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

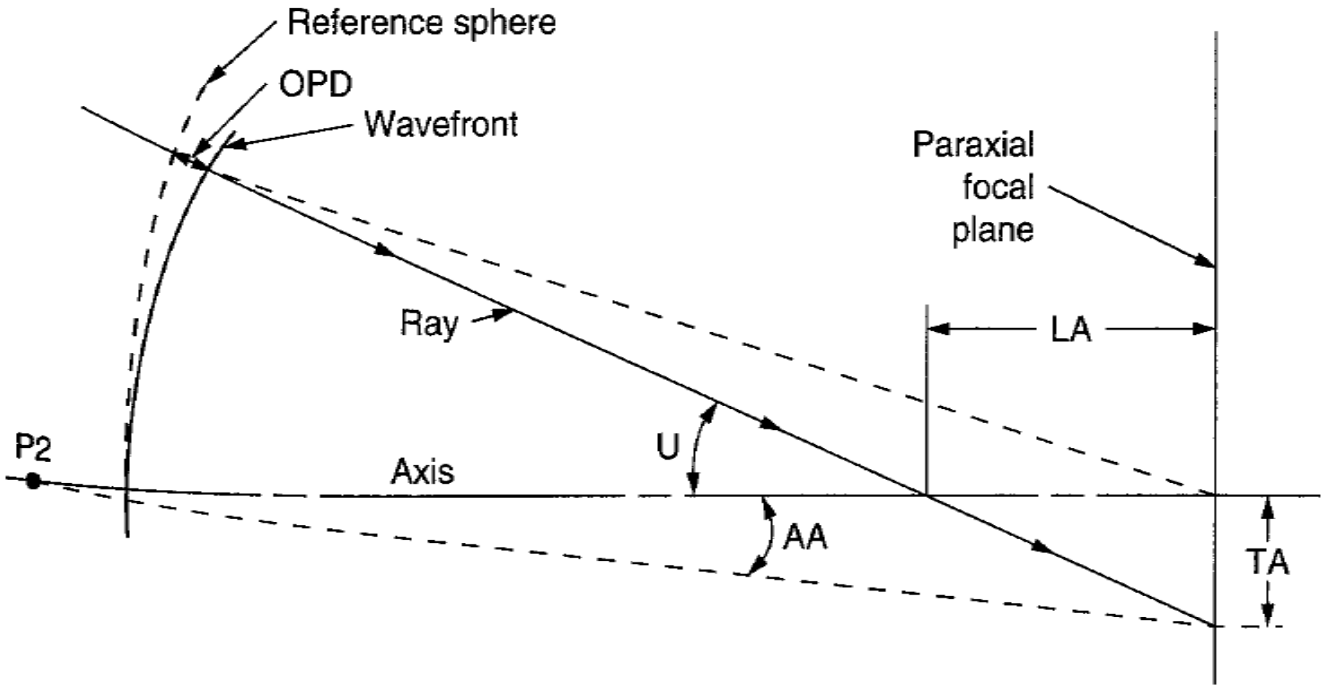

Figure 5.5 Showing the relationships between the several ways of describing the size of an aberration. LA = longitudinal aberration; TA = transverse aberration = TA · tan U; AA = angular aberration = TA/(P2-to-focus); OPD = $\int$AA.

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

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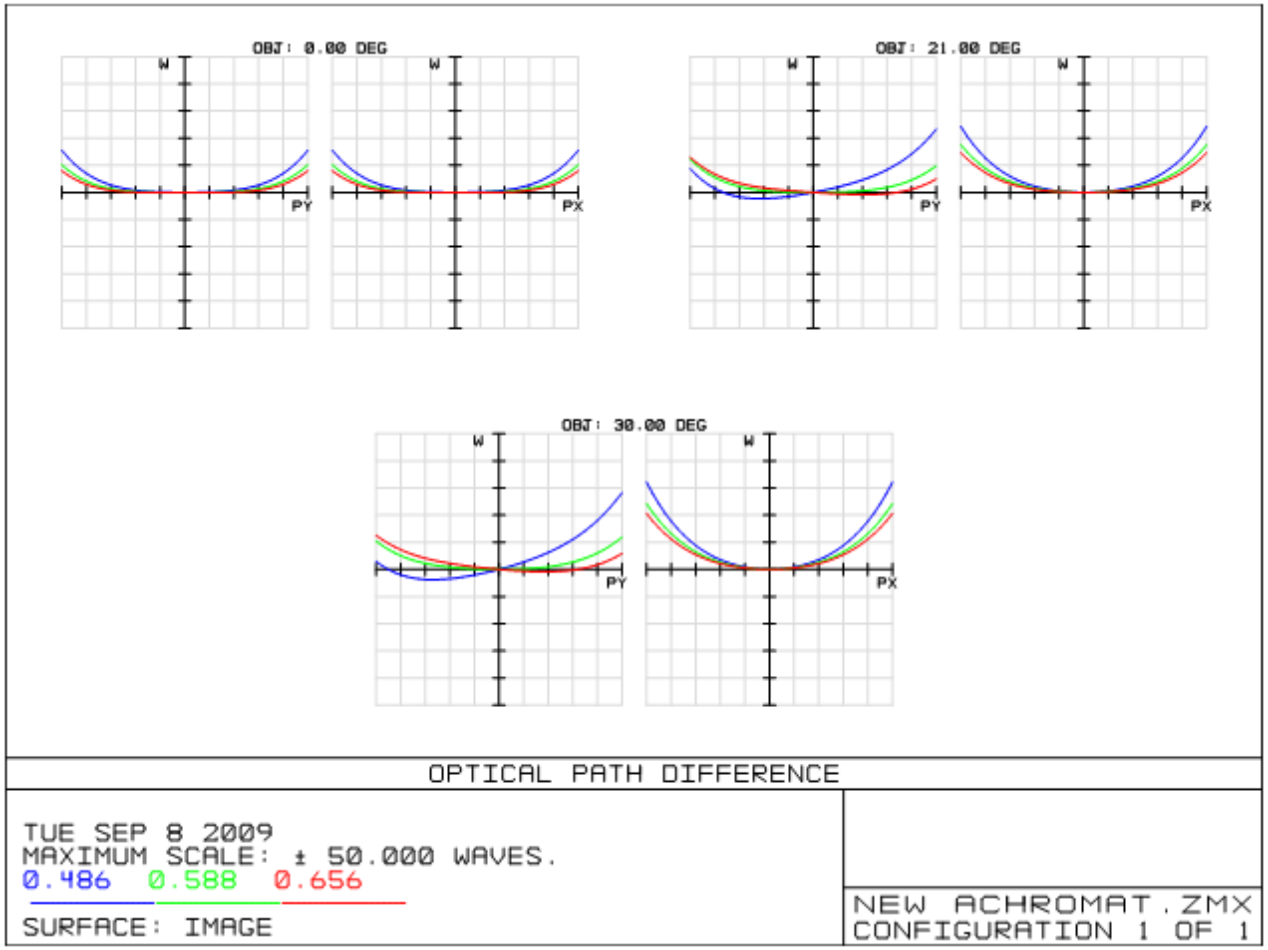
Example OPD Chart



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OPD Charts
Optical Path Difference

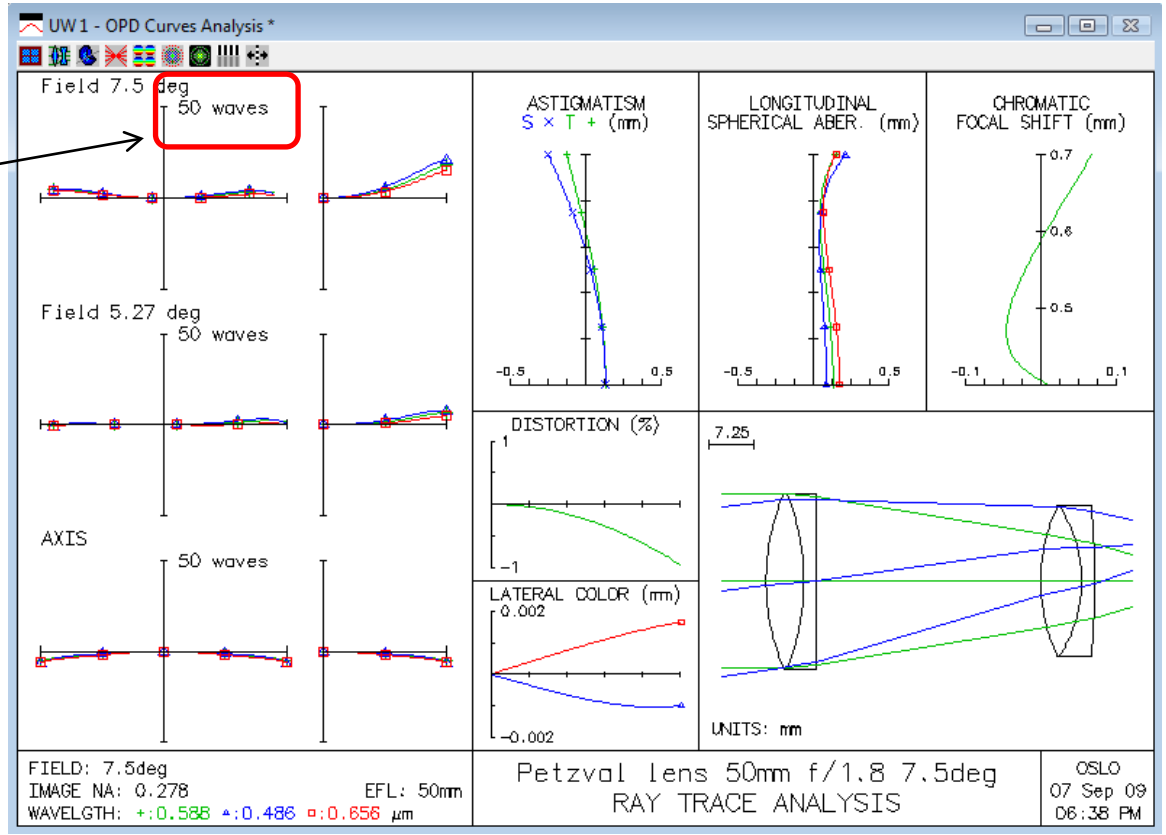
- OSLO
  - Evaluate / Other Ray Analysis / Report Graphic / Optical_path_difference curves
- Code V
  - Analysis / Diagnostics / OPD Aberration Curves
    - (remember to set the scale)
- Zemax
  - Analysis / Fans / Optical Path

OSLO

Optical Path Difference Report Graphic

Evaluate / Other Ray Analysis / Report Graphic / Optical_path_difference curves

Note: units should be waves



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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 Ite

*SEIDEL WAVEFRONT ABERRATION COEFFICIENTS - WAVELENGTH 1

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

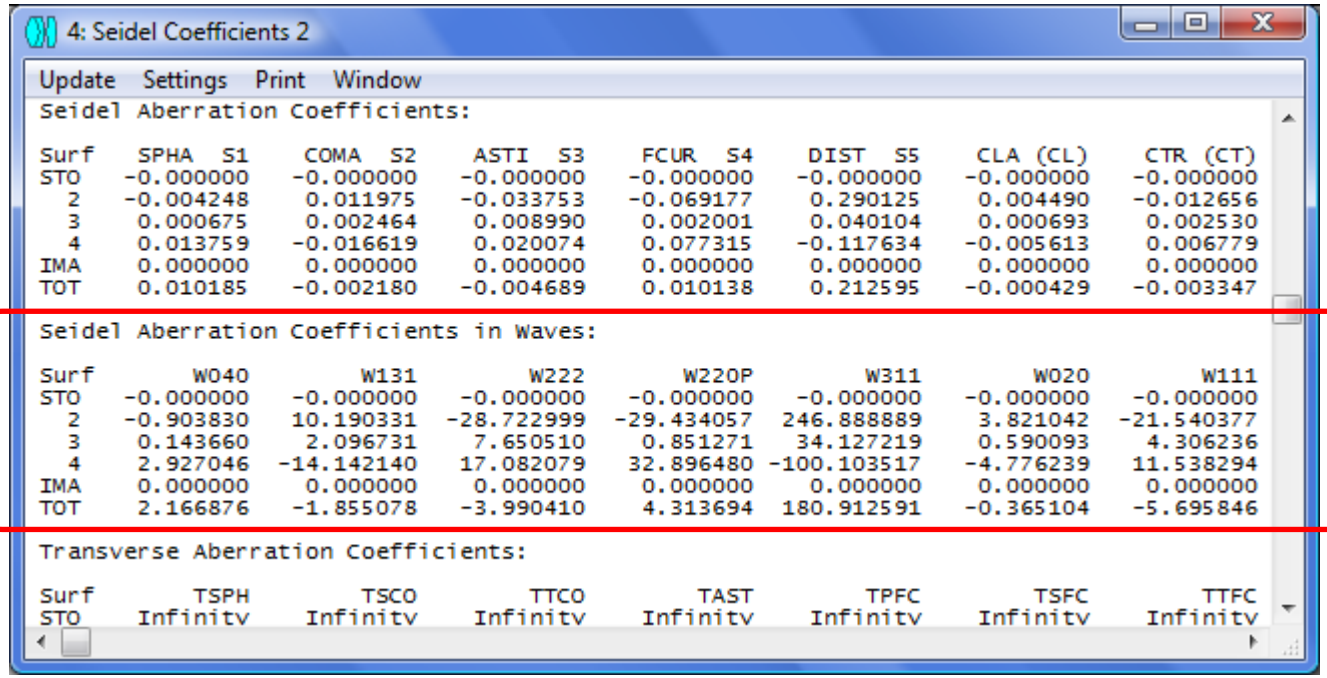
- Code V
  - Analysis / Diagnostics / Fifth Order Aberrations / Aberration Type = Wave Aberrations

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



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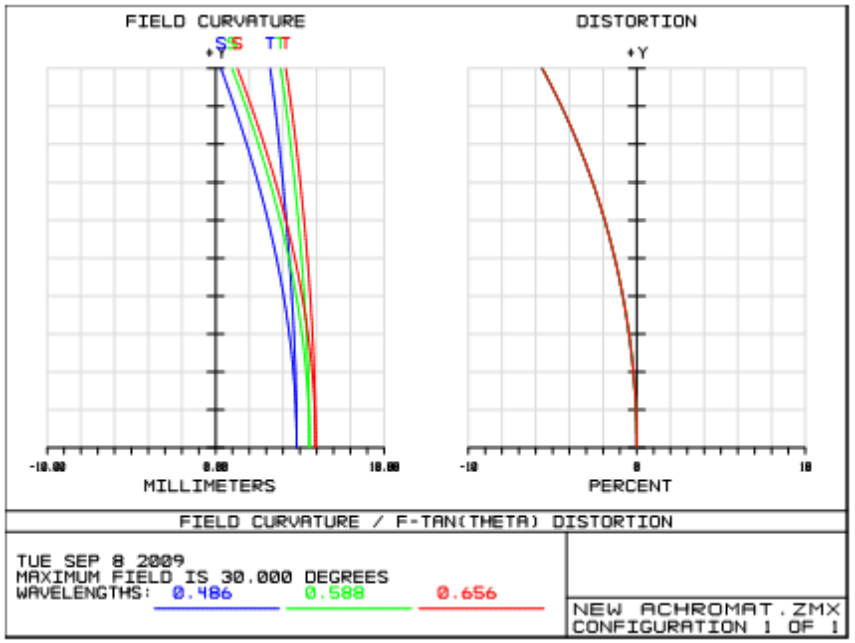
Field Curvature Charts

- 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