Errata Sheet for the book
"Nonlinear and Adaptive Control Design"
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The book *Nonlinear and Adaptive Control Design* was published by Wiley Interscience in June 1995. Since then, several typos and minor errors have been brought to the attention of the authors, and they are listed below, with the corrections highlighted in boldface. Most of them have been corrected in the second printing of the book.

- page 7, the 5th line after equation (1.22) should read 'with the normalized update law **(1.22)**'
- page 15, the 6th line before Section 1.3.5 should read 'present new designs with **the** *MT-filters*'
- page 27, equation (2.20) should read

$$\frac{\partial V}{\partial x} g(x) = 0 \Rightarrow \frac{\partial V}{\partial x} f(x) < 0, \quad \forall \boldsymbol{x \neq 0},$$

- page 32, the 1st line before equation (2.39) should read 'equal to $-c_2 z$' (not z^2)
- page 40, the 2nd line after equation (2.82) should read 'this implies that the output y **is** separated'
- page 45, the 1st line before equation (2.105) should read '$p_{\mathbf{11}} = 2$'
- pages 48–49, Example 2.18:
  - in (2.122a), the last term should be '$x^3\xi^{\mathbf{3}}$'
  - equation (2.122b) should read '$\dot{\xi} = \xi^{\mathbf{2}} u$'
  - the next line should read 'The choice of output $y = \xi^{\mathbf{3}}$'
  - equation (2.123) should read $u = -\xi + v$.
  - the next line should read 'results in $\dot{\xi} = -\xi^3 + \xi^{\mathbf{2}} v,\ y = \xi^{\mathbf{3}}$'
  - in equation (2.124), the second term should read '$-\xi^4 + \xi^{\mathbf{3}} v$'
  - equation (2.126) should read

$$f(x,\xi) = -x(1+e^{\xi}), \quad g(x,\xi) = x^3, \quad \boldsymbol{y = \xi^3},$$

  - equation (2.127) should read '$u = -\xi - x^4$'
  - equation (2.128) should read

$$\dot{V}_{\mathrm{a}} = -x^2(1+e^{\xi}) + x^4\xi^{\mathbf{3}} - \xi^4 - x^4\xi^{\mathbf{3}} \leq -x^2 - \xi^4 .$$

- pages 49–50, Example 2.20:
  - the x-subsystem of equation (2.129) and the first two equations of (2.132) should read

$$\begin{aligned} \dot{x}_1 &= -x_1(1+e^{x_2}) + x_1^3 x_2^{\mathbf{3}} \\ \dot{x}_2 &= x_2^{\mathbf{2}} y \end{aligned}$$

  - in equation (2.133) the last term should be $-x_2$ (not $-x_2^2$)
  - equation (2.134) should read

$$u = -\left(y + x_1^4 + x_2\right) \boldsymbol{- y + \xi_1} - x_2^2 y + 4x_1^4\left(1 + e^{x_2} - x_1^2 x_2^{\mathbf{3}}\right) - x_2^{\mathbf{3}} .$$

- page 53, the system (2.145) should read

$$
\begin{aligned}
\dot{x} &= -x(1+e^{\xi_1}) + x^3\xi_1^{\mathbf{3}} \\
\dot{\xi}_1 &= \xi_1^{\mathbf{2}}\,\xi_2^{\mathbf{3}} \\
\dot{\xi}_2 &= \xi_2^{\mathbf{2}}\,u\,.
\end{aligned}
$$

- page 53, the 2nd line after the system (2.145) should read 'through $y = \xi_2^{\mathbf{3}}$'
- page 68, the 6th line after (2.210) should read 'the $\dot{R}$-equation **(2.208)**'
- page 72:
  - equation (2.233) should read '$u = -\phi ...$'
  - equation (2.239) should read '$u = -k_1\phi ...$'
- page 127, in the first line of equation (4.25), θ should be replaced by $\hat{\theta}$
- page 137, equation (4.73) should read '$\alpha_1(x,\theta) = -z_{\mathbf{2}} - c_3 z_3 ...$'
- page 156, the 1st line before (4.187) should read 'A realization of **(4.186)**'
- pages 175, 176, 177, and 179, '$\dfrac{\partial \alpha_{n-1}}{x_n}$' should be replaced throughout by '$\dfrac{\partial \alpha_{n-1}}{\boldsymbol{\partial} x_n}$'
- page 201:
  - equation (5.70) should read '$+\frac{\partial \alpha_1}{\partial x_1}\left(x_2 + \varphi^{\mathrm{T}}\hat{\theta}\right)$'
  - 1st line of equation (5.72), the first entry of the matrix should read '$-c_1 - \boldsymbol{\kappa_1}\varphi^2$'
- page 237, equation (6.11) should read '$\dot{\chi} = -\chi + \varphi(x)$' (not '$\varphi(x)^{\mathrm{T}}$')
- page 239, 2nd line after equation (6.24) should read '$l(z,t) = 0,\ g(z,t) = h(z,t) = I_n$'
- page 248, equation (6.78) should read '$\Omega_0{+}x$'
- page 249, equation (6.88) should read '$\Omega_0{+}x$'
- page 250, Figure 6.2:
  - the Ω_0-block should read '$(\Omega_0{+}x){-}f$'
  - the Ω-block should read '$\dot{\Omega}^{\mathbf{T}} = \left(A_0 - \lambda F^{\mathrm{T}} F P\right)\Omega^{\mathbf{T}} + F^{\mathbf{T}}$'
- page 258, equation (6.142) should read '$\dot{\Omega}^{\mathbf{T}} = -c_0\Omega^{\mathbf{T}} - p\kappa_0 F^{\mathrm{T}} F \Omega^{\mathbf{T}} + F^{\mathrm{T}}$'
- page 259:
  - 1st line of equations (6.146)–(6.148), the first entry of the matrix should read '$-c_1 - \boldsymbol{\kappa_1}\varphi^2$'
  - 2nd line of equations (6.147), $\tilde{\theta}$ should be deleted
- page 260, 2nd line after equation (6.150) and the caption of Figure 6.3 should read '$= \mathbf{2}\kappa_0 =$'
- page 261, Figure 6.4:

$$
\begin{aligned}
1 &: \ \kappa_0 = .1 \\
2 &: \ \kappa_0 = .5 \\
3 &: \ \kappa_0 = 2.5
\end{aligned}
$$

- page 262:
  - the caption of Figure 6.5 should read '$= \mathbf{2}\kappa_0 = 1$.'
  - equation (6.152) should read '$(\Omega_0{+}x_1){-}x_2$'
  - equation (6.154) should read '$x_1{+}\Omega_0$'
- page 263:
  - caption of Figure 6.6 should read '$= \mathbf{2}\kappa_0 = 1$.'
  - Figure 6.6, labels $\tilde{\theta}$ should be replaced by $\hat{\theta}$
- page 264, Figure 6.7, labels $\tilde{\theta}$ should be replaced by $\hat{\theta}$
- page 264, 3rd line, and page 265, 1st line, 'the the' should be replaced by 'the'
- page 279, equation (6.245), $\dot{\tilde{\vartheta}}$ should be replaced by $\dot{\hat{\vartheta}}$
- page 280, equation (6.249), $\hat{\theta}$ should be replaced by $\hat{\vartheta}$
- page 290:
  - equation (7.22) should read

$$V_2(x,z,\tilde{\xi}) \;=\; V_1(x,\tilde{\xi}) + \frac{1}{2}z^2 + \frac{1}{2d_2k}\tilde{\xi}^2 \;=\; \frac{1}{2}\left[x^2 + z^2 + \left(\frac{1}{d_1k} + \frac{1}{d_2k}\right)\tilde{\xi}^2\right].$$

  - the first and second lines of equation (7.25) should read

$$\begin{aligned} \dot{V}_2 &\le -x^2 - cz^2 - \frac{3}{4d_1}\tilde{\xi}^2 - d_2z^2\left(\frac{\partial\alpha_1}{\partial x}x^2\right)^2 - z\frac{\partial\alpha_1}{\partial x}x^2\tilde{\boldsymbol{\xi}} - \frac{1}{d_2}\tilde{\xi}^2 \\ &= -x^2 - cz^2 - \frac{3}{4d_1}\tilde{\xi}^2 - d_2\left(z\frac{\partial\alpha_1}{\partial x}x^2 + \frac{1}{2d_2}\tilde{\xi}\right)^2 - \frac{3}{4d_2}\tilde{\xi}^2 \end{aligned}$$

- page 311, equation (7.131) should read

$$\dot{z}_1 \;=\; -c_1z_1 - d_1z_1 + \varepsilon_2 + b_mz_2 + b_m(\bar{\theta}_0 - \vartheta_1)^{\mathbf{T}}\omega_1 \mathbf{-}\, b_m\left(\frac{1}{b_m} - \vartheta_{1,1}\right)\dot{y}_{\mathrm{r}}\,.$$

- page 315, 1st line after (7.152) should read 'Hence, the design procedure of Theorem 7.**6**'
- page 429, 2nd line of equation (10.87) should read

$$+\tilde{\theta}^{\mathrm{T}}\left(\tau_{i-1} - \frac{\partial\alpha_{i-1}}{\partial y}\omega z_i - \Gamma^{-1}\dot{\hat{\theta}}\right) + \left(\sum_{k=2}^{i-1} z_k\frac{\partial\alpha_{k-1}}{\partial\hat{\theta}}\right)\left(\Gamma\tau_{i-1} - \dot{\hat{\theta}}\right)$$

- page 430, equation (10.90):
  - 1st line should read

$$\dot{V}_i \le -\sum_{k=1}^{i-1} c_kz_k^2 + z_iz_{i+1} + \tilde{\theta}^{\mathrm{T}}\left(\tau_i - \Gamma^{-1}\dot{\hat{\theta}}\right)$$

  - 5th line should read

$$\le -\sum_{k=1}^{i-1} c_kz_k^2 + z_iz_{i+1} + \tilde{\theta}^{\mathrm{T}}\left(\tau_i - \Gamma^{-1}\dot{\hat{\theta}}\right) + \left(\sum_{k=2}^{i-1} z_k\frac{\partial\alpha_{k-1}}{\partial\hat{\theta}}\right)\left(\Gamma\tau_i - \dot{\hat{\theta}}\right)$$

- page 494, last line should read 'immediate by taking a supremum of $\boldsymbol{u}$'
- page 498, the 1st line after Definition B.9 should read 'The following theorem,'
- page 499, the 1st line after (B.41) should read '$\mu(t) \equiv \mathbf{1}$'