Errata for Panofsky and Phillips *Classical Electricity and Magnetism*

p. 33 Eq. 2–19 The constant is not arbitrary but is proportional to the magnitude of any surface dipole layer (Eq. 1–61).

pp. 39–40 Properly, an isolated molecule is in a state of definite parity, such as one of its rotational eigenstates, and therefore has no permanent electric dipole moment (the expectation value of an operator of odd parity, such as the electric dipole moment, in a state of definite parity is zero). However, a proper quantum mechanical calculation gives the same result at the classical calculation here. The details are in P. Debye's 1929 book *Polar Molecules*, but not in most modern textbooks.

p. 40 Eq. 2–45 fails for many polar liquids, like $H_2O$, because of short-range correlations resulting from strong angle-dependent (covalent) intermolecular forces.

p. 48 It is clearer to say that the triangles with sides $rld$ and $l'r'd'$ are similar.

p. 85 Eq. 5–16 the last $=$ should be a $-$.

p. 92 Eq. 5–42 $e_0$ should be $\epsilon_0$.

p. 93 Exc. 3 $P\nu$ should be $P_n$.

p. 99 The derivation of the symmetry of $\kappa_{\alpha\beta}$ (last paragraph, Eqs. 6–18 and 6–19) is incorrect. The symmetry of $\kappa_{\alpha\beta}$ follows from defining dielectric susceptibility in a thermodynamically consistent manner, as the second derivative tensor of the free energy with respect to the electric field; see Landau and Lifschitz *Electrodynamics of Continuous Media* §11.

p. 113 Eq. 6–76 the upper limit should be $B$.

p. 117 Exc. 7 (6–44) should be (6–45).

p. 128 Eq. 7–42 $\oint$ should be $\int$.

p. 168 Exc. 9–4 can be solved if the orbital radius is taken to be constant, which is inconsistent with the conditions given. It is possible to solve this problem if the central force field is ignored, the initial $\vec{B}$ is nonzero, and its variation is slow compared to the gyroperiod. The second part of Exc. 9–7 shows that for a special spatial distribution of $\vec{B}$ and no central force field the orbital radius remains constant.

p. 168 Exc. 9–7 (first part) requires the assumption that $\dot{\vec{B}}$ is independent of $\varphi$ for *any* axis $z$. Do only the second part.

p. 174 Eq. 10–14 $\frac{\partial}{\partial t}$ should be $\frac{d}{dt}$.

p. 321 Eq. 17–73 $-2c^2\mathbf{p}_1 \cdot \bar{\mathbf{p}}_1$ should be $+2c^2\mathbf{p}_1 \cdot \bar{\mathbf{p}}_1$.
Eq. 17–74 should have a $-$ sign on one side.

p. 364 Eq. 20–35 $(u^2/c)^2$ should be $(u^2/c^2)$.

p. 365 Eq. 20–38 should have a factor $m_0c^2$ on the right.

p. 370 The reason real steady currents flowing through wires don't radiate significantly is their low speed and the Pauli exclusion principle; the current distribution is not microscopically continuous, contrary to the assertion here.

p. 378 One line above 21–9, (17–32) should be (18–32).
Eq. 21–9 The $-$ sign should be $+$.

p. 389 Eq. 21-56 The first $-$ sign on the left hand side should be $+$.

p. 401 Eq. 22–1 In the middle and right hand side (two places) $x$ should be $\dddot{x}$.

p. 404 One line after 22–20, (19–20) should be (20–18).

p. 412 After the unnumbered equation (22–9) should be (22–19).

p. 419 Second line from bottom, $\epsilon|\mathbf{H}|^2$ should be $\epsilon|\mathbf{E}|^2$.

p. 420 Eq. 22–76 The first exponential is $e^{-ikr(1-\cos\theta)}$.

p. 422 Eq. 22–89 This equation appears to give the erroneous result that for $\kappa_2 = 0$ (as is true to high accuracy for optical glass) but $\kappa_1 \neq 1$ the scattering cross-section must be zero. This paradox arises from the use of the infinite-medium relation between **p** and **E**. In the case of a small particle (or interface) the proper relation must include radiation damping, implying $\kappa_2 \neq 0$ (with its actual value determined by 22–89).

p. 465 1 farad $= 9 \times 10^{11}$ cm (cgs capacitance).
1 ohm $= \frac{1}{9} \times 10^{-11}$ sec/cm (cgs resistance; = esu).