

# Errata for the book

## Partial Differential Equation in Action

(First edition 2007) by  
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**N.B. : Negative lines start above the footnotes.**

### Chapter 1

- Page 8, line 1:  $= A$  should be  $= \bar{A}$ .
- Page 9, line -4: change  $A$  into  $\Omega$ .
- Page 11, line -2, change “be a  $C^1$ –” into “be a bounded  $C^1$ –”
- Page 12, line 5:  $|\nabla\varphi(\mathbf{y}')|$  should be  $|\nabla\varphi(\mathbf{y}')|^2$
- Page 12, line 10: Change  $\int_{\Omega}$  into  $\int_{\partial\Omega}$ .

### Chapter 2

- Page 24, line 17: “**leat square**” should be “**least squares**”.
- Page 26, line -5: change  $-\sum_{m=1}^{\infty}$  into  $-(u_1 - u_0)\sum_{m=1}^{\infty}$ .
- Page 34, line 10: change  $x_1 \in V$  into  $\mathbf{x}_1 \in \Omega$  and  $\bar{V}$  into  $\bar{\Omega}$ .
- Page 36, line 7:  $ca^n$  should be  $ca^n q$ .
- Page 36, line 9 and 12: delete  $q$ .
- Page 46, line -3: the first  $\langle k^2 \rangle$  should be  $\langle k \rangle$ .
- Page 56, line -5:  $u_{xx}$  should be  $c_{xx}$ .
- Page 58, line 10: change 3 into 4.
- Page 68, line -4: change  $u(x, y)$  into  $u(x, t)$ .
- Page 68, line -1:  $\Gamma$  should be  $\Gamma_D$ .
- Page 70, line 7: change  $(0, \infty)$  into  $(0, T)$ .
- Page 87, line 1: change 2.8.3 into 2.2.2.
- Page 98, line -3: *barrires* should be *barriers*.
- Page 101, line 8: change “large enough” into “suitably chosen”.

### Chapter 3

- Page 103, line 10:  $e^{i\alpha z}$  should be  $e^{\alpha z}$
- Page 106, line 2: change  $M_h f$  to  $M_h u$ .
- Page 108, line 4: change  $\Delta^* w_{\Gamma}$  to  $\Delta_h^* w_{\Gamma}$ .
- Page 111, line 4: erase “from”.
- Page 114, line 7: change  $-\lambda v(r)$  into  $\lambda v(r)$ .
- Page 114, line 15: change  $\lambda = m$  into  $\lambda = -m^2$ .
- Page 116, line 1 of the footnote 8: change  $R(\cos \varphi, \sin \varphi)$  into  $R(p_1 + \cos \varphi, p_2 + \sin \varphi)$ .
- Page 124, line 3:  $u_R$  should be  $u$ .
- Page 125, line -1:  $\omega_n^{-1}$  should be  $[(n-2)\omega_n]^{-1}$ .
- Page 140, line -10: change  $m \geq 2$  into  $m \geq 4$ .
- Page 140, line -7:  $\partial B_{mr_0}$  should be  $\partial B_{(m-1)r_0}$ .
- Page 142, footnote, line -2:  $u_h(\mathbf{x})$  should be  $u_h(\mathbf{x}, \boldsymbol{\sigma})$ .
- Page 147, lines -4, -5:  $B_R$  should be  $\Omega$ .

- Page 148, line -7: 3.16 should be 3.19.
- Page 151, line 11: replace “unit circle” by “circle of radius  $R$ ”.
- Page 151, line -7: replace “harmonic  $B_1^+$ ” by “harmonic in  $B_1^+$ ”.
- Page 154, line 3: replace “harmonic  $\Omega_e$ ” by “harmonic in  $\Omega_e$ ”.

## Chapter 4

- Page 175, lines 8, 11, 14, 19: replace  $q''$  by  $q'' \circ g$ .
- Page 176, line 7: replace  $q''$  by  $q'' \circ g$ .
- Page 181, Fig. 4.18, caption: change 4.3 into 4.2.
- Page 183, Footnote 13: replace “we already have  $u_x < 0$ ” by “we have  $u_x \geq \frac{1}{Ct}$ ”.
- Page 185, line -7: change the first  $u_-$  into  $u_+$ .
- Page 186, line 7: replace  $R$  by  $r$ .
- Page 189, line -9: change  $\rightarrow 0$  into  $\rightarrow 0^+$ .
- Page 191, line -5: erase one of the two (4.67).
- Page 192, line 4: replace “ $= \int_0^x$ ” by “ $= \frac{2}{\sqrt{\pi}} \int_0^x \mathbf{j}$ ”.
- Page 212, lines 3,4: add reference number (4.120bis) to the system.
- Page 212, line 17: change “system (5.30)” into “system (4.120bis)”
- Page 217, line 6: change  $q'$  into  $q' \circ g$  and  $q''$  into  $q'' \circ g$ .
- Page 218, line 8: change  $u(0, x) = \mathcal{H}(x)$  into  $u(x, 0) = -\mathcal{H}(x)$ .
- Page 218, line 14: replace “ $= \int_s^{+\infty}$ ” by “ $= \frac{2}{\sqrt{\pi}} \int_s^{+\infty} \mathbf{j}$ ”.

## Chapter 5

- Page 232, lines -6 and -7 : replace  $1/2L$  by  $c/2L$  and  $m/2L$  by  $mc/2Lm$ , respectively.
- Page 248, line 2: change  $-k$  into  $-2k$ .
- Page 248, lines 22 and 26: change  $\tau$  into  $\tau_0$ .
- Page 261, line -1:  $J$  should be  $J_0$ .
- Page 261, line 12: change both  $\mathbf{n}$ 's into  $\mathbf{k}$ .
- Page 262, line 12:  $x_3 \cos$  should be  $x_3 = \cos$
- Page 270, lines 9 and 12:  $b_{mm}$  and  $h_{mm}$  should be  $b_{mn}$  and  $h_{mn}$ .
- Page 298, line 9: change  $u(0-, t)$  and  $u(0+, t)$  into  $u_x(0-, t)$  and  $u_x(0+, t)$ , respectively.

## Chapter 6

- Page 304, line -14:  $E(v) = \int_{\Omega} \dots$  should be  $E(v) = \frac{1}{2} \int_{\Omega} \dots$
- Page 305, line 22: replace “there is a way” by “it is possible”.
- Page 313, line -4: put  $\sum_{j=1}^n x_j^2$  under square root.
- Page 321, line -4: “form” should be “from”.
- Page 322, line -4: change  $u(-1)$  and  $u(1)$  into  $|u(-1)|$  and  $|u(1)|$ , respectively.
- Page 345, line -3: change 6.23 into 6.13.
- Page 348, lines -5, -13, -20: change 6.8 into 6.9, 6.10 into 6.11 and 6.11 into 6.12, resp.
- Page 349, line -5: change 6.7 into 6.6.

Page 352, line -6 and page 353, lines -5 and 8: change 6.12 into 6.13.  
 Page 355, lines -2 and -11: change 6.12 into 6.13 and 6.13 into 6.14 resp.  
 Page 359, line -5: Repalce “Then:” by “Then, if  $\dim H = \infty$  :”.  
 Page 359, line -2: erase “If  $\dim H = \infty$ ” and add after  $\{\lambda_m\}$ : “either constitute a finite set or”.  
 Page 360, line 11: replace “theorems 6.13 and 6.14” by “Theorem 6.15”.  
 Page 360, line 12: change “theorem 6.12” into “Theorem 6.13”.  
 Page 360, line 15: change  $a_{\lambda_0}(u, v)$  into  $a_{\lambda_0}(v, v)$ .  
 Page 360, line -12: add at the end : “In particular we can consider  $S_\lambda \in \mathcal{L}(H)$ ”  
 Page 360, line -4: change 7.4 into 6.15.  
 Page 360, line -3 change  $\sigma(S_{\lambda_0})$  into  $\sigma_P(S_{\lambda_0})$ .  
 Page 361, line -3: change  $\sigma(S_{\lambda_0})$  into  $\sigma_P(S_{\lambda_0})$  and “ $\sigma(S_{\lambda_0}) =$ ” into “ $\sigma(S_{\lambda_0}) \setminus \{0\} =$ ”.  
 Page 365, line -15:  $u_{kj}$  should be  $u_{k,j}$ .

## Chapter 7

Page 370, line 3: change  $\Omega$  into  $\mathbb{R}^3$ .  
 Page 373, line 4: change “ $= \int_{\Omega' \cap B_\varepsilon(\mathbf{0})} \eta_\varepsilon(\mathbf{y}) d\mathbf{y} \leq 1$ ” into “ $\leq \int_{B_\varepsilon(\mathbf{0})} \eta_\varepsilon(\mathbf{y}) d\mathbf{y} = 1$ ”.  
 Page 374, line 6: “that linear” should be “that a linear”.  
 Page 389, line 5:  $x_1^{n_n}$  should be  $x_1^{\beta_n}$ .  
 Page 398, line -7, and Page 402, line -1, 7.26 should be 7.20.  
 Page 403, line 10: “identifies” should be “identify”.  
 Page 417, line 6: “turn” should be “turns”.  
 Page 419, line 3 “cotained” should be “contained”.  
 Page 425, line 3:  $\leq \int_0^T \|s_k\| \dots$  should be  $\leq \int_0^T \|s_h\| \dots$ .  
 Page 428, line -1:  $\frac{1}{2\pi}$  should be  $\frac{1}{4\pi}$ .  
 Page 457, line -2: “ $\dots - fu$ ” should be “ $-2fu$ ”.

## Chapter 8

Page 438, line 10: Proposition 6.6 should be Theorem 6.7.  
 Page 446, line 8:  $E(u) = \int_\Omega \dots$  should be  $E(u) = \frac{1}{2} \int_\Omega \dots$   
 Page 446, line -7: change  $a_0$  into  $\gamma_0$ .  
 Page 452, line -10: change *Raiyeigh* to *Rayleigh*.  
 Page 452, formula (8.42): change “non identically zero” to “ $\neq 0$  a.e.”.  
 Page 457, line -2: “ $\dots - fu$ ” should be “ $-2fu$ ”.  
 Page 458, line -1: **b** should be **c**.  
 Page 463, *Remark 8.12*: replace all lines 15 to 18 by “However, the boundary integral makes no sense if  $\mathbf{f} \in L^2(\Omega; \mathbb{R}^n)$  only, since  $\partial\Omega$  has  $n$ -dimensional measure zero. ”.  
 Page 465, line -10 and Page 467, line 5: Change  $\inf_\Omega \geq \inf_{\partial\Omega} u^-$  into  $\inf_\Omega u \geq \inf_{\partial\Omega} (-u^-)$ .  
 Page 466, line 9: Change  $\inf_{\partial\Omega} u^-$  into  $\inf_{\partial\Omega} (-u^-)$ .  
 Page 466, line -12: 6.12 should be 6.13.  
 Page 466, line -1: 8.18 should be 8.3.

- Page 469, line 11: change “ $a_{ij}$  be” into “ $a_{ij}$  and  $b_j$  be”.
- Page 471. In Figure 8.3 change 8.17 into 8.2.
- Page 472. In Figure 8.4 change 8.18 into 8.3.
- Page 475, line -4: “smooth domain” should be “smooth bounded domain”.
- Page 476, line 9: “ $u_* \leq g \leq u^*$ ” should be “ $u_* \leq u^*$ ”.
- Page 478, line 12:  $w_1$  should be  $\sigma w_1$ .
- Page 480, line -7: Proposition 6.4 should be Theorem 6.7.
- Page 482, line 6: replace  $p(z - \mathcal{E}[z])$  by  $-p\mathcal{E}[z]$ .
- Page 485, line -7:  $1/\sqrt{2}$  should be  $4/\sqrt{2}$ .
- Page 485, Problem 8.4: change  $x < 1$  and  $u(\pi/4)$  into  $x < \pi/6$  and  $u(\pi/6)$ .
- Page 486, Line 2: There is a missing  $v$  before  $\in$ .
- Page 486, Line 7:  $V$  should be  $X$ .

## Chapter 9

- Page 498, line 10: replace 6.11 by 6.12.
- Page 498, line 20: replace both  $\int_{\Omega}$  by  $\int_0^T$ .
- Page 500, formula (9.19): change  $\leq \|g\|_0^2$  into  $\leq 2 \|g\|_0^2$ .
- Page 503, line 5: replace  $-\alpha$  by  $\alpha$ .
- Page 503, line 9:  $\|u\|_{L^2(0,T;V)}^2$  should be  $\alpha \|u\|_{L^2(0,T;V)}^2$ .
- Page 504, line 4: replace both  $u_m(t)$  by  $\dot{u}_m(t)$ .
- Page 511, formula (9.39): change “ $= -(u^* \dots)$ ” into “ $= (u^* \dots)$ ”.
- Page 513, line -12:  $-\frac{\gamma_0 \varepsilon}{2}$  should be  $-\frac{\gamma \varepsilon}{2}$ .
- Page 513, line -6:  $\lambda_0 > \gamma$  should be  $\lambda_0 > \gamma_0$ .
- Page 520, line 12: replace “in  $H$ ” by “in  $V$  and  $H$ , respectively”.
- Page 522, line -2: change “ $G(t) e^{\gamma t}$ ” into “ $G(t) (e^{\gamma t} - 1)$ ”.
- Page 522, line -1: add: “Thus,  $\Psi(t) \leq G(t) + R(t) \leq G(t) e^{\gamma t}$ .”
- Page 523, lines 3, -11, -9, -3: Replace  $2c^2$  by  $c^2$ .
- Page 523, line 10: replace  $c^2$  by  $1/2$ .
- Page 524, line 2: replace  $2c^2$  by  $c^2$ .
- Page 525, line 2: change “Theorem 9.10 shows” into “Theorems 9.10 and 9.11 show”.



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