Corrections to the First Printing
(fixed in the second printing, summer 1999)
Introduction to Electrodynamics, 3rd ed.
by David Griffiths

- page 2: In Figure 1.4, the arrowhead is at the wrong end of the arrow labeled $(\mathbf{A} - \mathbf{B})$.

- page 7: In Figure 1.11, the intersection with the x axis should be labeled 1, the intersection with the y axis should be labeled 2, and the intersection with the z axis should be labeled 3.

- page 8: In the unnumbered equation right after Eq. 1.17, the first term should read $(\mathbf{A} \times \mathbf{B}) \times \mathbf{C}$.

- page 12: In Problem 1.8(a), change x to y (four times) and y to z (four times).

- page 38: In Equation 1.61, the first term on the right hand side should read $\int_{\mathcal{V}} \mathbf{A} \cdot (\boldsymbol{\nabla} \times \mathbf{B}) \, d\tau$. That is, change the first $\times$ to $\cdot$

- page 86: In Figure 2.34(a), the left charge should be $+q$, not $-q$

- page 87: In Problem 2.26, in the second line, change the words "and the radius of the top is R" to read "as is the radius of the top".

- Page 98, footnote 8: Add the sentence "See Prob. 2.52."

- Page 105, Ex. 2.11: Reverse the limits $(a \leftrightarrow b)$ on both integrals.

- Page 109, add a new Problem 2.52 (before the double line):

    Problem 2.52

    We know that the charge on a conductor goes to the surface, but just how it distributes itself there is not easy to determine. One famous example in which the surface charge density can be calculated explicitly is the ellipsoid:

    $$\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1.$$

    In this case[11]

    $$\sigma = \frac{Q}{4\pi abc} \left(\frac{x^2}{a^4} + \frac{y^2}{b^4} + \frac{z^2}{c^4} \right)^{-1/2}, \qquad (2.57)$$

    where Q is the total charge. By choosing appropriate values for a, b, and c, obtain (from Eq. 2.57): (a) the net (both sides)

surface charge density $\sigma(r)$ on a circular disk of radius R; (b) the net surface charge density $\sigma(x)$ on an infinite conducting "ribbon" in the $x\,y$ plane, which straddles the y axis from $x = -a$ to $x = a$ (let Λ be the total charge per unit length of ribbon); (c) the net charge per unit length $\lambda(x)$ on a conducting "needle", running from $x = -a$ to $x = a$. In each case, sketch the graph of your result.

[11] For the derivation (which is a real *tour de force*) see W. R. Smythe, *Static and Dynamic Electricity,* 3rd ed. (New York: Hemisphere, 1989), Sect. 5.02.

- page 126: In Equation 3.19, change s to a (four times).

- page 136: In Equation 3.51, bottom line, $\dfrac{16V_0}{\pi^2}$ should read $\dfrac{16V_0}{\pi^2 nm}$.

- page 145: In Problem 3.25, change k to a (twice).

- Page 146, second unnumbered equation in Ex. 3.10: the script r at the left should be squared.

- page 155: In the answer to Problem 3.36, change r to s (nine times).

- page 156: Put a comma after Equation 3.105.

- page 157: In Problem 3.41(a), $\hat{\mathbf{r}}$ in the equation should be r.

- page 158: In Figure 3.41, change #1 to a and #2 to b.

- page 158: In Problem 3.43(b), change #1 to a (three times) and #2 to b (three times); change V_{12} to V_{ab} (twice), and V_{21} to V_{ba} (twice).

- page 159: In Problem 3.46, second line, change R to R.

- page 159: In Problem 3.47, put an ! in the left margin.

- page 159: In Problem 3.48(b), remove the $\frac{1}{2}$ in the answer.

- Page 159, footnote 13: slip in the page number 107 (preceded by a comma) between **67** and (1999).

- page 169: In Figure 4.10, 10 arrowheads at the bottom should all be pointing up, not down (the very middle one—the eleventh—is correct).

- page 187: In Equation 4.43, eliminate the arrows ($\Rightarrow$) in (i) and (ii).

- page 190: In Problem 4.24, first words: change "A conducting..." to read "An uncharged conducting ...".

- Page 193, line 3 of first full paragraph: change "many nonlinear" to "dissipative".

- page 197: In Problem 4.30, remove the two hyphens in "y direction" and "x direction".

- page 206: In Figure 5.7 the lobes are too narrow for their height. The width (from 0 to a, from a to b, etc.) should be $\pi(\approx 3)$ times the height.

- page 224: Right after Equation 5.52, remove hyphen in "x component".

- page 234: In Problem 5.19(a), change "two free electrons" to "one free electron".

- page 242: In Problem 5.32, in the second line, change y to x.

- page 250: In Problem 5.50, eliminate the ! in the margin to the left of (b), and change the last sentence from "Confirm it, by computing the gradient." to "Derive it, by exploiting the appropriate analogy."

- page 253: In Problem 5.57(a), and in Figure 5.65, put a prime on $\mathbf{r}$. At the end of the hint in 5.57(a), just before closing the square brackets, insert the words "Use Eq. 5.91, if you like."

- page 254: In Equation 5.91, remove the second $\mathbf{r}$.

- page 260: In Problem 6.5(b), eliminate the hyphen in "y direction".

- page 274: In Problem 6.15, change "field of a" to "field inside a" (if that won't fit, make it "field in a").

- page 290: In Problem 7.1(c), first line should read $b \gg a$.

- page 293: In Problem 7.5, remove the words "should its" at the end of the second line.

- page 334: Problem 7.41, part (b), the answer should read $(\epsilon_0 V_0 / \pi a) \tan(\phi/2)$.

- page 358: In Figure 8.6, put the letter A on the top plate, to indicate its area.

- Page 363, add a new Problem 8.15:

  Problem 8.15[14]
  (a) Carry through the argument in Sect. 8.1.2, starting with Eq. 8.6, but using $\mathbf{J}_f$ in place of $\mathbf{J}$. Show that the Poynting vector becomes
  $$\mathbf{S} = \mathbf{E} \times \mathbf{H},$$

and the rate of change of the energy density in the fields is

$$\frac{\partial u_{\text{em}}}{\partial t} = \mathbf{E} \cdot \frac{\partial \mathbf{D}}{\partial t} + \mathbf{H} \cdot \frac{\partial \mathbf{B}}{\partial t}.$$

For *linear* media, show that

$$u_{\text{em}} = \frac{1}{2}(\mathbf{E} \cdot \mathbf{D} + \mathbf{B} \cdot \mathbf{H}).$$

(b) In the same spirit, reproduce the argument in Sect. 8.2.2, starting with Eq. 8.15, with ρ_f and $\mathbf{J}_f$ in place of ρ and $\mathbf{J}$. Don't bother to construct the Maxwell stress tensor, but do show that the momentum density is

$$\wp = \mathbf{D} \times \mathbf{B}.$$

[14] This problem was suggested by David Thouless of the University of Washington. Refer to Sect. 4.4.3 for the meaning of "energy" in this context.

- page 379: In Figure 9.10, the second dark-shaded lobe (going into the page) should *not* extend up to the dashed line; rather, it should match the fourth dark lobe on the right. The third dark lobe (coming out of the page) should *not* be hidden by the second light lobe on the left—rather, the *light* lobe should be hidden where the dark one is in front of it. Finally, the lower dashed line should not be hidden by the two light lobes—it is in front of them.

- Page 383: Change the line before Eq. 9.71 to read:

  and hence $c \to v$ (see Prob. 8.15). The energy density is[8]

  and insert a comma at the end of the previous line.

- Page 421: As a footnote to the word "Lorentz" in the title of Sect. 10.1.3:

  There is some question whether this should be attributed to H. A. Lorentz or to L. V. Lorenz (see J. Van Bladel, *IEEE Antennas and Propagation Magazine* **33**(2), 69 (1991)). But all the standard textbooks include the t, and to avoid possible confusion I shall adhere to that practice.

[*Note to corrections editor:* This is not an absolutely essential change; make it only if it can be done without substantial disruption. If it is given a footnote *number*, then the subsequent footnotes in this chapter will, of course, have to be adjusted. To avoid this, an asterisk might be used.]

- Page 442, Prob. 10.26: Put an exclamation mark in the margin for part (c); add a footnote (same format as Prob. 8.14 on page 363), to read: See J. J. G. Scanio, *Am. J. Phys.* **43**, 258 (1975).

- page 450: In Figure 11.6, top line, change "thichness" to "thickness".

- page 543: In Problem 12.59, remove the words "with velocity v", in the first line, and add to the last line, after the word "angle" the following: ", and v, the speed,".