



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: $u = u(z), \dots$
Correct: $w = u(z), \dots$

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

Page 365: Item 4°, line 2:
Was:

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

Correct:

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

(Thanks to Paul Nanninga for these corrections.)

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

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

Correct:

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

(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: ..., $z = x - 4p^3t - c,$

Correct: ..., $z = x - 4p^2t - c,$

Page 517: Penultimate displayed formula:

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

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

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

Was:

$$w(x, t) = 2 \frac{a_1 e^{\theta_1} + a_2 e^{\theta_2} + A a_2 e^{2\theta_1 + \theta_2} + A a_1 e^{\theta_1 + 2\theta_2}}{1 + e^{2\theta_1} + e^{2\theta_2} + 2(1 - A)e^{\theta_1 + \theta_2} + A e^{2(\theta_1 + \theta_2)}},$$

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

Correct:

$$w(x, t) = 2 \frac{a_1 e^{\theta_1} + a_2 e^{\theta_2} + A a_2 e^{2\theta_1 + \theta_2} + A a_1 e^{\theta_1 + 2\theta_2}}{1 + e^{2\theta_1} + e^{2\theta_2} + 2(1 - A)e^{\theta_1 + \theta_2} + A^2 e^{2(\theta_1 + \theta_2)}},$$

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

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. $f = w^{-4}$: $X_4 = x \partial_x - w \partial_w, \quad X_5 = t^2 \partial_x + t w \partial_w.$

Correct: 4. $f = w^{-4}$: $X_4 = 2x \partial_x - w \partial_w, \quad X_5 = t^2 \partial_t + t w \partial_w.$

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:

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

where

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

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:

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

where

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

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:

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

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

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

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

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:

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

Correct:

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

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

Was:

$$w_x^2: (\xi^2 - w)\zeta_{ww} + 2w\xi_{wx} + 2\xi\xi_{wt} + 2\xi\xi_{ww}\zeta = 0,$$

$$w_x: w\xi_{xx} - 2w\zeta_{wx} - 2\xi_{wt}\zeta - \xi_{ww}\zeta - 2\xi\zeta_{wt} - 2\xi\zeta_{ww} - \xi_{tt} = 0,$$

$$1: \zeta_{tt} - w\zeta_{xx} + 2\zeta\zeta_{wt} + \zeta^2\zeta_{ww}.$$

Correct:

$$w_x^2: (\xi^2 - w)\zeta_{ww} + 2w\xi_{wx} + 2\xi\xi_{wt} + 2\xi\xi_{ww}\zeta - 2\xi\xi_x\xi_w = 0,$$

$$w_x: w\xi_{xx} - 2w\zeta_{wx} - 2\xi_{wt}\zeta - \xi_{ww}\zeta^2 - 2\xi\zeta_{wt} - 2\xi\zeta_{ww} - \xi_{tt} + 2\xi_t\xi_x + 2\xi_x\xi_w\zeta + 2\xi\xi_w\zeta_x = 0,$$

$$1: \zeta_{tt} - w\zeta_{xx} + 2\zeta\zeta_{wt} + \zeta^2\zeta_{ww} - 2\xi_t\zeta_x - 2\xi_w\zeta\zeta_x = 0.$$