Errata list, Plasma Physics, 1st Edition

p. 37, Eq. (2.27):

$$\Phi(r) = \frac{Q}{4\pi\varepsilon_0\, r^2}\, \mathrm{e}^{-r/\lambda_\mathrm{D}}$$

p. 42, Basics in a Nutshell:

$$\lambda_{\mathrm{De,Di}} = \left(\frac{\varepsilon_0 k_\mathrm{B} T_\mathrm{e,i}}{n_\mathrm{e,i} e^2}\right)^{1/2} .$$

p. 43, Basics in a Nutshell:

$$\Gamma = \frac{q^2}{4\pi\varepsilon_0 a_\mathrm{WS}\, k_\mathrm{B} T}$$

p. 68, Eq. (3.61):

$$\ddot{x}_2 = \frac{q}{m} x_1(t) \frac{d}{dx} E(x_0) \cos(\omega t) = -\frac{q^2}{m\omega^2} E(x_0) \frac{d}{dx} E(x_0) \cos^2(\omega t)$$

p. 68, Eq. (3.62):

$$\langle \ddot{x}_2 \rangle = -\frac{q^2}{2m\omega^2} E(x_0) \frac{d}{dx} \left[E(x_0)\right] = -\frac{q^2}{4m\omega^2} \frac{d}{dx} \left[E^2(x_0)\right]$$

p. 70, problem 3.4: $\vec{M} = -M\vec{e}_z$.

p. 80, Eq. (4.17):

$$\nu_\mathrm{ion} = n_\mathrm{a} \langle \sigma_\mathrm{ion} v \rangle = \frac{n_\mathrm{a}}{n_\mathrm{e}} \int_0^\infty f_\mathrm{M,e}(v) \sigma(v) v dv$$

p. 91, first paragraph:
"When $\omega_\mathrm{ci}/\nu_\mathrm{m,i} \ll 1$, the ions experience only few collisions ..."

p. 97, Eq. (4.59):

$$P_\mathrm{br} = \frac{8\pi}{\sqrt{3}} \frac{(k_\mathrm{B} T_\mathrm{e})^{1/2}}{(4\pi\varepsilon_0)^3 m_\mathrm{e}^{3/2} c^3 h}\, n_\mathrm{e} n_\mathrm{i} Z^2$$

p. 129, Eq. (5.89):

$$B_\varphi = \frac{r u_\varphi B_r - \omega_\odot r_\odot^2 B_0}{r u_r} = -\frac{\omega_\odot (r - r_\odot)}{u_r} B_r$$

"In the last step we have used $B_r = B_0 (r_\odot/r)^2$ and $u_\varphi = \omega_\odot r_\odot$."

p. 152, Eq. (6.64):

$$-\mathrm{i}\omega m \hat{v} = -\mathrm{i}kq\hat{\phi} - \mathrm{i}k\gamma k_\mathrm{B} T \hat{n}/n_0$$

p. 154, 4th paragraph:
"Introducing the ion plasma frequency $\omega_{\mathrm{pi}} = (n_{\mathrm{i0}} e^2/\varepsilon_0 m_{\mathrm{i}})^{1/2}$ and the electron Debye length $\lambda_{\mathrm{De}} = (\varepsilon_0 k_{\mathrm{B}} T_{\mathrm{e}})^{1/2}/n_{\mathrm{e0}} e^2$, we find ..."

p. 158, Eq. (6.93):

$$\begin{pmatrix} S - \mathcal{N}^2 & -iD \\ +iD & S - \mathcal{N}^2 \end{pmatrix} \cdot \begin{pmatrix} \hat{E}_x \\ \hat{E}_y \end{pmatrix} = 0$$

p. 184, Eq. (7.44):

$$I_{\mathrm{e}} = I_{\mathrm{e}}(U_{\mathrm{dc}} + U_1 \sin \omega_1 t + U_2 \sin \omega_2 t) = \ldots$$

p. 194, The basics in a Nutshell:
"The ion saturation current of a plane probe of area A is $I_{\mathrm{i,sat}} = \exp(-1/2) en v_{\mathrm{B}} A$. The electron saturation current is $I_{\mathrm{e,sat}} = -(1/4) en v_{\mathrm{th,e}} A$. Both currents can be used to determine the plasma density n, when the electron temperature is known."

p. 266, Eq. (10.6):

$$I = \ldots = qn\pi a^2 \left(\frac{8 k_{\mathrm{B}} T}{\pi m} \right)^{1/2} \exp\left(-\frac{q\Phi}{k_{\mathrm{B}} T} \right)$$

p. 267, Eq. (10.7):

$$I = \ldots = qn\pi a^2 \left(\frac{8 k_{\mathrm{B}} T}{\pi m} \right)^{1/2} \left[1 - \frac{q\Phi}{k_{\mathrm{B}} T} \right]$$

p. 267, Eq. (10.9): "Then, the equation for η_{f} reads"

$$\mathrm{e}^{-\eta_{\mathrm{f}}} = (\mu\tau)^{-1/2}(1 + \tau\eta_{\mathrm{f}})$$

p. 269, Eq. (10.17):
"...(for $T_{\mathrm{e}}/T_{\mathrm{i}} = 100$ and argon ions) scales as"

$$\tau = 2.63 \times 10^{10}\,\mathrm{s}\ \frac{\sqrt{T_{\mathrm{e}}\,(\mathrm{eV})}}{n\,(\mathrm{m}^{-3})\ a\,(\mu\mathrm{m})}$$

p. 270, caption of Fig. 10.7:
"Nonlinear relaxation of the dust charge deviation from its equilibrium value for a dust grain with $a = 125\,\mathrm{nm}$ ..."

p. 271, Eq. (10.20):

$$\Delta t_k = -\frac{\ln(x_2)}{P_{\mathrm{e}} + P_{\mathrm{i}}}$$

p. 271: The time axis in Fig. 10.9 has to be relabeled from 0 1o 1.5 ms.

p. 276, last paragraph:
"The confinement of micrometer-sized dust particles inside the quasineutral plasma is difficult. The ambipolar field is often insufficient to balance the weight of the particle. For example, from (4.37) the ambipolar electric field in a plasma of $k_B T_e = 3\,\mathrm{eV}$ and a scale length $L = n/|\nabla n| \approx 1\,\mathrm{cm}$ is ..."

p. 283, Eq. (10.41):

$$\vec{F}_n = -\frac{4}{3}\delta\pi a^2 n_n v_{th,n} m_n (\vec{v}_d - \vec{v}_n)$$

p. 285, Eq. (10.52):

$$L = m_i v_0 b = m_i r^2 \dot{\theta}$$

p. 286, Eq. (10.56):

$$\lambda_s \approx \lambda_{De}\left[1 + \frac{2k_B T_e}{2k_B T_i + m_i v_0^2}\right]^{-1/2}$$

p. 287, Eq. (10.59):

$$\frac{d\sigma}{d\Omega} = \frac{b}{\sin\chi}\left|\frac{db}{d\chi}\right| = \frac{r_C^2}{4\sin^4(\chi/2)}$$

p. 287, Eq. (10.62), Add: "with $v_s^2 = (8k_B T_i/(\pi m_i) + v_0^2)$."

p. 305, Eq. (10.84):

$$m_d \ddot{\xi}_i = D(\xi_{i+1} - 2\xi_i + \xi_{i-1})$$

p. 346, caption to Fig. 11.20: replace δ by δ_0.