tilt About Z	Material	Radius 1	Conic 1	Clear 1	Edge 1	Thickness	Radius 2
1	Source Point		0	0	0.000	0.000	0.000	0.000	0.000	0.000	-	10	1E+05	1.000	0	0	20.000
2	Standard Lens		0	0	0.000	0.000	30.000	0.000	0.000	0.000	N-BK7	30.000	0.000	12.000	12.000	10.000	-30.000
3	Detector Rectangle		0	0	0.000	0.000	250.000	V 0.000	0.000	0.000		20.000	20.000	250	250	0	0
4	Null Object		0	0	0.000	0.000	0.000	0.000	0.000	0.000	-						

1: NSC 3D Layout

Settings

Line Thickness



3D Layout

2.04.2025

Zemax
Ansys Zemax OpticStudio 2023 R1.00

nsc_tolerance.zos
Configuration 1 of 1

Merit Function Editor

Wizards and Operands

Merit Function: 6.6405037555381

	Type	Surf	Det#	Pix#	Data	# Ignored	Spatial Frequency	Target	Weight	Value	% Contrib
1	NSDD	1	0	0	0	0	0.000	0.000	0.000	0.000	0.000
2	NSTR	1	0	0	0	0	0.000	0.000	0.000	0.000	0.000
3	NSDD	1	3	-9	0	0	0.000	0.000	1.000	6.641	100.000

Tolerance Data Editor

Operand 1 Properties

	Type	Surf	Object	Data	Nominal	Min	Max	Comment
1	TNPS	1	2	3	30.000	-29.000	31.000	source - lens distance
2	TNPS	1	3	3	250.000	245.000	255.000	lens - detector disance

Tolerancing

Set-Up
Criterion
Monte Carlo
Classic

Monte Carlo Runs: 100 Statistics: Normal

Monte Carlo Save: 0 File Prefix:

Save Best and Worst Monte Carlo Files

Overlay Monte Carlo Graphics

Save Load Reset OK Cancel Apply

Figure shows the result of 1000 MC trials which is the distribution of merit function values (spot size on detector).