Fowles "Introduction to Modern Optics, 2nd Ed.": Errors and Clarifications

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Eqs. 2.16 and 2.23 assume $\mu_0 = \mu$.

Page 35, Table 2.1: "Fast axis at ± 45°" should read "Fast axis at -/+ 45°".

Page 41, Eqs. 2.49, 2.50, 2.51: It is assumed that μ is the same in both media.

Page 43: the expressions for t_s and t_p are missing: Look up, or derive yourself!

Page 45: Fig. 2.12: all curves have a misleading downward offset

Page 55: Problem 2.11: Multiply the Jones matrix by ½.

Page 55: Problems 2.14, 2.15, 2.16: All three problems refer to water/air and diamond/air interfaces, not a diamond/water interface. Problem 2.16 refers to external reflection.

Page 55: Problem 2.18: Should be reworded to: "Given a Mooney rhomb with apex angle at A of 60 degrees, show that the refractive index should be about 1.65 to act as a quarter-wave plate."

Page 56, Problem 2.23: "Brewster window" should be "Brewster interface", i.e., only one interface.

Page 64: The last sentence, beginning with "In this case the central fringe…" should be deleted. This sentence would be correct only if the plate were not (even half) silvered.

Page 76: The sentence following Eq. 3.39 should read "…it has been assumed that that τ_b and τ_a are small in comparison with τ_0."

Page 76: The sentence preceding Eq. 3.40, should read: We then have τ_b-τ_a = $(r_{2b}$-$r_{2a})/c$

Page 76: Eq. 3.40 should read τ_b-τ_a = sl/cr.

Page 77: Figure 3.14 refers to an extended source of size s, not two point sources separated by s as discussed previously. In the description of the figure in the text (first sentence of second paragraph) it should state that this figure is for an extended source. This curve reaches its first minimum when the time difference τ_b for light from the lower edge of the extended source to P1 and P2, differs from that for light from the upper edge, τ_a,by a full period $T = 2\pi / \omega$. Eq. 3.41 should therefore read $\omega(\tau_b$-$\tau_a) = \omega\ s\ l_t/cr = 2\pi$. (In the sentence preceding this equation, it should thus say $\cos[\omega(\tau_b$-$\tau_a)] = +1$). Due to the cancellation of this error and the one in Eq. 3.40, the following equations (3.42 and 3.43) are correct.

For two (mutually incoherent) sources (rather than one extended source), the corresponding graph of $|\gamma_{12}|^2$ as a function of slit position P2 would just be a cosine oscillation (from Eq. 3.39), which has its first order maximum (next to the central, zero-order maximum) at the point where the extended-source curve shown in Fig. 3.14 has its first minimum.

Page 98, last sentence: Replace $T = |t|^2$ by $T = (n_T/n_0)\ |t|^2$.

Page 150, Problem 5.16, last sentence should read: Assume the trailing edge of the moon to be a straight edge.

Page 198: The whole discussion is incorrect. Instead of "velocity matching", the correct concept to consider is "phase matching". This requires that $\mathbf{k}_2 = 2\mathbf{k}_1$ for second harmonic generation. The figure should show the wave-vector surface, with the phase-matching directions given by the intersection of the $2\mathbf{k}(\omega)$ surface of the *o*-ray, with the $\mathbf{k}(2\omega)$ surface of the *e*-ray. In the bottom part of the figure, all wave fronts should be parallel.

Page 199, Problem 6.1: Add "assume $|n\text{-}1| << 1$ and $\kappa << 1$". In the equation for n, the term in parentheses should have $\omega_0^2 - \omega^2$ in the numerator and $(\omega_0^2 - \omega^2)^2 + \gamma^2\omega^2$ in the denominator. In the equation for κ, the term in parentheses should have $(\omega_0^2 - \omega^2)^2 + \gamma^2\omega^2$ in the denominator. Hint for solution: In the exact expression for $n^2 - \kappa^2$, set $\kappa^2 = 0$, then take the square root and perform Taylor expansion up to first order. In the expression for $2n\kappa$, just set $n = 1$, solve for κ.

Page 199, Problem 6.2: See corrections to problem 6.1 above. Also assume $\gamma << \omega_0$.

Page 220: 4th sentence should read: For left circularly polarized light, the photon's spin (angular momentum) vector is in the direction of propagation, whereas for right circular light, the spin vector is opposite to the direction of propagation.

Page 297, Eq. 10.11: The second term in the square brackets should have a minus sign, and the third term a plus sign.

Page 297, Eq. 10.12: Insert a minus sign on the right hand side (given that d_1 and d_2 are positive distances as indicated in Fig. 10.3).

Page 298, Fig. 10.3: The rays as drawn are completely incorrect. The top ray should emanate from the object in a direction parallel to the axis, and be bent only at principal plane H'. The bottom ray should be bent only at principal plane H.

Page 307, second sentence: Replace "¼ wavelength" by "½ wavelength, for one complete (peak – peak) shift of the fringe pattern."