# Errata

## Chapter 2

• Page 9. Equation after Eq. (2.8). The *a* before the integral should be deleted. Th

The 
$$a$$
 before the integral should be deleted. The equation should read as:

$$\mathcal{L}[e^{-at}] = \int_0^\infty e^{-at} e^{-st} \, \mathrm{d}t = \dots$$
 rest of equation is fine

• Page 14. Equation after Eq. (2.20) and just before the Impulse function section. A minus sign is missing in the last term  $e^{-sT}$ . The equation should read as:

$$\mathcal{L}[f(t)] = \dots = \frac{1}{Ts}(1 - e^{-sT}).$$

• Page 30. Mid-page. In calculating  $\tau_2$ , 00.2 should be 0.02.

$$\tau_2 = \frac{3}{0.02} = 150 \mathrm{s}$$

- Page 36. Example 2.12, the (4th) steady-state equation. Second term  $\beta y_s$  should be  $\beta y_s^2$ .
- Page 40. Top.  $\omega_2$  in Fig. E2.16(a) should be  $\omega^2$  as in Fig. E2.16(b).
- Page 41. Mid-page. Problem 13. Should be deriving Eqs. (2.33) and (2.34), not (3.33) and (3.34).
- Page 48. Eq. (3.17) at the bottom. The second transfer function should be Y/X, not X/X.

$$\frac{Y(s)}{X(s)} = \frac{K\omega_n^2}{s^2 + 2\zeta\omega s + \omega_n^2}$$

#### Chapter 4

 Page 74. Comment of MATLAB statement in the top half. Missing a minus sign on "-4" in commenting the result of "a." Should read as a=[a11 a12; a21 a22]; % [-5 0; 2 -4]

## Chapter 5

• Page 83. First paragraph. Should be "proportional-integral-derivative," not "integra."

#### Chapter 6

• Page 109. Bottom, footnote no.1. First line is an incomplete sentence. Footnote should be rewritten as "If we assume that an oscillatory system response can be fitted to a second-order underdamped function, we can calculate with Eq. (3.29) that with a DR of 0.25, the damping ratio  $\zeta$  is 0.215, and..."

- Page 113. Table of controller settings at the top. The integratal time constant for ITAE should be 5.2 (not 3.1).
- Page 122. Mid-page, Example 6.5 Delete "an" from the end of the statement. Should read as "Repeat the derivation... with a first-order process with dead time using IMC."
- Page 127. First paragraph, second from the last line. The ITAE result is approximately 1.7% overshoot (not 14%). Should read as "The ITAE setting, with 1.7% OS, is more conservative."

### Chapter 7

 Page 141. Third MATLAB statement (Part e) near the top. Missing parts. Should be rlocus(zpk([],[-1 -2 -3],1)).

#### Chapter 8

- Page 152. Title of Subsection 8.2.1. Missing "absolute" sign on the magnitude of  $G(j\omega)$ . Should read as "Magnitude and Phase Plots:  $\log |G(j\omega)|$  versus  $\log \omega \dots$ "
- Page 153. Title of Subsection 8.2.3. Missing "absolute" sign on the magnitude of  $G(j\omega)$ . Should read as "Magnitude versus Phase Plots:  $\log |G(j\omega)|$  versus  $\angle G(j\omega)$ "
- Page 158. Mid-page of Example 8.6. Missing minus sign in the phase angle of the first order lag. The second half should read as

$$\angle G(j\omega) = \tan^{-1}(-\omega\tau_p) - \omega t_d.$$

The first half on the magnitude is correct.

• Page 173. The last two equations at the bottom. Wrong values. The ultimate frequency  $\omega_{cg}$  "1.12" should be "1.22." There should also be spacing between the numerical values and the units. So the second to last equation is

$$1 = \frac{5}{\sqrt{1 + 4^2 \omega_{cg}^2}} \quad \text{or } \omega_{cg} = 1.22 \text{ s}^{-1}$$

and the last equation is

$$-180^{\circ} = \tan^{-1}(-4 \times 1.22) - t_d(1.22)(180/\pi)$$
 or  $t_d = 1.45$  s

- Page 174. Equation mid-page in Part (c).
  - Minor order change. The order of stating 0.8 and 0.6 should be switched to be consistent with how the transfer functions are defined (even though it makes no difference in the numerical calculation). The equations should read as

$$1 + K_c \left(\frac{0.6}{0.2s+1}\right) \left(\frac{0.8}{4s+1}\right) 2.6 e^{-0.725s} = 0$$

• Page 175. MATLAB statement for PID controller mid-page. There is an extra taud term. The statement should read as gc=tf([taui\*taud taui 1],[taui 0]); %ideal PID without

## Chapter 10

• Page 221. Revised Figure E10.6. Should appear as:



The dead times for  $G_{11}$  and  $G_{12}$  in Example 10.6 are 3 and 1 [time units]. But the original figure in the text was generated with these two values reversed. This example was also missing from the Web Support page for Chapter 10 examples. This page has been corrected to include this example and the Simulink files.

## **Problems Part II**

• Page 287. Figure PII.35 at the bottom. The proportional controller block should be  $K_c$ , not  $K_p$ .