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Addenda and Errata for: Applied Frequency-Domain Electromagnetics
Author: R. Paknys. Publisher: Wiley, 2016.

1 Software, Appendix H

The software on the book website might not be up to date. Here is the most recent revision; download at

`https://users.encs.concordia.ca/~paknys/paknys_programs.zip`

2 Errata

p.4 replace disk by disc.

p.9 should read

$$(\mathbf{E}_1 - \mathbf{E}_2) \times \hat{\mathbf{n}} = \mathbf{M}_s \tag{1.53}$$

p.11 term in square brackets

p.23 need a minus sign

$$\mathbf{J}_s = -\hat{\mathbf{x}}\frac{2E_0}{\eta}$$

p.23 need a minus sign

$$\boldsymbol{\mathcal{J}}_s(t) = -\hat{\mathbf{x}}\frac{2E_0}{\eta}\cos\omega t$$

p.24 footnote has $\alpha = \operatorname{Im} k$ and $\beta = \operatorname{Re} k$

p.29 rays lie in the $x - z$ plane.

p.38

$$Z_s\ \hat{\mathbf{z}} \times \hat{\mathbf{z}} \times \left[\mathbf{H}^t\ |_{z=0^+} - (\mathbf{H}^i + \mathbf{H}^r)\ |_{z=0^-}\right] = \hat{\mathbf{z}} \times \mathbf{E}^t\ |_{z=0^+}. \tag{2.96}$$

p.53 replace scapacitance by capacitance.

p.67 Prob. 2.19: . . . two 31 mil substrates.

p.69 Prob. 2.24 replace Use a TEN model . . . by Also use a TEN model . . .

p.74 between (3.22) and (3.23) insert $H_{xmn} = -E_{ymn}/Z_{mn}$.

p.75 need + sign before the 2nd βz term

$$E_y = A_{10}\frac{-\pi k\eta}{2ak_c^2}(e^{j(\pi x/a-\beta z)} - e^{-j(\pi x/a+\beta z)}). \tag{3.34}$$

p.76 line 3 replace $\frac{\lambda_z}{\lambda_0}$ by $u_0\frac{\lambda_z}{\lambda_0}$.
p.77 in the 2nd and 3rd equations, replace J_y by J_{sy}.
p.77 Example 3.3: ...by a current sheet at $z = 0$ that is given by...
p.77 Example 3.3: ...the fields for $z > 0$ are...
p.91 need a period after: ...for $-d \le x \le 0$.
p.93 Add at bottom of page: Similar to (2.174), Z_0 looking in the $+x$ direction is
p.95 is identical to the result (3.110) from the wave equation
p.107 applied to the tangential electric fields (3.166)-(3.168)
p.112 not a new paragraph: From (3.193) the Q ... From (3.195) the Q
p.115 not italic: 582.7 rad/m
p.121 ...in Collin (1991, Chapter 8).
p.122 Problem 3.5: modes mn = 10, 01, 11, 20, 02, 12, 21.
p.124 Problem 3.13: $\mathbf{J}_s = \hat{\mathbf{y}}\sin(m\pi x/a)$ at $z = c$ that produces a field

$$\mathbf{E}^A = -\hat{\mathbf{y}}\frac{k\eta}{2\beta_{m0}}\sin\frac{m\pi x}{a}\,e^{-j\beta_{m0}|z-c|}$$

p.127 In Figure 3.33 the fonts for (a) (b) (c) are inconsistent with other figures.
p.138 However, ~~other~~ TEM ϕ-dependent ~~modes~~ potentials are possible. These ~~modes~~ can be found...
p.139 line 12 change $\mathrm{TM}_{x,10}$ to $\mathrm{TM}_{y,10}$
p.141 2nd line from bottom, $\overrightarrow{Z} = j(k_{y0}/\omega\epsilon_0)\tan k_{y0}(b-d)$.
p.160 The integration point is at $\boldsymbol{\rho}' = \hat{\mathbf{x}}x'$. The current element...
p.166 Problem 4.13: Find ϕ-dependent ~~field~~ potential solutions. Hint: consider (3.44) when $\nu = 0$.
p.171 In (5.9) change J_n to J_n'.
p.175

$$\nabla^2\psi + k^2\psi = 0. \tag{5.28}$$

p.184 in two places, replace $\frac{d}{d\Theta}$ by $\frac{d}{d\theta}$
p.195 Problem 5.15 ...at what angle ϕ' would $|E_z|$ be maximum?
p.204 In three places replace γ by γ_0.

p.206 misaligned prime, replace $\boldsymbol{\rho}\,'$ by $\boldsymbol{\rho}'$

p.206 The J part is $E_x = -j\omega A_x$ ~~or~~ with A_x from (4.99) so that

p.207 line 9, in $\pi Y_1(x)$ replace $\frac{6}{32}x^3$ by $\frac{3}{16}x^3$

p.207

$$Z_{mm} = \frac{\eta k \Delta}{4}\left\{1 - \frac{j2}{\pi}\ln\left(\frac{\gamma_0 k\Delta}{4e}\right)\right\} - \frac{\eta}{2}H_1^{(2)}(k\Delta/2). \qquad (6.55)$$

however (6.55) as used in `PROGRAM mmtestrip` is correct.

p.215 Table 6.1 4th row ($m = 1$), replace 1.5 by 2.5 and replace 1.118 by 2.291

p.219 In Fig. 6.9(c) the internal fields are $\mathbf{E}', \mathbf{H}'$ not $\mathbf{E}, \mathbf{H}$.

3rd paragraph: ...external fields are zero and the internal fields are $\mathbf{E}', \mathbf{H}'$.

p.220 ...the same $\mathbf{E}'$, $\mathbf{H}'$ inside S that we had before.

...J_z still gives the correct fields ~~everywhere~~ outside.

Delete: The interior field comes from $-J_z$.

p.224 ... $\mathbf{J}_s$ and $\mathbf{M}_s$ turn out to be the same as in case (b) except for a minus sign.

p.229 footnote, replace $\mathbf{J}_{s,po}$ by $\mathbf{J}_{s,go}$.

p.247 ...terms with x, x^2, y, y^2, xy, and constant terms.

p.279 Figure 8.7a replace Q_e by Q_E. In the caption replace edge-fixed by ray-fixed.

p.281 outside the x-z and y-z planes

p.285 This is a special case of the ray tube, whereby $\mathbf{E}^i(Q_E) \cdot \overline{\mathbf{D}} = \mathbf{E}(\sigma_0)\sqrt{\rho_1}$ and $\mathbf{E}^d(s) = \mathbf{E}(\sigma)$.

p.285 ...$\overline{\mathbf{D}}$ is defined in such a way that

$$\lim_{\rho_1 \to 0} \sqrt{\rho_1}\ \mathbf{E}^d(Q_E) = \mathbf{E}^i(Q_E) \cdot \overline{\mathbf{D}}$$

remains finite.

p.294 $\mathbf{E}^i = \hat{\boldsymbol{\beta}}_0' E_0\ e^{jk(x\sin\theta'\cos\phi' + y\sin\theta'\sin\phi' + z\cos\theta')}$.

p.338 line 15: ...Green's second identity (B.43)

p.357 line 9: replace In other words, by For example,

p.359 The form of (11.11) ensures that the three required properties for G are satisfied, and the boundary conditions (11.12) ensure that (11.10) is satisfied.

p.360 in Example 11.1

$$W(T,U) = -k\cos k(b - x')\sin kx' - k\cos kx'\sin k(b - x') = -k\sin kb$$

p.372

$$G_y(y,y';\lambda_y X) = \sum_m \frac{\psi_m^*(y')\psi_m(y)}{\lambda_m - \lambda_y}. \tag{11.81}$$

p.375 Vectors are bold

$$G_{2D}(\boldsymbol{\rho},\boldsymbol{\rho}';k_t) = \frac{j}{2\pi}\oint_{C_y} G_x(x,x';k_t^2-\lambda_y)G_y(y,y';\lambda_y)\ d\lambda_y$$

$$G_{3D}(\mathbf{r},\mathbf{r}') = \frac{j}{2\pi}\oint_{C_z} G_{2D}(\boldsymbol{\rho},\boldsymbol{\rho}';k_t=\sqrt{k^2-\lambda_z})\ \frac{e^{-j\sqrt{\lambda_z}|z-z'|}}{j2\sqrt{\lambda_z}}\ d\lambda_z. \tag{11.86}$$

p.382 In (12.9) replace $|y-y'|$ by $(y+y')$.

p.391 From the SDP equation, at (x_s, y_s) we obtain $dy/dx = \tan\phi_s = 1$ and hence $\phi_s = \pi/4$ or $-3\pi/4$.

pp.399-403 Eqs. (12.55) (12.57) (12.59) (12.68) replace $k\rho$ by $k_1\rho$.

p.400 Figure 12.19 the unshaded and shaded regions should be interchanged.

p.403 . . . proper sheet of the ν plane, having $\operatorname{Im}\kappa_1 \leq 0$ and (b) leaky-wave poles on the improper sheet, having $\operatorname{Im}\kappa_1 > 0$.

p.403 replace $u(\alpha-\alpha_p)$ by $U(\alpha-\alpha_p)$

p.439 Figure B.1 the unit vectors $\hat{\boldsymbol{\phi}}$ should be bold.

p.446 (C.10) replace $\frac{6}{32}x^3$ by $\frac{3}{16}x^3$

p.469 2nd line from bottom, delete: `*.o`

p.474

$$\int_a^b f(x)\ dx = \frac{h}{2}\{f(a)+2f(a+h)+2f(a+2h) + \cdots + 2f(Nh)+f(b)\} - \frac{(b-a)}{12}h^2 f''(\xi) \tag{G.4}$$

p.476

$$\int_a^b f(x)\ dx = \frac{h}{2}\sum_{n=0}^{N-1}[f(x_1+a+nh)+f(x_2+a+nh)] + \frac{(b-a)}{4320}h^4 f^{(IV)}(\xi) \tag{G.6}$$

p.487 replace polarisation by polarization and combine the index terms.