Errata for the Fourth Edition of
Handbook of Differential Equations

Daniel Zwillinger & Vladimir Dobrushkin

LAST UPDATED: October 4, 2024

NOTES:

1. The latest errata are available from `http://www.mathtable.com/errata/hode4_errata.pdf`.
2. The home page for this book is `http://www.mathtable.com/hode/`.
3. You can reach the first author at `ZwillingerBooks@gmail.com`.

CORRECTIONS

1. Section 45, **Prüfer Transformation**, page 197.

   The second equation in (45.3) is missing a $\frac{1}{2}$. The correct expression should have been

   $$\frac{dR}{dx} = \frac{1}{2}\left[\frac{1}{P(x)} - Q(x)\right] R(x) \sin 2\theta.$$

   (Thanks to Yves Dermenjian for this correction.)

2. Section 73, **Free Boundary Problems**, page 206.

   (a) The T_H in the first equation in (73.5), for $f(\eta)$, should be T_C.
   (b) In equation (73.6) the "erf" and "erfc" terms should be reversed;
   the first term's denominator should be erfc$(\alpha/2)$ and
   the second term's denominator should be erf$(\alpha/2)$.

   (Thanks to Bruce R. Locke for these corrections.)

3. Section 30, **Zeros of Solutions**, page 92. *9/2024*

   Theorem F contains the expression
   $(1+\epsilon)/4t^2$ which is incorrect. It should have been
   $(1+\epsilon)/4x^2$

   (Thanks to Michael Levy for this correction.)

4. Section 115, **Fokas Method / Unified Transform**, page 323.

   This section has five examples and, in each case, the results obtained are correct. However, the approach taken is not completely correct, having to do with the solutions for $x < 0$.

   A correct approach is in the paper M. Farkas, J. Cisneros, and B. Deconinck, "The analytic extension of solutions to initial-boundary value problems outside their domain of definition," 19 Jun 2022, `https://arxiv.org/abs/2206.09487`

   (Thanks to Bernard Deconinck for this correction.)

5. Section 153, **Monge's Method**, page 423, Equation (153.7).

   The right hand side of equation (153.7) is presently $\dfrac{\partial z}{\partial y} + 6y$, which is incorrect.

   The right hand side should have been $\dfrac{\partial z}{\partial x} + 6y$.

   (Thanks to Fritz Schwarz for this correction.)

6. Section 75, **Green's Functions**, page 211. *10/2024*

   - Just above equation (75.18) we currently have

     Therefore,
     $$G(x;z) = \begin{cases} \dfrac{x(z-L)}{L} & \text{for } 0 \le x \le z, \\ \dfrac{z(x-L)}{L} & \text{for } z \le x \le L. \end{cases}$$
     which is incorrect. It should have been

     Therefore, because $p(x) = -1$ in (75.16),
     $$G(x;z) = \begin{cases} \dfrac{x(L-z)}{L} & \text{for } 0 \le x \le z, \\ \dfrac{z(L-x)}{L} & \text{for } z \le x \le L. \end{cases}$$
   - Equation (75.19) is currently
     $$\lambda_n = \frac{n\pi}{L}, \qquad \phi_n(x) = \sin \lambda_n x = \sin\left(\frac{n\pi x}{L}\right),$$
     which is incorrect. It should have been
     $$\lambda_n = \left(\frac{n\pi}{L}\right)^2, \qquad \phi_n(x) = \sin\left(\sqrt{\lambda_n} x\right) = \sin\left(\frac{n\pi x}{L}\right),$$
   - Equation (75.20) is currently
     $$G(x;z) = \frac{2L}{n\pi} \sum_{n=1}^{\infty} \sin\left(\frac{n\pi x}{L}\right) \sin\left(\frac{n\pi z}{L}\right),$$
     which is incorrect. It should have been
     $$G(x;z) = \sum_{n=1}^{\infty} \frac{2L}{(n\pi)^2} \sin\left(\frac{n\pi x}{L}\right) \sin\left(\frac{n\pi z}{L}\right),$$

   (Thanks to Michael Levy for these corrections.)

IMPROVEMENTS

1. Section 48, **Look-Up Technique**, page 130.

   Add the reference: Andrei D. Polyanin and Valentin F. Zaitsev, *Handbook of Ordinary Differential Equations: Exact Solutions, Methods, and Problems*, CRC Press, 2018.

2. Section 57, **Delay Equations**, page 165.

   Add the reference: Andrei D. Polyanin, Vsevolod G. Sorokin, and Alexi I. Zhurov, *Delay Ordinary and Partial Differential Equations*, CRC Press, 2024.

3. Section 125, **Separation of Variables**, page 355.

   Add the reference: Andrei D. Polyanin and Alexi I. Zhurov, *Separation of Variables and Exact Solutrions to Nonlinear PDEs*, CRC Press, 2022.

4. Section 135, **Differential Constraints**, page 380.

   Add the reference (Chapter 4): Andrei D. Polyanin and Alexi I. Zhurov, *Separation of Variables and Exact Solutrions to Nonlinear PDEs*, CRC Press, 2022.