Errata sheet for Engineering Electromagnetics, N. Ida, 2nd edition

Note: some of the corrections below are minor such as misspellings and minor modifications in text to clarify issues. However, some are more substantial and should be corrected.

Red: critical
Green: misspelling
Blue: important
Pink: not critical
Yellow: optional

NOTES;
1. Those items crossed were properly corrected in the 2nd edition, 2nd printing in May 2007.
2. See corrections on pages 804 and 945 which were not entered correctly – will have to be corrected in the next edition
3. See also the file "correction sheet" sent to springer – on which the 2nd printing corrections were based.
4.

Page 12, 1st line in exercise 1.2

Change: $\hat{\mathbf{x}}4 + \hat{\mathbf{y}}2$

To: $\hat{\mathbf{x}}4 - \hat{\mathbf{y}}2$

Page 69, 4th line of text from top of page

Change: positivie

To: positive

Page 83, 1st line above EXERCISE 2.4

Change: $P(0,90°,1)$

To: $P(2,90°,1)$

Page 100 and 101, in Eqs. (2.97), (2.98) and (2.99), 2nd term on the right hand side in each of the three equations:

Change: ∂_z

To: ∂z

(that is, z should not be a subscript – one location in each equation)

Page 228, last relation on the page:

Change: $\cos\alpha$

To: $\cos\theta_2$

Change: cos30

To: cos30º

Page 237, Figure 4.39

Replace existing figure with **Fig4.39new.eps** (supplied)

Page 274, 2nd line in Problem 4.31

Change: …electric filed intensity…
To: …electric field intensity…

Page 306, Eq. 5.27

Add *dx* to the integral:

Page 317, Eq. 5.38

Change: $\frac{r_A}{r_B}$
To: $\frac{r_B}{r_A}$

Page 317, Eq. 5.39

Change: $ln\frac{d}{a}$
To: $ln\frac{a}{d}$

Page 343, Figure 5.38

Replace existing figure with **Fig5.38new.eps** (supplied)

Page 368, Figure 6.14

Replace existing figure with **Fig6.14new.eps** (supplied)

Page 368, Caption to Figure 6.14

Add to the caption:
Negative sign indicates the field is in the negative *x* direction.

Page 405, Figure 6.39

Replace existing figure with **Fig6.39new.eps** (supplied)

Page 411, Figure 6.50

Replace existing figure with **Fig6.50new.eps** (supplied)

Page 422, first line at top

Change: …the anode is
To: …the cathode is

Page 429, 2nd expression below Figure 7.6

Change: $y_1 = \frac{0.002 - 0.001}{0.02}x$
To: $y_1 = (0.002 - 0.001) - \frac{0.002 - 0.001}{0.02}x = 0.001 - 0.05x$

Page 429, 3rd expression below Figure 7.6

Change: $S(x) = (0.004 - 2y_1) \times 0.0001 = (0.004 - 0.1x) \times 0.0001$
To: $S(x) = 2 \times (0.001 + y_1) \times 0.0001 = (0.004 - 0.1x) \times 0.0001$

Page 435, 3rd relation from top of page

Change: $P = \frac{P}{v} = ...$

To: $p_d = \frac{P}{v} = ...$

Page 442, between Eq. (7.39) and Eq. (7.40)

Add the following between the two equations:

In integral form,

Page 467, Figure 7.45

Replace existing figure with **Fig7.45new.eps** (supplied)

Page 529, 2nd line above Eq. (9.12)

Change: …nominator…

To: …numerator…

Page 562, 1st line above Example 9.8

Change: 1.346 H.

To: 1.346 μH.

Page 583, 2nd relation from bottom of the page

Add *dv* to the integral:

Page 588, 2nd line of text from bottom of page

Change: …magnetic flux density…

To: …magnetic field intensity…

Page 599, 4th line of text from bottom of page:

Change: on the wire $(\mathbf{F}_w = -\mathbf{F}_l)$ is

To: on the loops is

Page 599, 1st, 2nd, and 3rd relations from bottom of page:

Change: $\mathbf{F}_w =$

To: $\mathbf{F}_l =$

Page 599, 1st line of text from bottom of page:

Change: …on the wire is…

To: …on the wire $(\mathbf{F}_w = -\mathbf{F}_l)$ is…

Page 639, 1st line in exercise 10.2

Change: …have a resistance *r*….

To: …have a resistance per unit length *r*….

Page 646, Eq. (10.29), 3rd term in the equation

Change: $= -NS\frac{dB}{dt} =$

To: $= -N(S\cos\alpha)\frac{dB}{dt} =$

Page 648, 2nd relation from top of page

Change: $I\frac{emf}{R} =$

To: $I = \frac{emf}{R} =$

Page 658, 1st relation from top of page

In the denominator, perform the following two corrections

In the 2nd term of the relation, in the denominator:

Change: N_1^2

To: N_2^2

In the 3rd term of the relation, in the denominator

Change: $N_1\frac{dI_2}{dt}$

To: $N_2\frac{dI_2}{dt}$

Page 756, 1st expression from bottom of page

Change: $= \left[\frac{1}{2} + \frac{1}{2}\cos^2(\omega t - kz)\right]$

To: $= \left[\frac{1}{2} + \frac{1}{2}\cos 2(\omega t - kz)\right]$

Page 771, 2nd expression from top of page

Change: $w_e = \frac{\mu_0^2\varepsilon_0 H_0^2 e^{-0.02z}}{4}$

To: $w_e = \frac{\mu_0 H_0^2 e^{-0.02z}}{4}$ or: $w_e = \frac{\varepsilon_0\eta_0^2 H_0^2 e^{-0.02z}}{4}$

Page 773, immediately above (c):

Add:

(c) The propagation constant in the material is $\gamma = \alpha + j\beta = 1.84\text{x}10^{-4} + \text{j}643.83$, where α and β are those given in **(b)**. In free space, the propagation constant is $\gamma_0 = j\beta_0 = j628.32$

Change: **(c)** The intrinsic impedance…..
To: **(d)** The intrinsic impedance…..

Change: **(d)** Because only the…..
To: **(e)** Because only the …..

Page 799, 1st line in Problem 12.11

Change: The allowable microwave power….
To: The allowable time averaged microwave power….

Page 799, 5th line in Problem 12.11

Change: …radiation on Earth is about 1400 W/m^2.
To: …radiation on Earth is about 1400 W/m^2 (time averaged).

Page 801, Problem 12.16 (b)
Change: The power per unit area perpendicular to the direction…
To: The instantaneous power per unit area in the direction…

Page 804, 3rd line from bottom of page:
Change: …..for the wave.
To: …..for the wave: use $\omega_c = 10^7$, $10^7 \le \omega_c \le 2\times10^7$ [rad/s]

Page 813, 1st line below Eq. (13.25):
Change: $\Gamma e^{-\gamma z}$
To: $\Gamma e^{-\gamma_1 z}$

Page 868, 4th line in problem 13.4:
Change: …the powering entering…
To: …the power entering…

Page 869, 3rd line in Problem 13.13.
Change: ….in the *x* direction…
To: ….in the positive *x* direction…

Page 869, 4th and 5th line in Problem 13.13.
Change: Assume the magnetic field intensity has components in the *x* and *z* directions…
To: Assume the incident magnetic field intensity has components in the positive *y* and negative *z* directions…

Page 870, 3rd line in Problem 13.15.
Change: ….in the *x* direction…
To: ….in the positive *x* direction…

Page 870, 4th and 5th line in problem 13.15
Change: Assume the magnetic field intensity has components in the *x* and *z* directions.
To: Assume the incident electric field intensity has components in the negative *y* and positive *z* directions.

Page 870, 2nd line in Problem 13.16.
Change: ….in the *x* direction…
To: ….in the positive *x* direction…

Page 870, 3rd and 4th line in problem 13.16
Change: Assume the magnetic field intensity has components in the *x* and *z* directions.
To: Assume the incident electric field intensity has components in the negative *y* and positive *z* directions.

Page 889, 1st line from top of page

Change: $\delta = 1\sqrt{\pi f \mu_0 \sigma_c}$

To: $\delta = 1/\sqrt{\pi f \mu_0 \sigma_c}$

Page 901, Eq. 14.66

Change: $\left[\frac{N\phi}{m}\right]$

To: $\left[\frac{Np}{m}\right]$

Page 937, answer to Exercise 14.8

Change: **Answer.** 750 MHz, 1000 MHz.

To: **Answer. (a)** 750 MHz, 1000 MHz **(b)** 625 MHz, 875 MHz.

Page 937, 1st line above section 14.10

Change: **(b)** 375 MHz, 750 MHz and 1125 MHz.

To: **(b)** 125 MHz, 250 MHz and 375 MHz

Page 944, 5th line in Problem 14.6.

Change: …of line identical…

To: …of line with properties identical…

Page 951, 3rd line in Problem 14.32.

Change: …the reactance of the load…

To: …the impedance of the load…

Page 956, 1st line below Eq. (15.1)

Change: …nominator…

To: …numerator…

Page 983, 6th line of text from top of page

Change: …of the second stub,

To: …of stub(1),

Page 1007, Figure 16.8

Replace existing figure with **Fig16.8new.eps** (supplied)

Page 1115, Problem 17.7

Change: 17.7. Infrared...

To: 17.7. Application: Infrared...

Page 1123, 8th line above section 18.3

Change: $\delta = 1\sqrt{\pi f \mu_0 \sigma_c}$

To: $\delta = 1/\sqrt{\pi f \mu_0 \sigma_c}$

Page 1128, 3rd line above Eq. (18.20)

Change: …nominator…

To: …numerator…

Page 1132, 1st expression from the bottom
Change: $e^{-0.0209}$
To: $e^{-j0.0209}$

Page 1138, in Eq. (18.39)
Change: $e^{-j\beta r}$ (Two locations!)
To: $e^{-j\beta R}$ (Two locations!)

Page 1146, Caption to Figure 18.10:
Change: The magnetic dipole…..
To: **(a)** The magnetic dipole…..
Change: Configuration used for….
To: **(b)** Configuration used for….

Page 1154, in Eq. (18.79)
Change: $sin\beta\left(\frac{L}{2}-|z'|\right)$
To: $sin\left[\beta\left(\frac{L}{2}-|z'|\right)\right]$

Page 1155, in Eq. (18.80)
Change: $sin\beta\left(\frac{L}{2}-|z'|\right)$
To: $sin\left[\beta\left(\frac{L}{2}-|z'|\right)\right]$

Page 1155, in Eq. (18.81)
Change: $sin\beta\left(\frac{L}{2}-|z'|\right)$
To: $sin\left[\beta\left(\frac{L}{2}-|z'|\right)\right]$

Page 1155, in Eq. (18.83)
Change: $sin\beta\left(\frac{L}{2}-|z'|\right)$
To: $sin\left[\beta\left(\frac{L}{2}-|z'|\right)\right]$

Page 1155, in Eq. (18.84)
Change: $sin\beta\left(\frac{L}{2}-|z'|\right)$
To: $sin\left[\beta\left(\frac{L}{2}-|z'|\right)\right]$

Page 1164 (c) (7th and 6th lines of text from bottom of page:
Change: …maximum value of directivity given in **Eq. (18.104)** for the half wavelength antenna and in **Eq. (18.94)**.

To: …maximum value of **Eq. (18.104)** for the half wavelength antenna or of **Eq. (18.94)** for any antenna.

Page 1164, first mathematical relation from bottom of page:

Change: $d_{720} = \frac{2}{1.997} \times 1.309 = 1.32$

To: $d_{720} = \frac{2}{1.997} \times 1.7135 = 1.716$

Page 1164 3rd line of text from bottom of page:

Change: 1.309

To: 1.7135

Page 1164, 2nd and 1st line from bottom of page:

Change: …has lower directivity at 720 MHz but has higher radiation resistance.

To: …has higher directivity and higher radiation resistance at 720 MHz.

Page 1184, Figure 18.37

Replace existing figure with **Fig18.37new.eps** (supplied)

Page 1185, Eq. (18.142). Remove the 2nd term in the equation. That is:

Change: $P_L = \frac{1}{2}\left(\frac{V_a}{2R_{rad}}\right)^2 R_{rad} = \frac{V_a^2}{8R_{rad}} = \ldots\ldots\ldots\ldots\ldots\ldots$

To: $P_L = \frac{V_a^2}{8R_{rad}} = \ldots\ldots\ldots\ldots\ldots\ldots$

Page 1201, 1st line in problem 18.19 (first line below heading "Two-element image antennas")

Change: A Hertzian dipole…

To: A $\lambda/2$ dipole….

Page 1206, answer to Problem 2.31

Change: $\frac{b^2c^3 + a^2b^3 + a^2c^3}{6\sqrt{b^2c^2 + a^2b^2 + a^2c^2}}$

To: $\pm \frac{ba + ca + bc}{2}$

Page 1206, answer to Problem 4.13(a)

Change: $\rho_v = \varepsilon y$

To: $\rho_v = \varepsilon |y|$

Page 1208, first column, first line from top of column

Change: $\mathbf{E}(x,y) =$

To: $\mathbf{E}(2d,y) =$

Page 1214, 2nd column, 2nd line from top:

Change: **3.** $50 + j50\ \Omega$

To: **3.** $48 + j44\ \Omega$

Page 1214, 2nd column, 8th line above heading CHAPTER 16

Change: $d_{11} = 0.047\lambda$

To: $d_{11} = 0.199\lambda$

Page 1214, 2nd column, 2nd line above heading CHAPTER 16

Change: $d_{min} = 2.6316\lambda$

To: $d_{min} = 2.75\lambda$

Page 1216, answer to Problem 18.14(a)

Change: (a) 3 m.

To: (a) 1.5 m.

Page 1216, answer to Problem 18.14(d)

Change: (d) 4.822.

To: (d) 2.41.

Page 1216, answer to Problem 18.29(b)

Change: (b) $\mathbf{E} = \hat{\theta} \times \ldots\ldots$

To: (a) $\mathbf{E} = \hat{\theta} \ldots.$

Note: the unit vector should be placed together with the amplitude which currently is on the following line. Otherwise the answer is correct but the use of x may be misleading to students since it may imply a vector product rather than a simple continuation of the expression.

Page 1216, answer to Problem 18.30(b)

Change: 0.08 (four locations!!)

To: 0.04 (four locations!!)

Optional changes: these are not necessary but may be done in the future to improve the text

Page 942/943, Problem 14.1, lines 4, 5, 6
Change: Calculate:
To: Calculate the line parameters for each line assuming perfect conductors.
Remove lines 5 and 6. (these are marked as (a) and (b) on page 943)

Page 1213, answer to problem 14.1
Change: **1.** (a) C_1……
To: **1.** C_1……
Remove (b) (both lines)

Page 945, Figure 14.36
Replace existing figure with **Fig14.36new.eps** (supplied)

Page 945, Figure 14.37
Replace existing figure with **Fig14.37new.eps** (supplied)

Page 269, 3rd line in Problem 4.9
Change: …parallel to the *x* axis…
To: …on the *x* axis…

Page 343, 3rd line in Problem 5.15
Change: …placed between…
To: …placed midway between…

Page 515, Problem 8.8, 3rd line
Change: …the *z* axis at…
To: …the *z* axis, in the *xz* plane, at…

Page 515, Problem 8.9, 3rd line
Change: …the *z* axis, the other parallel to the y axis.
To: …the *z* axis, in the *xz* plane, the other parallel to the y axis, in the *xy* plane.

Page 521, 1st line in problem 8.23
Change: A straight wire….
To: A straight, infinitely long wire….

Page 872, Problem 13.26, line 3
Change: …$\varepsilon_2 = \varepsilon_0$.
To: …$\varepsilon_2 = \varepsilon_0$, $\mu_2 = \mu_1 = \mu_0$.

Page 872, Problem 13.26, line 4
Change: …$\varepsilon_{r2} = 1$.

To: … $\varepsilon_{r2} = 1$, $\mu_2 = \mu_1 = \mu_0$.

Page 872, Problem 13.26, line 5
Change: … $\varepsilon_{r2} = 1$.
To: … $\varepsilon_{r2} = 1$, $\mu_2 = \mu_1 = \mu_0$.

Page 945, 1st line below Figure 14.36
Change: ….constant as given,
To: ….constant (b = 20 mm),

Change: ….be the radius…
To: ….be the radius a…

Page 945, 2nd and 3rd lines below Figure 14.36
Change: Assume copper conductors are thick.
To: Assume material properties μ_0, ε_0 for copper.

NOTE: The following must be changed together or not at all!!!
Page 945, Figure 14.37
Replace existing figure with **Fig14.37new.eps** (supplied)

Page 1213, 13th line under heading CHAPTER 14
Change: $Z_0 \approx 441\,\Omega$
To: $Z_0 \approx 44.1\,\Omega$

Page 271, Heading: Potential: Distributed charges
Move heading and place it above problem 4.19 (same page