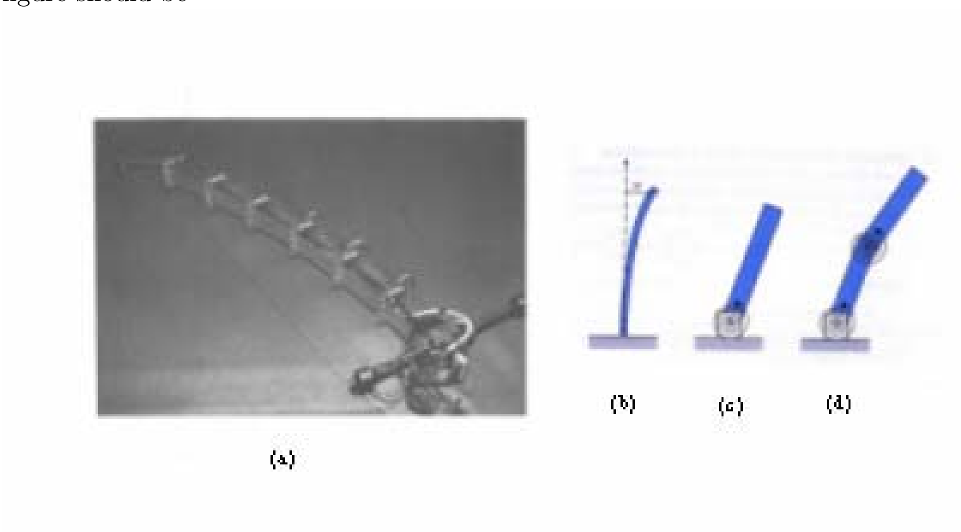
Known Errors in the 4th Edition of Feedback Control of Dynamic Systems

Franklin, Powell and Emami-Naeini

Date	Page		Corrections
3/4/02	40	Fig.2.17,	Parts b, c and d are missing. The correct figure should be



8/15/02	91	Problem 2.30	part (c) $z_1 = 10^6 y_1$ and $z_2 = 10^6 y_2$, and part (d)

$$\begin{aligned}\dot{\mathbf{x}} &= \mathbf{F}\mathbf{x} + \mathbf{G}v, \\ y &= \mathbf{H}\mathbf{x} + Jv\end{aligned}$$

3/1/02	251	Fig.4.35	Curves for T = 0.035 are missing. see m file for corrections
3/1/02	257	Fig.4.41	change ‘problem’ to ‘Problem’ in the caption.
3/1/02	285	Fig. 5.8	The dot for the $-j\omega$ crossing is off. See m file
3/1/02	294	footnote12	add ‘See Problem 5.13’.

3/1/02 303 Eq.5.86 In second line, replace $\tan^{-1}(\frac{6.6}{12})$ with $\tan^{-1}(\frac{6.6}{12}))$ [add right parenthesis]

3/1/02 355 Problem 5.37 line 1. Replace 'shown Fig. 5.76' with 'shown in Fig.5.76' [insert 'in']

3/1/02 355 Problem 5.37 lines 2 and 3. Replace k_m with K_t.

3/1/02 355 Problem 5.37 lines 2 and 3. Replace k_m with K_t.

8/15/02 381 Fig. 6.9(b) Replace $(s/0.5+1)^{-1}$ by $(s/0.5+1)$.

3/4/02 695 Problem 8.2 where $y(0)=0$, for $k<0$. (not $k>0$)

3/4/02 697 Problem 8.13(a) The system equations have errors in the $\mathbf{F}$ and $\mathbf{G}$ matrices. They should be:

$$\begin{bmatrix} x_1(k+1) \\ x_2(k+1) \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ T & 1 \end{bmatrix} \begin{bmatrix} x_1(k) \\ x_2(k) \end{bmatrix} + \begin{bmatrix} T \\ T^2/2 \end{bmatrix} u(k).$$

$$y(k) = [0 \quad 1][x_1(k) \; x_2(k)]^T.$$

2/21/02 Proof of Final Value Theorem is missing from Appendix A. It is provided below.

1 Proof of the Final Value Theorem

If all poles of $sY(s)$ are in the left half of the s-plane, then

The Final Value Theorem

$$\lim_{t\to\infty} y(t) = \lim_{s\to 0} sY(s). \tag{3.35}$$

Proof: We may prove this result as follows. The derivative relationship developed in Eq. (3.22) is

$$\mathcal{L}\left\{\frac{dy}{dt}\right\} = sY(s) - y(0^-) = \int_{0^-}^{\infty} e^{-st}\frac{dy}{dt}dt.$$

We assume we are interested in the case where $s \to 0$. Then

$$\lim_{s\to 0}[sY(s) - y(0)] = \lim_{s\to 0}\left(\int_0^{\infty} e^{-st}\frac{dy}{dt}dt\right) = \lim_{t\to\infty}[y(t) - y(0)]$$

and we have,

$$\lim_{t\to\infty} y(t) = \lim_{s\to 0} sY(s).$$

Another way to see this same result is to note the partial-fraction expansion of $Y(s)$ (Eq. 3.32):

$$Y(s) = \frac{C_1}{s-p_1} + \frac{C_2}{s-p_2} + \cdots + \frac{C_n}{s-p_n}.$$

Let us say that $p_1 = 0$ and all other p_i are in the left half-plane so that C_1 is the steady-state value of $y(t)$. Using Eq. (3.34) we see that

$$C_1 = \lim_{t \to \infty} y(t) = sY(s)|_{s=0},$$

which is the same result as above.

8/15/02 815 Example A.3 $F(s) = \frac{A\omega}{s^2+\omega^2}$