

Bonus Lecture

Helpful Homework Tips

Methods to find common charts used in the homework.

Disclaimer: There maybe a better way, but this shows at least one way to get the charts.

Optical Path Difference

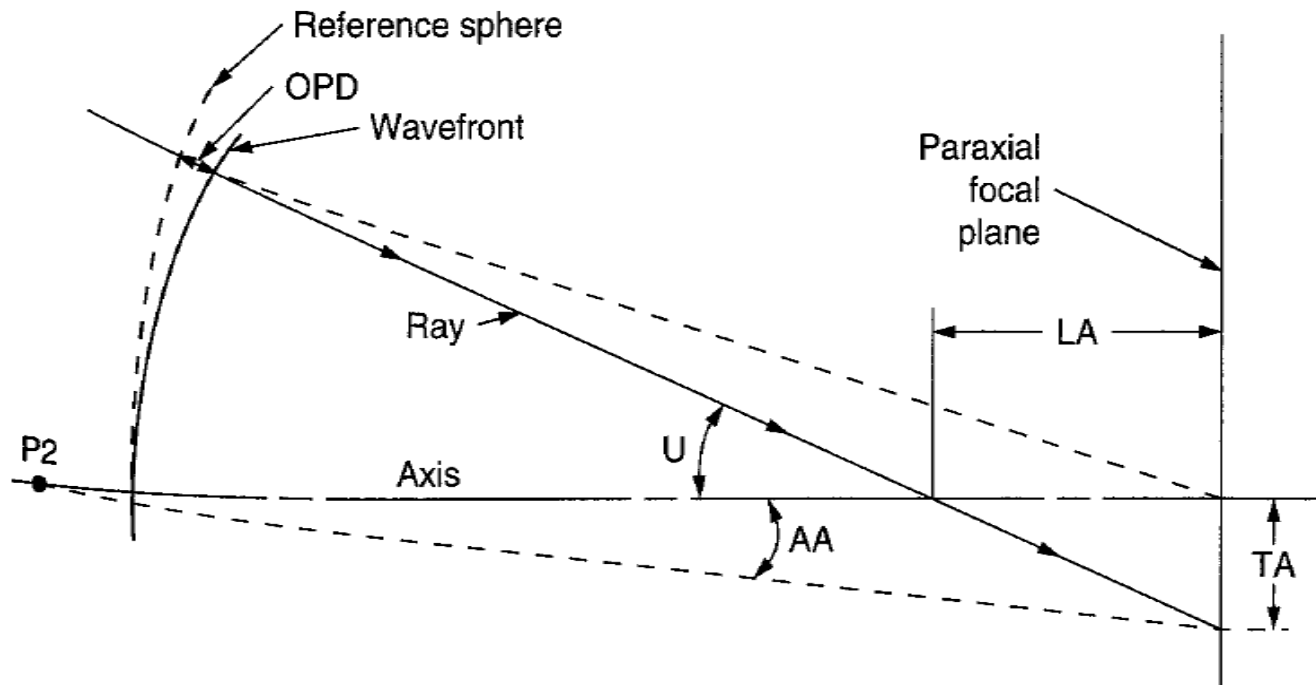
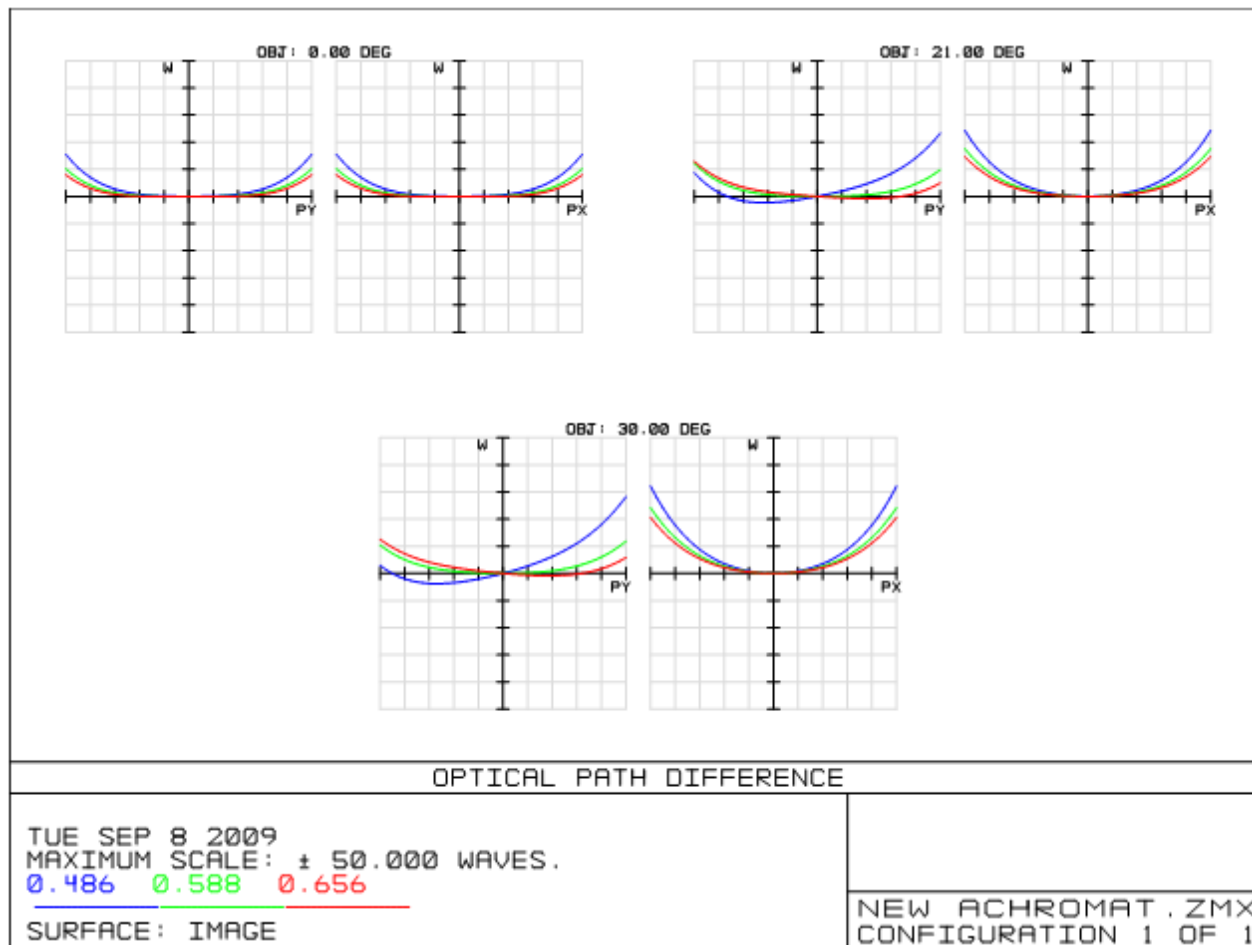


Figure 5.5 Showing the relationships between the several ways of describing the size of an aberration. LA = longitudinal aberration; TA = transverse aberration = $TA \cdot \tan U$; AA = angular aberration = $TA/(P2\text{-to-focus})$; $OPD = \int AA$.

Warren Smith, Modern Lens Design 2nd Edition, pg. 95

Example OPD Chart



OPD Charts

Optical Path Difference

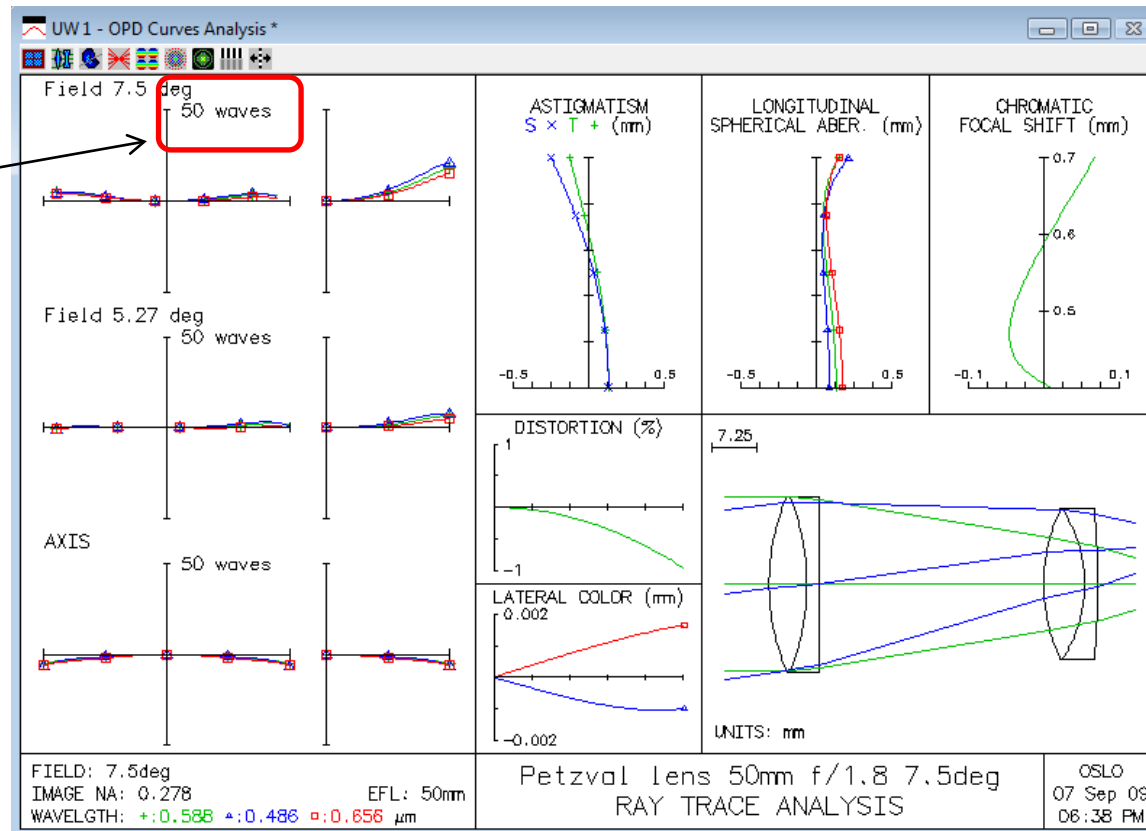
- OSLO
 - Evaluate / Other Ray Analysis / Report Graphic / Optical_path_difference curves
- Code V
 - Analysis / Diagnostics / OPD Aberration Curves
 - (remember to set the scale)
- Zemax
 - Analysis / Fans / Optical Path

OSLO

Optical Path Difference Report Graphic

Evaluate / Other Ray Analysis / Report Graphic / Optical_path_difference curves

Note: units should
be waves



OPD RMS

- OSLO
 - Evaluate / Wavefront / Report Graphic
- Code V
 - Analysis / Diagnostics / Pupil Map / Wavefront Aberration Map / Text
- Zemax
 - Analysis / Wavefront / Wavefront Map

Wavefront Aberration Coefficients

- $W_{IJK} \rightarrow H^I \rho^J \cos^K \Theta$
 - W_{020} Defocus
 - W_{111} Tilt
 - W_{040} Spherical Aberration
 - W_{131} Coma
 - W_{222} Astigmatism
 - W_{220} Field Curvature
 - W_{311} Distortion

Wavefront Aberration Coefficients

- OSLO
 - Evaluate / Other Aberrations / Seidel Wavefront

Len	Spe	Rin	Ape	Wav	Pxc	Abr	Mrg	Chf	Tra	Sop	Ref	Fan	Spd	Auf	Var	One	Re
<u>*SEIDEL WAVEFRONT ABERRATION COEFFICIENTS - WAVELENGTH 1</u>																	
COEFFICIENTS IN WAVELENGTHS																	
SRF	W040		W131		W222		W220		W311								
1	37.256288		43.273021		12.565358		19.570462		11.365505								
2	-36.891185		30.566881		-6.331690		-4.839862		2.005079								
3	6.732087		-24.105503		21.578571		10.789286		-19.316532								
4	-0.466719		-6.110800		-20.002329		6.956890		45.543630								
5	-17.494880		-31.003745		-13.735907		-9.736507		-8.627329								
6	20.694020		-8.113912		0.795345		3.296891		-0.646338								
SUM	9.829611		4.505942		-5.130652		26.037160		30.324015								

Wavefront Aberration Coefficients

- Code V
 - Analysis / Diagnostics / Fifth Order Aberrations /
Aberration Type = Wave Aberrations

THIRD AND FIFTH ORDER IMAGE ABERRATIONS (Waves at 850.0000 nm.)					
	W040	W131	W220	W222	W311
	W060	W151	W420	W422	W511
	W080	W331	W333	W240	W242
STO	-12.1943	3.6809	0.0356	0.0284	0.0005
	-35.9428	0.0165	0.0000	0.0000	0.0000
	73.3307	0.0004	-0.0002	0.0073	0.0197
2	15.4174	-0.9321	0.0070	0.0141	-0.0002
	7.2333	-0.0385	0.0000	0.0000	0.0000
	0.8329	0.0000	-0.0001	0.0018	-0.0028
SUM	3.2231	2.7488	0.0426	0.0425	0.0003
	-28.7095	-0.0220	0.0000	0.0000	0.0000
	74.1636	0.0004	-0.0004	0.0091	0.0168

Wavefront Aberration Coefficients

- Zemax
 - Analysis / Aberration Coefficients / Seidel Coefficients

4: Seidel Coefficients 2

Update Settings Print Window

Seidel Aberration Coefficients:

Surf	SPHA S1	COMA S2	ASTI S3	FCUR S4	DIST S5	CLA (CL)	CTR (CT)
STO	-0.000000	-0.000000	-0.000000	-0.000000	-0.000000	-0.000000	-0.000000
2	-0.004248	0.011975	-0.033753	-0.069177	0.290125	0.004490	-0.012656
3	0.000675	0.002464	0.008990	0.002001	0.040104	0.000693	0.002530
4	0.013759	-0.016619	0.020074	0.077315	-0.117634	-0.005613	0.006779
IMA	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
TOT	0.010185	-0.002180	-0.004689	0.010138	0.212595	-0.000429	-0.003347

Seidel Aberration Coefficients in Waves:

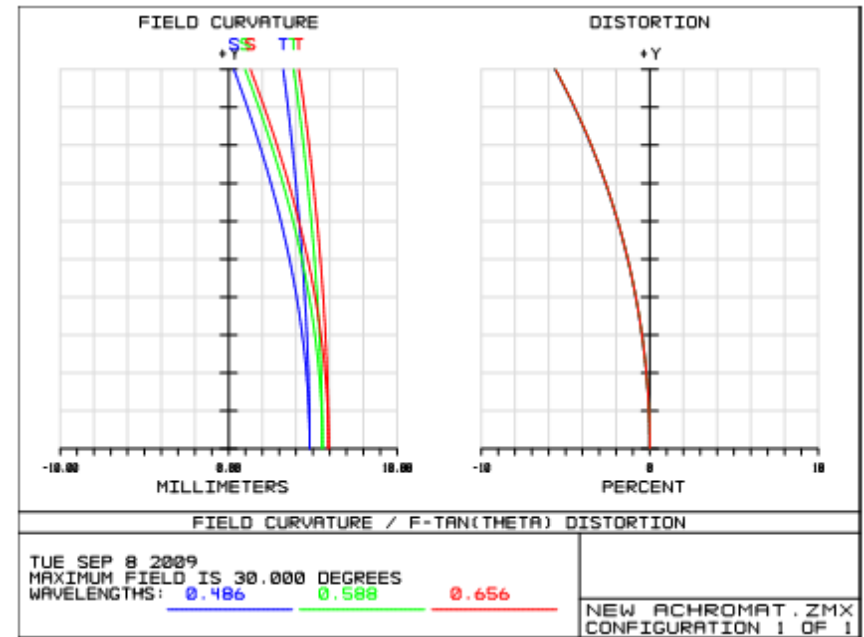
Surf	W040	W131	W222	W220P	W311	W020	W111
STO	-0.000000	-0.000000	-0.000000	-0.000000	-0.000000	-0.000000	-0.000000
2	-0.903830	10.190331	-28.722999	-29.434057	246.888889	3.821042	-21.540377
3	0.143660	2.096731	7.650510	0.851271	34.127219	0.590093	4.306236
4	2.927046	-14.142140	17.082079	32.896480	-100.103517	-4.776239	11.538294
IMA	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
TOT	2.166876	-1.855078	-3.990410	4.313694	180.912591	-0.365104	-5.695846

Transverse Aberration Coefficients:

Surf	TSPH	TSCO	TTCO	TAST	TPFC	TSFC	TTFC
STO	Infinitv	Infinitv	Infinitv	Infinitv	Infinitv	Infinitv	Infinitv

Field Curvature Charts

- OSLO
 - Evaluate / Other Ray Analysis / Report Graphic / Optical_path_difference curves
- Code V
 - Analysis / Diagnostics / Field Curves
- Zemax
 - Analysis / Miscellaneous / “Field Curv/Distortion”



Chromatic Focal Shift

- OSLO
 - Evaluate / Other Ray Analysis / Report Graphic / Optical_path_difference curves
- Code V
 - Tools / Macro Manager / Sample Macros / 1st order analysis / “C:\CODEV100\macro\bflplot.seq”
- Zemax
 - Analysis / Miscellaneous / Chromatic Focal Shift

