

Corrections and Additions to First & Second Printings

Lens Design Fundamentals, Second Edition

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1. **Correction:** Table of Contents should have started on right-hand page.
2. **Correction:** Page 65. Eq. (3-6). After the second = sign, the m should be n so it should read $nu^2 / n'u'^2$.
3. **Correction:** Page 153. Seventh line counting equations. The first term in the equation should read as $V_a(c_a \Delta n_a)$ where the comma currently in the book following c_a is deleted.
4. **Addition:** Page 208. Insert the following text following end of current text ending as "... and also along the 0.7 zonal ray."

It is important for lens designers to know whether the interferometer software they are using produces Zernike coefficients¹⁴ with a +1 or -1 multiplier with respect to the ray trace software being used. This issue arises from different *OPD* sign conventions being in use and one result is that programs may not agree on the sign of Zernike coefficients even though the absolute value of each like coefficient generated by such programs are the same. Conrady defined *OPD* as optical path length along the reference ray minus the optical path length along the ray under consideration.

5. **Addition:** Page 208. Add the following to the **ENDNOTES**.

¹⁴ C-J Kim and Robert R. Shannon, "Catalog of Zernike Polynomials," Chap. 4 in *Applied Optics and Optical Engineering*, Vol. X, R. Shannon and J. Wyant, Eds., Academic Press (1987).

6. **Correction:** Page 281. Third line in Designer Note. +/-0.0005% should read +/-0.0005.
7. **Correction:** Page 306. Third paragraph, line 4. "(see page 311)" should read "(see page 309)".
8. **Correction:** Page 321. Page heading should be changed from "*Chapter 11*" to "*11.7 Computation of the Seidel Aberrations*".
9. **Correction:** Page 321. First line after heading 11.7.4.
Add following first sentence reading "... or a field flattener." The text "(see also Section 11.2.2.)"

10. **Addition:** Page 321. Insert the following text prior to the **ENDNOTES**. The entries in the **ENDNOTES** will flow to the following page which has open space. Adjust size of Figure 11.22 to allow everything to fit.

In practice, the lens designer may decide that it is preferable to flatten the tangential field rather than to minimize the Petzval sum (see Section 11.2.1). Figure 11.22a illustrates a simple concave-plano lens, with $N = 1.5$, used as a field flattener for an optical system having $f' = 10$, $f/10$, and FOV of 10° . The vertical dashed line represents the location of the original paraxial image plane. The finite axial thickness of the field flattener necessarily shifts the image plane farther from the optical system in a manner similar to a parallel plate (see Section 6.4); however, the shift is about 15% larger than $t(N - 1) / N$ due to the negative power of the front surface. Figure 11.22b shows the inward curving fields of the original optical system and the excellent tangential field correction by use of the field flattener. A consequence of using this field flattener form is the introduction of distortion as shown in Figure 11.22c. The original optical system had essentially no distortion. This potentially can be corrected by adjusting the optical system to have compensating distortion.

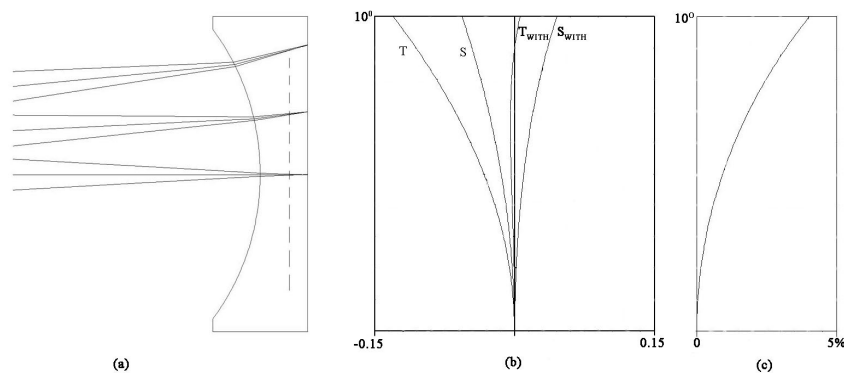


Figure 11.22. (a) Basic field flattener showing image shift from original image plane, (b) astigmatic field curves with (T_{WITH} and S_{WITH}) and without (T and S) the field flattener, and (c) distortion caused by field flattener.

11. **Correction:** Page 376. Caption for Figure 13.18. Delete “points” at end of caption.
12. **Correction:** Page 434. First word on page “Abbe” should read “Hirano”.
13. **Correction:** Page 456. Last line of text on page. “field lens” should read “field flattener”.
14. **Correction:** Page 542. Entry for Field flattener should be changed as follows:
 a. Bold “301” i.e., **301**–305, ...
 b. Insert “321” i.e., **301**–305, 321, 379, and rest as is.

15. **Correction:** Page 203. Figure 6.21. Unit in left-side scale legend should read “radian” rather than “radiation”. [Note: Not corrected in Second Printing].
16. **Correction:** Page 354. DESIGNER NOTE. In fourth line from bottom, it should read “double” rather than “doubling”. [Note: Not corrected in Second Printing].
17. **Correction:** Page 110. First line of last paragraph. The word “meridional” should read “sagittal”. [Note: Not corrected in Second Printing].
18. **Correction:** Page 246. Figure 8.11 should read Figure 8.12. Figure 8.12 should read Figure 8.11. [Note: Not corrected in Second Printing. In third printing, the order of the two figures should be corrected.]
19. **Correction:** Page 34. In the caption for Figure 2.6, delete the semicolon following Q'_1 . [Note: Not corrected in Second Printing.]
20. **Correction:** Page 393. In the last of the Designer Note, “stain” should read “strain”. [Note: Not corrected in Second Printing.]
21. **Correction/Addition:** Page 171. Endnote 11. Replace text with the following. “For telephoto, reverse telephoto (see page 429), and other lenses where the object is located at infinity, track length is the distance from the front element of the lens system to the image plane. When a lens system is used at finite magnification, the track length may be defined as the object-to-image distance; however, the designer should be certain of the definition used in the lens design program being utilized. A related term is the *cell length* which is the distance from the front element to the final-element rear-surface vertex of the lens system.” [Note: Not corrected in Second Printing.]
22. **Addition:** Index. Add “Track length, 171” and “Cell length, 171”. [Note: Not corrected in Second Printing.]
23. **Correction:** Page 377. Item 9 in ENDNOTES, add ” following the coma after the word anastigmat. [Note: Not corrected in Second Printing.]