Design, Analysis and Research Corporation (DARcorporation)

ERRATA: Airplane Flight Dynamics and Automatic Flight Controls Part I

Year of Print, 1998
(Errata Revised August 4, 2022)

Please check the website www.darcorp.com for updated errata

page iii, line 3	Topic 3.2.17 Review of Important Sign Conventions should be removed		
page x, line 4	The second word 'control' in the description of the c_{l_δ} should be deleted		
page xxii – xxviii	Add the following symbols and descriptions		
	Symbol	Description	Unit
page xxii	X, Y, Z	Body-fixed (rotating) axis system	--
page xxii	X', Y', Z'	Earth-fixed (non-rotating) axis system	--
page xxvi	1, 2, 3	Eular rotation sequence (the use of the symbol "1" to denote the first Euler rotation is used only in Chapter 1)	
page xxvii	P	Origin of the XYZ system	
page xxv, Line 6	μ_g should be dimensionless.		
page 7, Line 14	Should read 'The transformation formula … of both equations (1.11) and (1.12). First, for the l.h.s. of Eqn (1.11):'		
page 14, Line 33	'$\Theta = 90)$' should be '$\Theta = 90$'		
page 17, Figure 1.7	The aircraft of the lowest figure should be seen from behind, i.e. a positive bank angle should have right wing down.		
page 26, Equation (1.62)	'$\vec{\omega} = k\dot{\Theta}$' should be '$\vec{\omega} = j_2\dot{\Theta}$'		
page 28, Line 9	'un' should be 'in'		

page 34, Line 25	Should read 'Roskam, J.; Airplane Design, Parts I through VIII; Design, Analysis, and Research Corporation, 1440 Wakarusa Drive Suite #500, Lawrence, KS 66049, USA; 1990'
page 40, Line 26	Should read '… apply to cambered (un-symmetrical) airfoils.'
page 47, Line 11	'In variant' should be 'invariant'
page 51, Line 20	'top' should be 'to'
page 55, Equation (2.27)	Should read: $\left(\frac{d\varepsilon}{d\alpha}\right)_M = \frac{\left(\frac{d\varepsilon}{d\alpha}\right)_{M=0}}{\sqrt{\left(1-M^2\right)}}$
page 59, Figure 2.20	Flap Chord, c_f, should go from hinge line to trailing edge
page 63, Line 8	'b)' should be 'c)'
page 63, Line 12	'two families' should be 'three families'
page 64, Line 2	'two families' should be 'three families'
page 66, Figure 3.2	β should be β_1 in Note 3
page 67, Line 1	'loose' should be 'lose'
page 72, Equation (3.5)	C_{D_0} is the value of C_D for: $\alpha = i_h = \delta_e = 0$
page 77, Equation (3.12)	C_{L_0} is the value of C_L for: $\alpha = i_h = \delta_e = 0$
page 80, Equation (3.29)	C_{m_0} is the value of C_m for: $\alpha = i_h = \delta_e = 0$
page 84, Equation (3.30)	Should read:

$$M_A = M_{ac_{wf}} + L_{wf}\left(x_{cg} - x_{ac_{wf}}\right)\cos(\alpha) - L_h\left(x_{ac_h} - x_{cg}\right)\cos(\alpha - \varepsilon)$$

page 84, Equation (3.32)	Should read:

$$C_m = C_{m_{ac_{wf}}} + \left(C_{L_{0_{wf}}} + C_{L_{\alpha_{wf}}} \alpha \right)\left(\bar{x}_{cg} - \bar{x}_{ac_{wf}} \right)$$
$$- C_{L_{\alpha_h}} \eta_h \frac{S_h}{S}\left(\bar{x}_{ac_h} - \bar{x}_{cg} \right)\left[\alpha - \left(\varepsilon_o + \frac{d\varepsilon}{d\alpha}\alpha \right) + i_h + \tau_e \delta_e \right]$$

page 84, Equation (3.34)	Should read: $C_{m_0} = C_{m_{ac_{wf}}} + C_{L_{0_{wf}}} \left(\bar{x}_{cg} - \bar{x}_{ac_{wf}} \right) + C_{L_{\alpha_h}} \eta_h \frac{S_h}{S}\left(\bar{x}_{ac_h} - \bar{x}_{cg} \right)\varepsilon_0 \approx$ $\approx C_{m_{ac_{wf}}} + C_{L_{0_{wf}}} \left(\bar{x}_{cg} - \bar{x}_{ac_{wf}} \right) \textit{if } \varepsilon_0 \textit{ is negligible}$
page 84, Line 27	'Eqn (3.33)' should be 'Eqn (3.32)'
page 85, Line 19	'as well a positive' should be 'as well as positive'
page 95, Line 26	Should read '… shed vortices (at high angles of attack) which…'
page 97, Figure 3.28	Normal velocity vector on left wing should not be present
page 98, Line 11	'three-vies' should be 'three-views'
page 99, Figure 3.30	Axis labeled as 'Z' should be labeled as 'X'
page 104, Line 1	'loose' should be 'lose'
page 104, Line 30	'right wheel deflection are activated' should be 'right wheel deflection) are activated'
page 106, Equation (3.67)	K_{SW} needs to be defined: is the gearing constant between cockpit control wheel or stick and aileron or spoiler deflection
page 108, Figure 3.38	The subscripts "v" should be taken out from the two variables $F_{a_{y_{rudder}}}$ and $N_{A_{rudder}}$
page 108, Equation (3.71)	Should read: $C_{l_{\delta_r}} = C_{L_{\alpha_v}} \alpha_{\delta_r} \eta_v \frac{S_v z_{v_s}}{Sb}$
page 109, Equation (3.72)	Should read: $L_{A_{1_s}} = L_A = \left(C_{l_\beta}\beta + C_{l_{\delta_a}} \delta_a + C_{l_{\delta_r}} \delta_r \right)\bar{q}Sb$

page 111, Equation (3.76)

Should read: $F_{A_{y_v}} = C_{y_{\beta_v}} \beta \bar{q} S = -C_{L_{\alpha_v}} \left(1 - \frac{d\sigma}{d\beta}\right) \beta \bar{q}_v S_v$

page 113, Equation (3.78)

The subscripts "v" should be taken out from the variables $F_{a_{y_{rudder}}}$

page 113, Equation (3.80)

Should read:

$$F_{A_{y_{1_s}}} = F_{A_y} = \left(C_{y_\beta} \beta + C_{y_{\delta_a}} \delta_a + C_{y_{\delta_r}} \delta_r\right) \bar{q} S$$

page 115, Line 14

Should read 'The yawing moment due to the vertical tail may be written as:'

page 117, Line 9

After Line 9, should read 'Methods for computing the yawing moment due to aileron control derivative are found in Part VI of Reference 3.1.'

page 117, Line 18-19

Lines 18-19 should read 'Methods for computing the yawing moment due to spoiler control derivative are found in Part VI of Reference 3.1.'

page 118, Figure 3.46

'Positive rolling moment' should be 'Positive yawing moment'

page 118, Figure 3.46, Note 1

'induces drag' should be 'induced drag'

page 121, Equation (3.91)

Should read:

$$N_{A_{1_s}} = N_A = \left(C_{n_\beta} \beta + C_{n_{\delta_a}} \delta_a + C_{n_{\delta_r}} \delta_r\right) \bar{q} S b$$

page 122, Equation (3.92a)

Should read:

$$L_{T_{1_s}} = L_T = \left[\sum_{i=1}^{i=n} T_i \left(-z_{T_i} \cos\phi_{T_i} \sin\psi_{T_i} - y_{T_i} \sin\phi_{T_i}\right)\right] \cos\alpha_1 +$$
$$+ \left[\sum_{i=1}^{i=n} T_i \left(-x_{T_i} \cos\phi_{T_i} \sin\psi_{T_i} - y_{T_i} \cos\phi_{T_i} \cos\psi_{T_i}\right)\right] \sin\alpha_1$$

page 122, Equation (3.92b)

Should read:

$$F_{T_{y_1}} = F_{T_y} = \sum_{i=1}^{i=n} T_i \left(\cos\phi_{T_i} \sin\psi_{T_i}\right)$$

page 122, Equation (3.92c) Should read:

$$N_{T_{1_s}} = N_T = \left[\sum_{i=1}^{i=n} T_i \left(-x_{T_i} \cos\phi_{T_i} \sin\psi_{T_i} - y_{T_i} \cos\phi_{T_i} \sin\psi_{T_i} \right) \right] \cos\alpha_1 +$$
$$- \left[\sum_{i=1}^{i=n} T_i \left(-z_{T_i} \cos\phi_{T_i} \sin\psi_{T_i} - y_{T_i} \sin\phi_{T_i} \right) \right] \sin\alpha_1$$

page 124, Equation (3.95b) The summation should say $i = 1$

page 126, Table 3.4 'V_1' should be 'Q_1'

page 127, Line 4 Should read '2) partial derivatives in Table 3.4 indicate the slope by which a particular perturbed force or moment is affected by a particular perturbed variable.'

page 133, Figure 3.51 'V_{P_1}' should be 'V_p' in all cases

page 134, Figure 3.52 '$\arctan \left.\frac{\partial C_D}{\partial M}\right|_{M=M_2} > 0$' should be '$\arctan \left.\frac{\partial C_D}{\partial M}\right|_{M=M_2} < 0$'

page 134, Figure 3.52 Caption should read 'Example of Determination of: $\partial C_D / \partial M$ at a constant angle of attack'

page 136, Equation (3.119) Should read: $C_{L_u} = \frac{M_1^2}{\left(1 - M_1^2\right)} C_{L_1}$

page 136, Equation (3.122) Should read: $\frac{\partial M_A}{\partial \left(\frac{u}{U_1} \right)} = \left(C_{m_u} + 2C_{m_1} \right) \bar{q}_1 S \bar{c}$

page 137, Line 24 Should read '... are affected by changes in angle of attack, α: ...'

page 139, Equation (3.133) Should read: $\frac{\partial F_{A_z}}{\partial \alpha} = -\left(C_{L_\alpha} + C_{D_1} \right) \bar{q}_1 S$

page 141, Equation (3.142) 'airplane, caused by' should be 'airplane ΔC_L, caused by'

page 143, Line 5	Should read '... multiplying by the non-dimensional moment ...'
page 145, Equation (3.156)	Should read: $\dfrac{\partial M_A}{\partial\left(\dfrac{q\bar{c}}{2U_1}\right)} = \dfrac{\partial C_m}{\partial\left(\dfrac{q\bar{c}}{2U_1}\right)}\bar{q}_1 S\bar{c} = C_{m_q}\bar{q}_1 S\bar{c}$
page 147, Equation (3.162)	Replace the variable C_{L_1} in (2,1) entry to C_{D_1}
page 147, Equation (3.162)	'$\dfrac{\alpha\bar{c}}{2U_1}$' should be '$\dfrac{\dot{\alpha}\bar{c}}{2U_1}$'
page 148, Equation (3.163a)	Should read: $F_{A_y} = C_y\bar{q}S$
page 148, Equation (3.163b)	Should read: $L_A = C_l\bar{q}Sb$
page 148, Equation (3.163c)	Should read: $N_A = C_n\bar{q}Sb$
page 148, Line 27	'changes in sideslip, β' should be 'changes in sideslip rate, $\dot{\beta}$'
page 148, Line 28	'sideslip angle, β' should be 'sideslip rate, $\dot{\beta}$'
page 162, Equation (3.197)	'Cn_p' should be 'C_{n_p}'
page 162, Equation (3.197)	'Cn_r' should be 'C_{n_r}'
page 167, Equation (3.214)	Should read: $F_{T_x} = \dfrac{n_p 550\eta_p BHP}{U_1 + u}$
page 173, Line 7	Should read '… normally sufficiently small that they can be neglected…'
page 182, Line 2	Should read 'Roskam, J.; Airplane Design, Parts I through VIII; Design, Analysis, and Research Corporation, 1440 Wakarusa Drive, Lawrence, KS 66049, USA; 1990'
page 182, Line 16	Should read 'Lan, C.E. and Roskam, J.; Airplane Aerodynamics and Performance; Design, Analysis, and Research Corporation, 1440 Wakarusa Drive, Lawrence,

KS 66049, USA; 1990'

page 186, Equation (4.3)	Should read: $\left(C_{T_{x_u}} - C_{D_u}\right) + 2\left(C_{T_{x_1}} - C_{D_1}\right) < 0$
page 187, Table 4.1	Entry (5,5), '$\dfrac{\partial\left(M_A + M_T\right)}{\partial\alpha} > 0$' should be '$\dfrac{\partial\left(M_A + M_T\right)}{\partial\alpha} < 0$'
page 189, Equation (4.7)	Should read: $F_{A_y} + F_{T_y} = \left(C_y + C_{T_y}\right)\bar{q}S$
page 189, Line 13	'(4.1)' should be '(4.6)'
page 190, Line 6	'criterion (4.1)' should be 'criterion (4.10)'
page 190, Line 11	'$C_{Z_{T_\alpha}} \ll C_{L_\alpha}$' should be '$C_{T_{z_\alpha}} \ll C_{L_\alpha}$'
page 195, Equation (4.36)	Should read: $\left(C_{m_u} + C_{m_{T_u}}\right) + 2\left(C_{m_1} + C_{m_{T_1}}\right) > 0$
page 195, Line 6	'Table 5.1' should be 'Table 4.1'
page 196, Line 2	'Table 5.1' should be 'Table 4.1'
page 197, Equation (4.42b)	Should read: $-mg\sin\phi_1\cos\gamma_1 = \left(C_{y_\beta}\beta_1 + C_{y_{\delta_a}}\delta_{a_1} + C_{y_{\delta_r}}\delta_{r_1}\right)\bar{q}_1 S + F_{T_{y_1}}$
page 198, Line 1	'(4.22)' should be '(4.42)'
page 199, Line 9	Should read 'Where: $C_{L_1} \approx \dfrac{mg}{\bar{q}_1 S}$. Note that $\cos\gamma_1 \approx 1.0$, which…'
page 202, Line 6	'$C_{L_1} = \dfrac{mg}{\bar{q}_1 S}$' should be '$C_{L_1} \approx \dfrac{mg}{\bar{q}_1 S}$'
page 206, Line 28	'in Example 1.' should be 'in Example 1).'
page 209, Figure 4.11b	The negative tail stall locus as shown in the diagram is wrong. The trim diagram should have a positive tail stall locus at $\alpha = 25°$ and a negative tail stall locus at $\alpha = -12°$.

	Both of these lines are out of the range of the diagram so none of them should be shown.
page 211, Line 11	The corresponding values for $\alpha_{tail-stall}$ should be –12° and 25°, respectively.
page 211, Line 11	The sentence that reads, 'Figure 4.11b shows only the negative tail stall locus because the positive locus is outside of the diagram' should be removed
page 211, Line 11	'degespectively' should be 'deg respectively'
page 216, Line 15	'Appendix A..' should be 'Appendix A.'
page 216, Equation (4.71a)	Should read: $-mg\sin\phi_1\cos\gamma_1 = \left(C_{y_\beta}\beta_1 + C_{y_{\delta_a}}\delta_{a_1} + C_{y_{\delta_r}}\delta_{r_1}\right)\bar{q}_1 S + F_{T_{y_1}}$
page 218, Line 13	'$F_{S_{TO}}$' should be '$V_{S_{TO}}$'
page 218, Equation (4.73)	'$F_{y_{T_1}}$' should be '$F_{T_{y_1}}$'
page 219, Equation (4.74)	'$F_{y_{T_1}}$' should be '$F_{T_{y_1}}$'
page 219, Equation (4.75)	'$F_{y_{T_1}}$' should be '$F_{T_{y_1}}$'
page 219, Equation (4.76)	'$F_{y_{T_1}}$' should be '$F_{T_{y_1}}$'
page 220, Equation (4.81)	Should read: $V_{mc} = \sqrt{\dfrac{-2\left(N_{T_1} + \Delta N_{D_1}\right)}{\rho C_{n_{\delta_r}}\delta_{r_{\max}} Sb}}$
page 221, Figure 4.16a	The lateral axis should be the Y-axis.
page 221, Figure 4.16a	Should read 'ϕ as shown is negative'
page 225, Equation (4.86b)	Should read:

$$mU_1R_1 - mg\sin\phi_1 = \left(C_{y_\beta}\beta_1 + C_{y_r}\frac{R_1 b}{2U_1} + C_{y_{\delta_a}}\delta_{a_1} + C_{y_{\delta_r}}\delta_{r_1}\right)\bar{q}_1 S$$

page 225, Line 20	'three of these' should be 'four of these'

page 226, Equation (4.90)	Should read: $\dot{\psi}_1 = \dfrac{g \tan \phi_1}{U_1}$
page 226, Line 18	Should read 'By combining Eqns (4.85b) and (4.85c) with…'
page 227, Equation (4.96)	Should read: $0 = \left(C_{y_\beta} \beta_1 + C_{y_r} \dfrac{R_1 b}{2U_1} + C_{y_{\delta_a}} \delta_{a_1} + C_{y_{\delta_r}} \delta_{r_1} \right) \bar{q}_1 S$
page 227, Equation (4.97)	'ϕ' should be 'ϕ_1'
page 227, Equation (4.103b)	'ϕ' should be 'ϕ_1'
page 227, Equation (4.103c)	'ϕ' should be 'ϕ_1'
page 227, Line 6	The first sentence should be removed.
page 228, Equation (4.98)	Variables a_{11}, b_{11} *and* c_{11} should be a, b and c
page 228, Equation (4.99)	Variables a_{11}, b_{11} *and* c_{11} should be a, b, and c
page 228, Equation (4.100)	Variables a_{11}, b_{11} *and* c_{11} should be a, b, and c
page 228, Equation (4.100)	'δ_{a_1}' should be 'δ_{r_1}'
page 228, Equation (4.102a)	'ϕ' should be 'ϕ_1'
page 228, Equation (4.102b)	'ϕ' should be 'ϕ_1'
page 228, Equation (4.102c)	'ϕ' should be 'ϕ_1'
page 228, Equation (4.102a)	'a_{11}' should be 'a'
page 228, Equation (4.102b)	'b_{11}' should be 'b'
page 228, Equation (4.102c)	'c_{11}' should be 'c'
page 232, Equation (4.113b)	'γ_1' should be 'Θ_1'

page 232, Equation (4.114a) ‘ γ_1 ’ should be ‘ Θ_1 ’

page 233, Line 12 ‘forward’ should be ‘aft’

page 234, Figure 4.21 Arrow for $M_{ac_{wf}}$ should act on the A.C. of the wing-fuselage not the C.G.

page 235, Line 14 Should read ‘ $\left|M_{ac_{wf}}\right| < L_{wf}\left(x_{cg} - x_{ac_{wf}}\right)$ is satisfied.’

page 235, Line 24 ‘conventional’ should be ‘canard’

page 236, Line 13 Should read ‘ $\left|M_{ac_{wf}}\right| < L_{wf}\left(x_{cg} - x_{ac_{wf}}\right)$ is satisfied.’

page 237, Equation (4.131) Should read:

$$L_c\left(x_{cg} - x_{ac_c}\right) - L_{wf}\left(x_{ac_{wf}} - x_{cg}\right) + M_{ac_{wf}} - L_h\left(x_{ac_h} - x_{cg}\right) = 0$$

page 237, Line 7 ‘in Eqn (4.10)’ should be ‘in Eqn (4.131)’

page 237, Lines 10-11 Should read ‘From Eqn (4.133) it may be concluded that as long as L_h is positive (i.e. ‘up’) and $(x_{ac_{wf}} - x_{cg})$ is positive the canard load to trim, L_c, will also be positive (i.e. ‘up’).’

page 242, Equation (4.136) Should read: $HM = C_h \bar{q}_h S_e \bar{c}_e$

page 244, Line 27 ‘ $\eta_h = \dfrac{\bar{q}}{\bar{q}_h}$ ’ should be ‘ $\eta_h = \dfrac{\bar{q}_h}{\bar{q}}$ ’

page 252, Line 2 Should read ‘... differentiating Eqn (4.148) with respect to the angle of attack.’

page 252, Equation (4.154) Should read:

$$NP_{free} \approx \bar{x}_{ac_{wf}} + \ldots \approx NP_{fix} - \ldots \approx NP_{fix} + \frac{C_{m_{\delta_e}}}{C_{L_\alpha}}\left(1 - \frac{d\varepsilon}{d\alpha}\right)\left[\frac{C_{h_\alpha}}{C_{h_{\delta_e}}}\right]$$

page 253, Equation (4.158) Should read:

$$SM_{fix} - SM_{free} = NP_{fix} - NP_{free} = -\left\{ \frac{C_{m_{\delta_e}}}{C_{L_\alpha}} \left(1 - \frac{d\varepsilon}{d\alpha}\right) \frac{C_{h_\alpha}}{C_{h_{\delta_e}}} \right\}$$

page 253, Line 23	'found by by' should be 'found by'
page 255, Line 20	'from Eqn 4.169)' should be 'from Eqn (4.169)'
page 256, Equation (4.171)	Should read:

$$MP_{free} = \bar{x}_{cg_{\partial Fs/\partial n=0}} = NP_{free} - \left(1 - \frac{C_{h_\alpha}\tau_e}{1.1C_{h_{\delta_e}}}\right)\left(\frac{\rho S\bar{c}g}{4W}\right)C_{m_q}$$

page 256, Line 12	'stick-force-per-'g'' should be 'stick-force'
page 259, Figure 4.36a	'$\delta_e = 2°$' should be '$\delta_{t_e} = 2°$'
page 259, Figure 4.36b	'$\frac{dF_e}{dV}$' should be '$\frac{dF_s}{dV}$'
page 263, Line 2	Should read 'Next, recall the stick-force equation …'
page 267, Line 20	'positive' should be 'negative'
page 267, Line 22	'positive' should be 'negative'
page 267, Line 24	'negative' should be 'positive'
page 268, Line 14	Include in τ_r definition: '$\tau_r = \frac{\partial\beta}{\partial\delta_r}$ and is normally negative'
page 268, Figure 4.43	Note should be: $C_{h_{\beta_v}} > 0$ $C_{h_{\delta_r}} < 0$
page 269, Equation (4.197)	Should read:

$$C_{n_{\beta_v free}} = C_{L_{\alpha_v}}\eta_v \frac{S_v x_{v_s}}{Sb}\left(1 - \frac{C_{h_{\beta_v}}}{C_{h_{\delta_r}}}\left(1 - \frac{\partial\sigma}{\partial\beta}\right)\tau_r\right) - C_{L_{\alpha_v}}\eta_v \frac{S_v x_{v_s}}{Sb}\frac{\partial\sigma}{\partial\beta}$$

page 269, Equation (4.198)	Should read:

$$C_{n_{\beta_{free}}} = C_{n_{\beta_{fix}}} - C_{L_{\alpha_v}} \eta_v \frac{S_v x_{v_s}}{Sb} \frac{C_{h_{\beta_v}}}{C_{h_{\delta_r}}} \left(1 - \frac{\partial \sigma}{\partial \beta}\right) \tau_r$$

page 269, Equation (4.199)	Should read: $C_{n_{\beta_{free}}} = C_{n_{\beta_{fix}}} + C_{n_{\delta_r}} \frac{C_{h_{\beta_v}}}{C_{h_{\delta_r}}} \left(1 - \frac{\partial \sigma}{\partial \beta}\right)$
page 269 Equation (4.203)	Should read: $\frac{\partial F_r}{\partial \beta} = -\frac{G_r \eta_v \bar{q}_1 S_r \bar{c}_r C_{h_{\delta_r}}}{C_{n_{\delta_r}}} C_{n_{\beta_{free}}}$
page 273, Line 4	Should read 'or, with Eqn (4.208) as:'
page 277, Line 13	'$\bar{C}_{D_o}$' should be 'C_{D_o}'
page 278, Line 6	Should read 'HM is the elevator hinge moment as expressed by Eqn (4.136)'
page 278, Line 22	Should read, 'The hingemoment coefficient equation…'
page 278, Line 26	Equation '4.225' should be '4.225a'
page 280, Line 16	'$\frac{\partial \delta_e}{\partial n}$' should be '$\frac{\partial F_s}{\partial n}$'
page 281, Line 20	Should read '… moment and stick-force trim. This represents …'
page 281, Line 22	List is inconsistent with Figure 4.49
page 286, Equation (4.241)	'$C_{h_{\beta_r}}$' should be '$C_{h_{\beta_v}}$'
page 288, Line 3	Should read 'Exceptions to this are airplanes like the B-52.'
page 288, Line 15	Should read '… at the instant of rotation: no load on the nose-gear.'
page 288, Equation (4.245)	Should read: $D_g = C_{D_g} \bar{q}_{rotate} S$
page 288, Line 27	'$C_{D_{ground}}$' should be 'C_{D_g}'

page 290, Equation (4.246) Should read: $L_{wf_g} = C_{L_{wf_g}} \overline{q}_{rotate} S$

page 290, Line 3 ‘ $C_{L_{wf_{ground}}}$ ’ should be ‘ $C_{L_{wf_g}}$ ’

page 290, Equation (4.247) Should read: $L_{h_g} = C_{L_{h_g}} \eta_{h_g} \overline{q}_{rotate} S_h$

page 290, Line 6 ‘ $C_{L_{h_{ground}}}$ ’ should be ‘ $C_{L_{h_g}}$ ’

page 290, Equation (4.248) Should read: $M_{ac_{wf_g}} = C_{m_{ac_{wf_g}}} \overline{q}_{rotate} S\overline{c}$

page 290, Line 18 ‘ $C_{m_{ac_{wf_{ground}}}}$ ’ should be ‘ $C_{m_{ac_{wf_g}}}$ ’

page 291, Line 24 ‘are’ should be ‘area’

page 291, Equation (4.250) ‘ $\ddot{\theta}$ ’ should be ‘ $\ddot{\theta}_{mg}$ ’

page 291, Equation (4.250) ‘ $C_{L_{\max h_{ground}}}$ ’ should be ‘ $C_{L_{\max h_g}}$ ’

page 292, Table 4.10 ‘ $C_{D_{ground}}$ ’ should be ‘ C_{D_g} ’

page 292, Table 4.10 ‘ $C_{L_{wf_{ground}}}$ ’ should be ‘ $C_{L_{wf_g}}$ ’

page 292, Table 4.10 ‘ $C_{L_{\max h_{ground}}}$ ’ should be ‘ $C_{L_{\max h_g}}$ ’

page 292, Table 4.10 ‘ $C_{m_{ac_{wf_{ground}}}}$ ’ should be ‘ $C_{m_{ac_{wf_g}}}$ ’

page 292, Figure 4.52b ‘ $x_{cg_g} = 38\ ft$ ’ should be ‘ $x_{cg_g} = 39\ ft$ ’ and vice versa

page 299, Line 10 ‘Eqn (4.155)’ should be ‘Eqn (4.159)’

page 299, Line 23 Should read ‘…minimum control speed as a function of bank angle.’

page 305, Figure 5.2 ‘ t_1 ’ should be ‘ t_0 ’ in all cases

page 307, Equation (5.1a) Should read:

$$m\dot{u} = -mg\theta\cos\theta_1 + \bar{q}_1 S\left\{-\left(C_{D_u} + 2C_{D_1}\right)\frac{u}{U_1} + \left(C_{T_{x_u}} + 2C_{T_{x_1}}\right)\frac{u}{U_1} + -\left(C_{D_\alpha} - C_{L_1}\right)\alpha - C_{D_{\delta_e}}\delta_e\right\}$$

page 307, Equation (5.1b)

Should read:

$$m\left(\dot{w} - U_1 q\right) = -mg\theta\sin\theta_1 + \bar{q}_1 S\left\{-\left(C_{L_u} + 2C_{L_1}\right)\frac{u}{U_1} - \left(C_{L_\alpha} + C_{D_1}\right)\alpha + -C_{L_{\dot{\alpha}}}\frac{\dot{\alpha}\bar{c}}{2U_1} - C_{L_q}\frac{q\bar{c}}{2U_1} - C_{L_{\delta_e}}\delta_e\right\}$$

page 307, Equation (5.1c)

Should read:

$$I_{yy}\dot{q} = \bar{q}_1 S\bar{c}\left\{\left(C_{m_u} + 2C_{m_1}\right)\frac{u}{U_1} + \left(C_{m_{T_u}} + 2C_{m_{T_1}}\right)\frac{u}{U_1} + C_{m_\alpha}\alpha + C_{m_{T_\alpha}}\alpha + +C_{m_{\dot{\alpha}}}\frac{\dot{\alpha}\bar{c}}{2U_1} + C_{m_q}\frac{q\bar{c}}{2U_1} + C_{m_{\delta_e}}\delta_e\right\}$$

page 314, Figure 5.6 — Solid black line should be removed

page 316, Line 9 — 'the system is zero' should be 'the system are zero'

page 318, Line 5 — Should read 'First, by using the substitution $q = \dot{\theta}$ and $w = U_1\alpha$ …'

page 319, Table 5.1 — '$M_{\dot{\alpha}} = \dfrac{\bar{q}_1 S\bar{c}^2 C_{m_\alpha}}{2I_{yy}U_1}$' should be '$M_{\dot{\alpha}} = \dfrac{\bar{q}_1 S\bar{c}^2 C_{m_{\dot{\alpha}}}}{2I_{yy}U_1}$'

page 322, Equation (5.35)

Equation for B_u should read:

$$B_u = -X_{\delta_e}\left\{\left(U_1 - Z_{\dot{\alpha}}\right)M_q + Z_\alpha + M_{\dot{\alpha}}\left(U_1 + Z_q\right)\right\} + Z_{\delta_e}X_\alpha$$

page 324, Line 16 — Should read 'Response of the airplane to control …'

page 328, Equation (5.48) — Should read: $\dfrac{C_{m_\alpha}}{C_{L_\alpha} + C_{D_1}} < \dfrac{C_{m_u}}{C_{L_u} + 2C_{L_1}}$

page 328, Equation (5.49) — Should read: $\dfrac{C_{m_\alpha}}{C_{L_\alpha}} = \left(\bar{x}_{cg} - \bar{x}_{ac_A}\right) < \dfrac{C_{m_u}}{C_{L_u} + 2C_{L_1}}$

page 332, Equation (5.53) Should read: $s_{1,2} = -\zeta_{1,2}\omega_{n_{1,2}} \pm j\omega_{n_{1,2}}\sqrt{1-\zeta_{1,2}{}^2}$ or

$s_{sp} = -\zeta_{sp}\omega_{n_{sp}} \pm j\omega_{n_{sp}}\sqrt{1-\zeta_{sp}{}^2}$

page 333, Equation (5.54) Should read: $s_{3,4} = -\zeta_{3,4}\omega_{n_{3,4}} \pm j\omega_{n_{3,4}}\sqrt{1-\zeta_{3,4}{}^2}$ or

$s_{ph} = -\zeta_{ph}\omega_{n_{ph}} \pm j\omega_{n_{ph}}\sqrt{1-\zeta_{ph}{}^2}$

page 333, Line 8 Should read '$T_1 = -0.35$ sec and $T_2 = 0.28$ sec'

page 333, Equation (5.56) Should read: $s_{3,4} = -\zeta_{3,4}\omega_{n_{3,4}} \pm j\omega_{n_{3,4}}\sqrt{1-\zeta_{3,4}{}^2}$ or

$s_{3rd} = -\zeta_{3rd}\,\omega_{n_{3rd}} \pm j\omega_{n_{3rd}}\sqrt{1-\zeta_{3rd}{}^2}$

page 338, Equation (5.69) Should read: $\dfrac{\theta(s)}{\delta_e(s)} = -\dfrac{\left(Z_{\delta_e}s - X_u Z_{\delta_e} + X_{\delta_e}Z_u\right)}{U_1\left(s^2 - X_u s - \dfrac{gZ_u}{U_1}\right)}$

page 340, Line 3 'ration' should be 'ratio'

page 340, Equation (5.76) Should read: $\lim_{t\to\infty} u(t) = \lim_{s\to 0}\left\{s\dfrac{\delta_e}{s}\dfrac{N_u}{\bar{D}_1}\right\} = \ldots$

page 340, Equation (5.77) Should read: $\lim_{t\to\infty} \alpha(t) = \lim_{s\to 0}\left\{s\dfrac{\delta_e}{s}\dfrac{N_\alpha}{\bar{D}_1}\right\} = \ldots$

page 340, Equation (5.78) Should read: $\lim_{t\to\infty} \theta(t) = \lim_{s\to 0}\left\{s\dfrac{\delta_e}{s}\dfrac{N_\theta}{\bar{D}_1}\right\} = \ldots$

page 342, Equation (5.82a) '$\dfrac{2\zeta_p s}{\omega_{n_{sp}}}$' should be '$\dfrac{2\zeta_p s}{\omega_{n_p}}$'

page 342, Equation (5.82b) '$\dfrac{2\zeta_p s}{\omega_{n_{sp}}}$' should be '$\dfrac{2\zeta_p s}{\omega_{n_p}}$'

page 342, Equation (5.82b)	'$\frac{2\zeta_\alpha}{\omega_{n_\alpha}}$' should be '$\frac{2\zeta_\alpha s}{\omega_{n_\alpha}}$'
page 342, Equation (5.82c)	'$\frac{2\zeta_p s}{\omega_{n_{sp}}}$' should be '$\frac{2\zeta_p s}{\omega_{n_p}}$'
page 346, Equation (5.94)	In the (3,3) element of the transformation matrix, '$\cos^2 \alpha_1$' should be '$\cos 2\alpha_1$'
page 350, Line 6	'$\phi(s)/\delta_e(s)$' should be '$\phi(s)/\delta(s)$'
page 357, Line 2	'(pitching moment of inertia)' should be '(lat.-dir. inertias)'
page 364, Line 28	'Eqn (5.120)' should be 'Eqn (5.121)'
page 371, Equation (5.136)	Should read: $\lim_{t\to\infty} \beta(t) = \lim_{s\to 0} \left\{ s \frac{\delta_a}{s} \frac{N_\beta}{\bar{D}_2} \right\} = \ldots$
page 371, Equation (5.137)	Should read: $\lim_{t\to\infty} \phi(t) = \lim_{s\to 0} \left\{ s \frac{\delta_a}{s} \frac{N_\phi}{\bar{D}_2} \right\} = \ldots$
page 371, Equation (5.138)	Should read: $\lim_{t\to\infty} \psi(t) = \lim_{s\to 0} \left\{ s \frac{\delta_a}{s} \frac{N_\psi}{\bar{D}_2} \right\} = \ldots$
page 372, Line 35	'$\psi(\tau)$' should be '$\psi(t)$'
page 381, Figure 5.24	'-1/T' should be '1/T' on vertical axis
page 381, Figure 5.25	'-1/T' should be '1/T' on vertical axis
page 382, Figure 5.26	'-1/T' should be '1/T' on vertical axis
page 382, Figure 5.27	'-1/T' should be '1/T' on vertical axis
page 383	Remove the two lines before *Section 5.4.3*
page 384, Figure 5.28	'-1/T' should be '1/T' on vertical axis
page 384, Figure 5.29	'-1/T' should be '1/T' on vertical axis

page 385, Figure 5.30	'-1/T' should be '1/T' on vertical axis
page 385, Figure 5.31	'-1/T' should be '1/T' on vertical axis
page 387, Figure 5.32	'-1/T' should be '1/T' on vertical axis
page 387, Figure 5.33	'-1/T' should be '1/T' on vertical axis
page 388, Figure 5.34	'-1/T' should be '1/T' on vertical axis
page 388, Figure 5.35	'-1/T' should be '1/T' on vertical axis
page 390, Figure 5.36	'-1/T' should be '1/T' on vertical axis
page 390, Figure 5.37	'-1/T' should be '1/T' on vertical axis
page 392, Figure 5.38a	'-1/T' should be '1/T' on vertical axis
page 392, Figure 5.38b	'-1/T' should be '1/T' on vertical axis
page 393, Figure 5.39	'-1/T' should be '1/T' on vertical axis
page 393, Figure 5.40	'-1/T' should be '1/T' on vertical axis
page 394, Figure 5.41	'-1/T' should be '1/T' on vertical axis
page 394, Figure 5.42	'-1/T' should be '1/T' on vertical axis
page 396, Line 25	Should read '… say 10 deg/deg/sec, a 3 deg/s pitch rate …'
page 398, Line 2	'elevator deflection' should be 'rudder deflection'
page 401, Figure 5.44	On the Y_B vector, the smaller vector should be labeled 'q'
page 405, Lines 24-28	Remove paragraph contained by lines 24-28
page 407, Line 14	'$\cos\theta = 0$' should be '$\cos\theta = 1$'
page 411, Line 7	Should read 'How well do these results agree with your conclusions from problem 5.12?'
page 418, Table 6.1	'Douglas B-60' should be 'Douglas B-66'
page 424, Table 6.4	The Civilian Requirements FAR-23 are updated to the following:

For wheel controllers:

$$\frac{\partial F_s}{\partial n} > \frac{\left(W_{TO}/100\right)}{n_{\text{limit}}-1} \text{ and } \frac{20.0}{n_{\text{limit}}-1}$$

but not more than: $\dfrac{50.0}{n_{\text{limit}}-1}$

For stick controllers:

$$\frac{\partial F_s}{\partial n} > \frac{W_{TO}}{140} \text{ and } \frac{15.0}{n_{\text{limit}}-1}$$

but not more than: $\dfrac{35.0}{n_{\text{limit}}-1}$

page 427, Line 6 — Remove the return so "be" and "written" are on the same line.

page 427, Line 7 — 'time to double' should be 'time-to-double'

page 434, Line 12 — 'Reference 6.5' should be 'Reference 6.6'

page 446, Table 6.20 — Column 2 for Bank Angle in 1.1 sec should be 97

page 453, Table 6.22 — Cell (1,5) should read 'Number on Root Locus of Figure 6.16'

page 456, Equation (6.26) — Should read: $\Delta\delta_{e_{gust}} = \dfrac{\left(1.10-0.0322S_h\right)}{-0.023S_h}\Delta\alpha_{gust}$

page 457, Figure 6.18 Note — Add '$\Delta_{a_{gust}} = 1.8$ degrees'

page 460, Line 21 — Should read 'Roskam, J.; Airplane Design, Parts I through VIII; Design, Analysis, and Research Corporation, 1440 Wakarusa Drive Suite #500, Lawrence, KS 66049, USA; 1990'

page 461, Lines 20-23 — Should read '1440 Wakarusa Drive Suite #500, Lawrence, KS 66049, USA Tel. 785-832-0434'

page 466, Line 26 — Should read 'Design, Analysis, and Research Corporation, 1440 Wakarusa Drive Suite #500, Lawrence, KS 66049, USA'

page 466, Line 29	Should read 'Design, Analysis and Research Corporation, 1440 Wakarusa Drive, Suite #500, Lawrence, KS 66049, USA Tel. 785-832-0434'
Appendix B	'$C_{h_{\beta_r}}$' should be '$C_{h_{\beta_v}}$' for all examples
page 480, Table B1	C.G. location should be $0.264\bar{c}$
page 487, Table B2	C.G. location should be $0.33\bar{c}$
page 501, Table B4	C.G. location should be $0.27\bar{c}$
page 560, Line 18	Should read 'Roskam, J.; Airplane Design, Parts I through VIII; Design, Analysis, and Research Corporation, 1440 Wakarusa Drive Suite #500, Lawrence, KS 66049, USA; 1990'