## List of Errata

### Handbook of Nonlinear Partial Differential Equations, Chapman & Hall/CRC, 2004 by A. D. Polyanin and V. F. Zaitsev

Page 4: Equation 4, line 1 in Item 2°:
**Was:** ... ($A$, $B$, and $C$ are arbitrary constants).
**Correct:** ... ($A$ is an arbitrary constant).

Page 371: Line 2 (formula):
**Was:** $u = u(z)$, ...
**Correct:** $w = u(z)$, ...

Page 363: Equation 11, Item 3°:
One should set $C_1 = 0$ in the solution.

Page 365: Item 4°, line 2:
**Was:**

$$w(x,y) = -\frac{2}{\beta} \ln \frac{\sqrt{|a|\beta^2}\,\bigl[1 + \operatorname{sign}(a\beta)\Phi(z)\overline{\Phi(z)}\,\bigr]}{4|\Phi'_z(z)|},$$

**Correct:**

$$w(x,y) = -\frac{2}{\beta} \ln \frac{\bigl[1 - 2a\beta\Phi(z)\overline{\Phi(z)}\,\bigr]}{4|\Phi'_z(z)|},$$

(Thanks to Paul Nanninga for these corrections.)

Page 385: Equation 6, Item 1°, line 2:
**Was:**

$$w(x,y) = -\frac{2}{\beta} \ln \frac{|\beta F(z)|\bigl[1 + \varepsilon\operatorname{sign}(\beta)\Phi(z)\overline{\Phi(z)}\,\bigr]}{4|\Phi'_z(z)|},$$

**Correct:**

$$w(x,y) = -\frac{2}{\beta} \ln \frac{|F(z)|\bigl[1 - 2\varepsilon\beta\Phi(z)\overline{\Phi(z)}\,\bigr]}{4|\Phi'_z(z)|},$$

(Thanks to Paul Nanninga for these corrections.)

Page 397: Item 14°, line 1:
**Was:** The original equation can be represented as the sum of the equations
**Correct:** The original equation can be represented as the system of the equations

Page 503: Third line above equation 2:
**Was:** ... The general solution of equation (1) ...
**Correct:** ... The general solution of equation (4) ...

Page 503: Formula on the second line above equation 2:
**Was:** $\varphi(t) = \dots$
**Correct:** $\psi(t) = \dots$

Page 516: Second line from bottom:
**Was:** ..., $z = x - 4p^3 t - c$,
**Correct:** ..., $z = x - 4p^2 t - c$,

Page 517: Penultimate displayed formula:

**Was:** $w(x,t) = -2\dfrac{\partial^2}{\partial x^2}(x^6 + 60x^3t - 720t^2)$

**Correct:** $w(x,t) = -2\dfrac{\partial^2}{\partial x^2}\ln(x^6 + 60x^3t - 720t^2)$

Page 524: Item 3°, Solution on lines 2 and 3:

**Was:**

$$w(x,t) = 2\frac{a_1e^{\theta_1} + a_2e^{\theta_2} + Aa_2e^{2\theta_1+\theta_2} + Aa_1e^{\theta_1+2\theta_2}}{1 + e^{2\theta_1} + e^{2\theta_2} + 2(1-A)e^{\theta_1+\theta_2} + Ae^{2(\theta_1+\theta_2)}},$$

$$\theta_1 = a_1 - a_1^3t + b_1, \quad \theta_2 = a_2 - a_2^3t + b_2, \quad A = \left(\frac{a_1 - a_2}{a_1 + a_2}\right)^2,$$

**Correct:**

$$w(x,t) = 2\frac{a_1e^{\theta_1} + a_2e^{\theta_2} + Aa_2e^{2\theta_1+\theta_2} + Aa_1e^{\theta_1+2\theta_2}}{1 + e^{2\theta_1} + e^{2\theta_2} + 2(1-A)e^{\theta_1+\theta_2} + A^2e^{2(\theta_1+\theta_2)}},$$

$$\theta_1 = a_1x - a_1^3t + b_1, \quad \theta_2 = a_2x - a_2^3t + b_2, \quad A = \left(\frac{a_1 - a_2}{a_1 + a_2}\right)^2,$$

Page 543: Line 13:

**Was:** equation (2) can be ...

**Correct:** equation (3) can be ...

Page 716: Line before Example 7:

**Was:** It can be shown that, for equations (2), this equation has a solution with a logarithmic nonlinearity of the form (7).

**Correct:** It can be shown that, equation (2) with a logarithmic nonlinearity of the form (7) has a solution of the form (8).

Page 722: Sixth line from bottom:

**Was:** The substitution of expression (1) with $n = 2$ ...

**Correct:** The substitution of expression $w = F(z)$ with $z = \varphi(x) + \psi(y)$ ...

Page 740: Line 24:

**Was:** $f[4ff - 7(f')^2\xi_{xx} - (f')^2\xi_t = 0,$

**Correct:** $f[4ff - 7(f')^2]\xi_{xx} - (f')^2\xi_t = 0,$

Page 741: Line before Paragraph S.7.1-3:

**Was:** 4. $f = w^{-4}$ : $\mathrm{X}_4 = x\partial_x - w\partial_w, \quad \mathrm{X}_5 = t^2\partial_x + tw\partial_w.$

**Correct:** 4. $f = w^{-4}$ : $\mathrm{X}_4 = 2x\partial_x - w\partial_w, \quad \mathrm{X}_5 = t^2\partial_t + tw\partial_w.$

Page 745: four lines after equation (34):

**Was:** The transformation $\alpha = -3(\ln\varphi)_x$ reduces the equations of (33) into the linear equations

$$\varphi_t = 3\varphi_{xx}, \quad \varphi_{xt} = \varphi_{xxx} + \varphi_x,$$

respectively. The solution that satisfies the two equations simultaneously is expressed as

$$\alpha(x,t) = -\frac{3}{\sqrt{2}}\,\frac{C_1\exp\left[\frac{1}{2}(\sqrt{2}\,x + 3t)\right] - C_2\exp\left[\frac{1}{2}(-\sqrt{2}\,x + 3t)\right]}{C_1\exp\left[\frac{1}{2}(\sqrt{2}\,x + 3t)\right] + C_2\exp\left[\frac{1}{2}(-\sqrt{2}\,x + 3t)\right] + C_3}.$$

**Correct:** The stationary solution $\alpha = \alpha(x)$ that satisfies the two equations (33) simultaneously is expressed as

$$\alpha(x) = -\frac{3}{\sqrt{2}}\,\frac{C_1\exp\left(\frac{\sqrt{2}}{2}\,x\right) + C_2\exp\left(-\frac{\sqrt{2}}{2}\,x\right)}{C_1\exp\left(\frac{\sqrt{2}}{2}\,x\right) - C_2\exp\left(-\frac{\sqrt{2}}{2}\,x\right)}.$$

Page 746: Line 4 (system of equations):

**Was:**

$$\alpha_t - 3\alpha_{xx} + 2\alpha\alpha_x = 0, \quad 2\alpha_{xt} - 2\alpha_{xxx} + 4\alpha_x^2 + \alpha_x.$$

**Correct:**

$$\alpha_t - 3\alpha_{xx} + 2\alpha\alpha_x = 0, \quad 2\alpha_{xt} - 2\alpha_{xxx} + 4\alpha_x^2 + \alpha_x = 0.$$

Page 746: Item 2°, lines 6–10:

**Was:**

$$w(x,t) = \tfrac{1}{2}\bigl\{C_1 \exp\bigl[\tfrac{1}{8}(2\sqrt{2}\,x + 3t)\bigr] - C_2 \exp\bigl[\tfrac{1}{8}(-2\sqrt{2}\,x + 3t)\bigr]\bigr\} h\bigl(z; \tfrac{\sqrt{2}}{2}\bigr),$$

where

$$z = C_1 \exp\bigl[\tfrac{1}{8}(2\sqrt{2}\,x + 3t)\bigr] + C_2 \exp\bigl[\tfrac{1}{8}(-2\sqrt{2}\,x + 3t)\bigr] + C_3,$$

the function $h(z;k)$ is the Jacobi elliptic function satisfying the ordinary differential equation (36); $C_1$, $C_2$, and $C_3$ are arbitrary constants.

**Correct:**

$$w(x,t) = \tfrac{1}{2} + \bigl\{C_1 \exp\bigl[\tfrac{1}{8}(2\sqrt{2}\,x + 3t)\bigr] - C_2 \exp\bigl[\tfrac{1}{8}(-2\sqrt{2}\,x + 3t)\bigr]\bigr\} F(z),$$

where

$$z = C_1 \exp\bigl[\tfrac{1}{8}(2\sqrt{2}\,x + 3t)\bigr] + C_2 \exp\bigl[\tfrac{1}{8}(-2\sqrt{2}\,x + 3t)\bigr] + C_3,$$

the function $F(z)$ is determined by the ordinary differential equation $F''_{zz} = 8F^3$; $C_1$, $C_2$, and $C_3$ are arbitrary constants.

Page 746: Item 3°, lines 2 and 3:

**Was:**

$$\xi = \alpha(x,t), \quad \eta = 1, \quad \zeta = -\alpha_x\bigl(w - \tfrac{1}{2}\bigr),$$

where the function $\alpha(x,t)$ satisfies system (33). In this case, we obtain solution (35).

**Correct:**

$$\xi = \alpha(x,t), \quad \eta = 1, \quad \zeta = -\alpha_x(w - 1),$$

where the function $\alpha(x,t)$ satisfies system (33). In this case, we obtain the solution

$$w(x,t) = 1 + \bigl\{C_1 \exp\bigl[\tfrac{1}{2}(\sqrt{2}x + 3t)\bigr] - C_2 \exp\bigl[\tfrac{1}{2}(-\sqrt{2}x + 3t)\bigr]\bigr\} h\bigl(z; \tfrac{\sqrt{2}}{2}\bigr),$$
$$z = C_1 \exp\bigl[\tfrac{1}{2}(\sqrt{2}x + 3t)\bigr] + C_2 \exp\bigl[\tfrac{1}{2}(-\sqrt{2}x + 3t)\bigr] + C_3,$$

where the function $h(z;k)$ is determined by the ordinary differential equation (36).

Page 746: Item 4°, the last formula:

**Was:** $C_2(t)$ (twice)

**Correct:** $C_2$

Page 746: Item 5°, the last formula:

**Was:**

$$w(x,t) = \frac{aC_1 \exp\bigl[\frac{1}{2}(\sqrt{2}\,ax + a^2 t)\bigr] + C_2(t) \exp\bigl[\frac{1}{2}(\sqrt{2}\,x + t)\bigr]}{C_1 \exp\bigl[\frac{1}{2}(\sqrt{2}\,ax + a^2 t)\bigr] + C_2(t) \exp\bigl[\frac{1}{2}(\sqrt{2}\,x + t)\bigr] + C_3 \exp\bigl[\frac{1}{2}(\sqrt{2}\,(a+1)x + at)\bigr]},$$

**Correct:**

$$w(x,t) = \frac{aC_1 \exp\bigl[\frac{1}{2}(\sqrt{2}\,x + a^2 t)\bigr] + C_2 \exp\bigl[\frac{1}{2}(\sqrt{2}\,ax + t)\bigr]}{C_1 \exp\bigl[\frac{1}{2}(\sqrt{2}\,x + a^2 t)\bigr] + C_2 \exp\bigl[\frac{1}{2}(\sqrt{2}\,ax + t)\bigr] + C_3 \exp\bigl[\frac{1}{2}(\sqrt{2}\,(a+1)x + at)\bigr]},$$

Page 747: Example 2, the lines 11, 12, and 13 (equations):

**Was:**

$$
\begin{aligned}
w_x^2:&\quad (\xi^2 - w)\zeta_{ww} + 2w\xi_{wx} + 2\xi\xi_{wt} + 2\xi\xi_{ww}\zeta = 0,\\
w_x:&\quad w\xi_{xx} - 2w\zeta_{wx} - 2\xi_{wt}\zeta - \xi_{ww}\zeta - 2\xi\zeta_{wt} - 2\xi\zeta\zeta_{ww} - \xi_{tt} = 0,\\
1:&\quad \zeta_{tt} - w\zeta_{xx} + 2\zeta\zeta_{wt} + \zeta^2\zeta_{ww}.
\end{aligned}
$$

**Correct:**

$$
\begin{aligned}
w_x^2:&\quad (\xi^2 - w)\zeta_{ww} + 2w\xi_{wx} + 2\xi\xi_{wt} + 2\xi\xi_{ww}\zeta - 2\xi\xi_x\xi_w = 0,\\
w_x:&\quad w\xi_{xx} - 2w\zeta_{wx} - 2\xi_{wt}\zeta - \xi_{ww}\zeta^2 - 2\xi\zeta_{wt} - 2\xi\zeta\zeta_{ww} - \xi_{tt} + 2\xi_t\xi_x + 2\xi_x\xi_w\zeta + 2\xi\xi_w\zeta_x = 0,\\
1:&\quad \zeta_{tt} - w\zeta_{xx} + 2\zeta\zeta_{wt} + \zeta^2\zeta_{ww} - 2\xi_t\zeta_x - 2\xi_w\zeta\zeta_x = 0.
\end{aligned}
$$