Design, Analysis and Research Corporation (DARcorporation)

ERRATA: Airplane Flight Dynamics and Automatic Flight Controls Part I

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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
pages vii – 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 xiii	In the fourth line from the bottom, C_X should be C_Z
page xxii – xxiii	Remove the negative sign in all lateral acceleration equations.
page xxv, 6th line	μ_g should be dimensionless.
page 6, Eqn. (1.7)	r'_p should be $\vec{\mathrm{r}}'_\mathrm{p}$.
page 7, before *Eqn (1.14)*	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, Section 1.4	Last paragraph, 1st line "$\Theta = 90)$" should be "$\Theta = 90$"
page 17, Fig 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, Eq (1.62) — First equation set "$\vec{\omega} = k\dot{\Theta}$" should be "$\vec{\omega} = j_2\dot{\Theta}$"

page 28, Line 9 — "un" should be in.

page 34, Lines 25-26 — Reference should be: 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 43, Fig 2.6 — S_{wf} should be $\frac{S_{wf}}{2}$

page 44, Eqn. (2.16) — $S_{w_f} = S\,\frac{(\eta_o - \eta_i)}{(1+\lambda)}\left[2 - (1-\lambda)(\eta_i + \eta_o)\right]$

page 47 — First paragraph under 2.5.2 second line. "In variant" should be "invariant"

page 51 — Second paragraph 8th line. "top" should be "to"

page 55, Eq (2.27) — should be $\left(\frac{d\varepsilon}{d\alpha}\right)_M = \frac{\left(\frac{d\varepsilon}{d\alpha}\right)_{M=0}}{\sqrt{(1-M^2)}}$

page 59, Figure 2.20 — Flap Chord, c_f, should go from hinge line to trailing edge

page 63, Problem 2.3 — the set of data under data set "a" should be data set "c"

page 67 — change loose in lose.

page 72, Eqn (3.5) — C_{D_0} is the value of C_D for: $\alpha = i_h = \delta_e = 0$

page 77, Eqn (3.12) — C_{L_0} is the value of C_L for: $\alpha = i_h = \delta_e = 0$

page 80, Eqn (3.29) — C_{m_0} is the value of C_m for:

page 84, Eq (3.30) — in $\cos(\alpha + i_w - \varepsilon)$ "i_W" should be "i_h"

page 84, Eqn (3.32) — Should be:

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

page 84 4th line from bottom A reference to Eqn (3.33) should be Eqn (3.32).

page 85 19th line "as well a positive" should be "as well as positive"

page 95 Last full paragraph, 4th line. After "vortices" add "(at high angles of attack)"

page 97, Figure 3.28 Normal velocity vector on left wing should not be present.

page 98, 11th line from top 'three-vies' should be 'three-views'.

page 99, Figure 3.30 Axis labeled as "Z" should be labeled as "X".

page 104 change loose in lose.

page 104 Last paragraph, last line "right wheel deflection are activated" should be "right wheel deflection) are activated"

page 106, Eqn (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 Eqn (3.71) $C_{l_{\delta_r}} = C_{L_{\alpha_v}} \alpha_{\delta_r} \eta_v \frac{S_v z_{v_s}}{Sb}$ replaces $C_{l_{\delta_r}} = C_{L_{\alpha_v}} \alpha_{\delta_r} \bar{q}_v \frac{S_v x_{v_s}}{Sb}$

page 109, Eq (3.72) multiply right side quantity by $\bar{q}Sb$

page 111, Eqn (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 be multiplied by: $\bar{q}S$

page 115, Line 14 "The yawing moment due to the vertical tail me be written as:"

should be "The yawing moment due to the vertical tail may be written as:"

page 117, Line 20 — Line 20 should be between Lines 13 and 14.

page 118, Figure 3.46 — "Positive rolling moment" should be labeled as "Yawing moment".

page 118, Figure 3.46, 1.) — "induces drag" should be "induced drag"

page 121, Eq (3.91) — multiply right side quantity by $\bar{q}Sb$

page 122, Eqn (3.92a) — Should be

$$L_{T_{1_S}} = \ldots = \left[\sum_{i=0}^{i=n} T_i\left(-z_{T_i}\cos\phi_{T_i}\sin\psi_{T_i} - y_{T_i}\sin\phi_{T_i}\right)\right]\cos\alpha_1 + \ldots$$

page 122, Eqn 3.92a — The summation should say $i = 1$

page 122, Eqn 3.92b — The summation should say $i = 1$

page 122, Eqn 3.92c — The summation should say $i = 1$

page 122, Eqn (3.92c) — Should be

$$N_{T_{1_S}} = \ldots = \ldots - \left[\sum_{i=0}^{i=n} T_i\left(-z_{T_i}\cos\phi_{T_i}\sin\psi_{T_i} - y_{T_i}\sin\phi_{T_i}\right)\sin\alpha_1\right]$$

page 124, Eqn 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 — All "V_{P_1}" in this figure should be "V_p"

page 134, Figure 3.52 — Equation "$\arctan\left.\frac{\partial C_D}{\partial M}\right|_{M=M_2} > 0$" should be "$\arctan\left.\frac{\partial C_D}{\partial M}\right|_{M=M_2} < 0$".
Figure should be labeled "Example of Determination of: $\partial C_D / \partial M$ at a constant angle of attack".

page 136, Eqn (3.119) — "C_L" should be "C_{L_1}"

page 136, Eqn (3.122) — Variable M should be "M_A"

page 137, 6th line from bottom — Should read '... are affected by changes in angle of attack, α: ...'.

page 139 — Equation (3.133), change the subscript "x" to "z" in $\frac{\partial F_{A_z}}{\partial \alpha}$

page 141, Eqn (3.142) — change "airplane, caused by" to "airplane, ΔC_L caused by"

page 143, right after Eqn (3.146) — Should read '... multiplying by the non-dimensional moment ...'

page 145, Eqn (3.156) — change $\frac{\partial M_A}{\partial\left(\frac{q\bar{c}}{2U_1}\right)} = \frac{\partial C_m}{\partial\left(\frac{q\bar{c}}{2U_1}\right)}\bar{q}_1 S = C_{m_q}\bar{q}_1 S$ to

$$\frac{\partial M_A}{\partial\left(\frac{q\bar{c}}{2U_1}\right)} = \frac{\partial C_m}{\partial\left(\frac{q\bar{c}}{2U_1}\right)}\bar{q}_1 S\bar{c} = C_{m_q}\bar{q}_1 S\bar{c}$$

page 147 — Equation (3.162), replace the variable C_{L_1} in (2,1) entry to C_{D_1}

page 147, Eqn (3.162) — "$\frac{\alpha\bar{c}}{2U_1}$" should be "$\frac{\dot{\alpha}\bar{c}}{2U_1}$"

page 148 — Equations (3.163a, b, c), the negative signs should be removed

page 148, Section 3.2.10 — First paragraph "changes in sideslip, β" should be "changes in sideslip rate, $\dot{\beta}$"

Second paragraph "sideslip angle, β" should be "sideslip rate, $\dot{\beta}$"

page 157, Eqn. (3.189) — $C_{y_r} \approx C_{y_{r_v}} = C_{L_{\alpha_v}}\left(\frac{2x_{v_s}}{b}\right)\eta_v\left(\frac{S_v}{S}\right)$

page 162, Eqn (3.197) — "Cn_p" and "Cn_r" should be "C_{n_p}" and "C_{n_r}," respectively.

page 167, Eq (3.214) — Insert "+ u" in denominator.

$$F_{T_x} = \frac{n_p 550 \eta_p BHP}{U_1 + u}$$

page 168, Eqn. (3.223) $C_{X_{T_u}}$ should be $C_{T_{X_u}}$
This change should also be made in text above Eqn. (3.223)

page 173 First paragraph, 5th line. The word "be" is duplicated and should be deleted

page 174, Eqn (3.248) '0_{0_0}' should be '0'(zero).

page 182, Lines2-3, 17-18 Reference should be: Roskam, J.; Airplane Design, Parts I through VIII; Design, Analysis, and Research Corporation, 1440 Wakarusa Drive, Lawrence, KS 66049, USA; 1990

page 186 Equation (4.3), remove the variable U_1

page 189 Equation (4.7), remove the negative sign

page 189 The line below Equation (4.7), change (4.1) to (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), remove the variable U_1

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 198, 1st line '(4.22)' should be '(4.42)'.

page 199, after *Eqn (4.45)* Should read: '$C_{L_1} \approx \frac{mg}{\bar{q}_1 S}$'. Note that $\cos\gamma_1 \approx 1.0$.

page 206 Last paragraph, 3rd line, "in Example 1." should be "in Example 1)."

page 208, Fig. 4.10 In the graph on the left, $\bar{x}_{cg} = 0.15$ should be $\bar{x}_{cg} = 0.30$ and $\bar{x}_{cg} = 0.30$ should be $\bar{x}_{cg} = 0.15$

page 209, Fig 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 $\alpha = 25^0$ and a negative tail stall locus at $\alpha = -12^0$. Both of these lines are out of the range of the diagram so none of them should be shown.
page 211, 11th line	The corresponding values for $\alpha_{\text{tail-stall}}$ should be -12^0 and 25^0, respectively. Also, the tail stall locus should not be shown in Figure 4.11b because they are outside the range of the diagram.
page 216	15th line, "Appendix A.." should be "Appendix A."
page 218, 8th line from bottom	'$F_{S_{TO}}$' should be '$V_{S_{TO}}$'.
page 219, Table 4.3	In Eqn. (4.76), change δ_{a_1} to δ_{r_1}
page 220, Eqn (4.81)	change $V_{mc} = \sqrt{\dfrac{2\left(N_{T_1} + \Delta N_{D_1}\right)}{\rho C_{n_{\delta_r}} \delta_{r_{\max}} \bar{q}_1 S b}}$ to $V_{mc} = \sqrt{\dfrac{-2\left(N_{T_1} + \Delta N_{D_1}\right)}{\rho C_{n_{\delta_r}} \delta_{r_{\max}} S b}}$
page 221, Fig. 4.15	$\beta = -15^\circ$ should be $\beta = -10^\circ$
page 221, Fig 4.16a	The lateral axis should be the Y-axis. Also, the bank angle is negative as shown.
page 225, Eqn (4.86b)	"C_{Y_r}" should be "C_{y_r}".
page 225	Line 20, "three of these" should be "four of these"
page 226, Eqn (4.89)	On the right-hand side of the equation, $\tan\phi_1$ should be in the denominator
page 226, Eqn (4.90)	ψ_1 should read $\dot{\psi}_1$
page 226, Eqn (4.95)	Should be $mU_1R_1 = mg\sin\phi_1$.
page 226, Eqn (4.106)	The '(' in between 'n' and '$C_{L_{trim}}$' should be in front of 'n'.
page 227, Eqn (4.96)	"C_{Y_r}" should be "C_{y_r}".
page 227, Eqn (4.97)(4.103)	"Φ" should be "Φ_1"
page 227, Line 6	The first sentence should be removed

page 228, Eqn (4.98) Variables a_{11}, b_{11}, and c_{11} should be a, b, and c

page 228, Eqn (4.99) Variables a_{11}, b_{11}, and c_{11} should be a, b, and c

page 228, Eq (4.100) δ_{a_1} should read δ_{r_1}, Variables a_{11}, b_{11}, and c_{11} should be a, b, and c

page 228, Eqn (4.102) "Φ" should be "Φ_1"

page 228, Eqn (4.102a) Variable a_{11} should be a.

page 228, Eqn (4.102b) Variable b_{11} should be b.

page 228, Eqn (4.102c) Variable c_{11} should be c.

page 232, Eqn (4.113b) "γ_1" should be "Θ_1"

page 232, Eqn (4.114a) "γ_1" should be "Θ_1"

page 233 Third paragraph, 2nd line. The word "forward" should be changed to "aft"

page 235, Conclusion for Sec. 4.4.1 The inequality should be $\left|M_{ac_{wf}}\right| < L_{wf}\left(x_{cg} - x_{ac_{wf}}\right)$.

page 235 Last line, "for a conventional airplane" should be "for a canard airplane"

page 236, Conclusion for Sec. 4.4.2 The inequality should be $\left|M_{ac_{wf}}\right| < L_{wf}\left(x_{cg} - x_{ac_{wf}}\right)$.

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, Eqn (4.136) change $HM = C_h \bar{q} S_e \bar{c}_e$ to $HM = C_h \bar{q}_h S_e \bar{c}_e$

page 244, Section 4.5.1 Last paragraph, change $\eta_h = \frac{\bar{q}}{\bar{q}_h}$ to $\eta_h = \frac{\bar{q}_h}{\bar{q}}$

page 250, Eqn (4.147) Eqn (4.147) is derived from Eqn (4.140) and it should be:

$$C_{h_{o_{trim}}} = -\left\{ C_{h_\alpha}\left(1-\frac{d\varepsilon}{d\alpha}\right)\alpha_{C_{L_1}=0} + C_{h_\alpha}\left(i_h-\varepsilon_o\right) + C_{h_{\delta_e}}\,\delta_{e_{C_{L_1}=0}} \right\}$$
$$- C_{L_1}\left\{ \frac{C_{h_\alpha} C_{m_{\delta_e}}\left(1-\frac{d\varepsilon}{d\alpha}\right) - C_{h_{\delta_e}} C_{m_\alpha}}{\left(C_{L_\alpha} C_{m_{\delta_e}} - C_{m_\alpha} C_{L_{\delta_e}}\right)} \right\}$$

page 252, 2nd line — Should read '... differentiating Eqn (4.148) with respect to the angle of attack.'

page 252, Eqn (4.150) — The first term on the RHS of Eqn (4.150) should be $C_{L_{\alpha_{wf}}}\left(\bar{x}_{cg} - \bar{x}_{ac_{wf}}\right)$.

page 252, Eqn (4.154) — Second row: Delete the ')' after '$\frac{C_{h_\alpha}\tau_e}{C_{h_{\delta_e}}}$'.

Last row: Delete the 'τ_e' and the ')' after it.

page 253, Eqn 4.158 — Remove the 'τ_e' from the equation.

page 253 — Last paragraph, 1st line, "found by by" should be "found by"

page 255 — Last paragraph, 2nd line, "from Eqn 4.169)" should be "from Eqn (4.169)"

page 256, Eqn (4.171) — Should be

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

page 259, Figure 4.36 — In graph a) "$\delta_e = 2^o$" should be "$\delta_{t_e} = 2^o$"

page 259, Figure 4.36 — In graph b) "dFe/dV" should be "dFs/dV"

page 263, Line 2 — Second "the" should be removed.

page 267 — Definitions for each variable should be: $C_{h_{\delta_r}}, C_{h_{\delta_{T_t}}}, C_{h_{\beta_v}}$ normally negative, negative, positive respectively

page 268 — Include in τ_r definition: $\tau_r = \frac{\partial\beta}{\partial\delta_r}$ and is normally negative

page 268, Fig 4.43 — Signs on hingemoment derivatives are reversed.

$C_{h_{\beta_v}} > 0$

$$C_{h_{\delta_r}} < 0$$

page 269, Eqn. 4.197

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

page 269, Eqn. 4.198

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

page 269, Eqn. 4.199

$$C_{n_{\beta\, free}} = C_{n_{\beta\, fix}} + C_{n_{\delta_r}}\,\frac{C_{h_{\beta_v}}}{C_{h_{\delta_r}}}\left(1-\frac{\partial\sigma}{\partial\beta}\right)$$

page 269, Eqn. 4.203

$$\frac{\partial F_r}{\partial\beta} = \frac{G_r\,\eta_v\,\bar{q}\,S_r\,\bar{c}_r\,C_{h_{\delta_r}}}{C_{n_{\delta_r}}}\,C_{n_{\beta\, free}}$$

page 273, Line 4 "and (4.209)" should be removed.

page 277, 1st line after Eqn (4.221c) The symbol '$\overline{C}_{D_o}$' should be 'C_{D_o}'.

page 278, Line 6 HM should refer to Eqn (4.136).

page 278, Eqn (4.225) Equation # 4.225 is repeated for two different equations.

page 278, Line 22 Should read, "The hingemoment coefficient equation…"

page 280, Line 15 "$\frac{\partial\delta_e}{\partial n}$" should be "$\frac{\partial F_s}{\partial n}$"

page 281 Extra period after stick-force trim
List at end of page is inconsistent with Figure 4.49

page 286, Eqn (4.241) $C_{h_{\beta_r}}$ should be $C_{h_{\beta_v}}$

page 288, Line 2 Sentence should read "Exceptions to this are airplanes like the B-52."

page 288, Line 14 Remove "!" after "nose-gear."

page 288-290 "ground" subscript should be "g"

page 291 Last paragraph, 1st line. The word “are” should be “area”

page 291, Eqn.(4.250) $\ddot{\theta}$ should be $\ddot{\theta}_{mg}$

page 292, Figure 4.52b x_{cg_g} labels should be reversed for $x_{cg_g} = 38\ ft$ and $x_{cg_g} = 39\ ft$

page 299, Problem 4.5 ‘Eqn (4.155)’ should be ‘Eqn (4.159)’.

page 307, Eqn (5.1a) Insert θ after mg.

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

page 307, Eqn (5.1b) Insert θ after mg.

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

page 307, Eqn (5.1c) Should be

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

page 314, Figure 5.6 Solid black line needs removed.

page 316, Line 9 Line is “the system is zero” should be “the system are zero”

page 318, 5th line Should read ‘$w = U_1\alpha$’.

page 322, Eqn. (5.34) Equation for C_1 should read as follows:

$$C_1 = \left(X_u + X_{T_u}\right)\left\{M_q\left(U_1 - Z_{\dot{\alpha}}\right) + Z_\alpha + M_{\dot{\alpha}}\left(U_1 + Z_q\right)\right\} +$$
$$+ \mathrm{M_q Z_\alpha} - \mathrm{Z_u X_\alpha} + \mathrm{M_{\dot{\alpha}} g\sin\theta_1} - \left(\mathrm{M_\alpha} + \mathrm{M_{T_\alpha}}\right)\left(\mathrm{U_1} + \mathrm{Z_q}\right)$$

page 322, Eqn (5.35) change $B_u = -X_{\delta_e}\left\{\left(U_1 - Z_{\dot{\alpha}}\right)M_q + Z_\alpha + M_{\dot{\alpha}}\left(U_1 + Z_q\right) + Z_{\delta_e}X_\alpha\right\}$

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

page 324, Line 16 Remove the list number "1)" and align row to far left.

page 328, Eqn (5.48) ">" should be "<"

page 328, Eqn (5.49) ">" should be "<"

page 332, Eq (5.53) the equation should have a minus " - " before $\zeta_{1,2}\omega_{n1,2}$ and $\zeta_{sp}\omega_{nsp}$

page 333, Eq (5.54) the equation should have a minus " - " before $\zeta_{3,4}\omega_{n3,4}$ and $\zeta_{ph}\omega_{nph}$

page 333, Line 8 $T_1 = -0.35$ and $T_2 = 0.28$

page 333, Eq (5.56) the equation should have a minus " - " before $\zeta_{3,4}\omega_{n3,4}$ and $\zeta_{3rd}\omega_{n3rd}$

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

page 340 3rd line. The word "ration" should be "ratio"

page 340 Equation (5.76), the term $Z_{\delta_e}M_\alpha$ should be $-Z_{\delta_e}M_\alpha$

page 340 Equations (5.76) to (5.78), change D_1 to $\bar{D}_1$

page 342, Eqn (5.82a) In equation, "$\dfrac{2\zeta_p s}{\omega_{n_{sp}}}$" should be "$\dfrac{2\zeta_p s}{\omega_{n_p}}$"

page 342, Eqn (5.82b) In equation, "$\dfrac{2\zeta_p s}{\omega_{n_{sp}}}$" should be "$\dfrac{2\zeta_p s}{\omega_{n_p}}$" and "$\dfrac{2\zeta_\alpha}{\omega_{n_\alpha}}$" should be "$\dfrac{2\zeta_\alpha s}{\omega_{n_\alpha}}$"

page 342, Eqn (5.82c) In equation, "$\dfrac{2\zeta_p s}{\omega_{n_{sp}}}$" should be "$\dfrac{2\zeta_p s}{\omega_{n_p}}$"

page 344, Eqn. (5.88) Change the term $-g\sin\theta_1$ to $-g\cos\theta_1$

page 344, Eqn (5.92) Should be $Magnitude = \sqrt{\dfrac{{n_{num}}^2 + {\omega_{num}}^2}{{n_{den}}^2 + {\omega_{den}}^2}}$

page 345, Fig 5.14 The mode descriptions are reversed. a) should be Phugoid Mode

	Shape and b) should be Short Period Mode Shape
page 346, Eqn (5.94)	The (3,3) element of the transformation matrix should be '$\cos 2\alpha_1$' instead of '$\cos^2\alpha_1$'.
page 349, Table 5.8	The left-hand side of Eqn. (5.96c) should be $\ddot{\psi} - \bar{B}_1\ddot{\phi}$
page 350, Line 5	"$\phi(s)/\delta_e(s)$" should be "$\phi(s)/\delta(s)$"
page 357, 2nd line	The '(pitching moment of inertia)' should be replaced by '(moments and products of inertia)'.
page 364, Eqn (5.120b)	The equation should be numbered as (5.119b).
page 364, Eqn 5.121	$\frac{\sqrt{C_{n_\beta}\bar{q}_1 Sb}}{I_{zz}}$ should be replaced with $\sqrt{\frac{C_{n_\beta}\bar{q}_1 Sb}{I_{zz}}}$
page 364, Line 28	Eqn (5.120) should be Eqn (5.121)
page 371	Equations (5.136) to (5.138), change D_2 to $\bar{D}_2$
page 372, last line	'$\psi(\tau)$' should be '$\psi(t)$'.
page 381, Figure 5.24	For Damping Ratio "-1/T" should be "1/T"
page 381, Figure 5.25	For Damping Ratio "-1/T" should be "1/T"
page 383	Remove the two lines before *Section 5.4.3*.
page 396, Line 25	Should read, "…say 10 deg/deg/sec, a 3 deg/s pitch rate…"
page 397, Sec. 5.5.2	In the third line of text change ζ_{sp} to ζ_d
page 398, Line 2	"elevator deflection" should be "rudder deflection"
page 398, Eqn. (5.161)	On the right-hand side of the equation change $\bar{c}$ to b.
	In the two paragraphs following Eqn. (5.162), change all the references of pitch to yaw. Also, in the second paragraph following the words 10 deg/deg/sec, remove the phrase "a pitch".
page 399	In the paragraph following Eqn. (5.169), the equation describing the resulting induced angle of attack should read: 22x57.3/(1.688x516)=1.4 deg.

Also, in the following line, the canard deflection command should be –2.6 deg.

page 400, 4th line above Sec. 5.6.1 'Eqns (5.76)' should be 'Eqns (1.76)' instead.

page 401, Figure 5.44 On the Y_B vector, the smaller vector should be labeled "q"

page 403 In the line of text preceding Eqn. (5.194), change $(P_1)^2$ to $(P_1)^4$

page 405, Lines24-28 Omit paragraph contained by lines 24-28.

page 407, Line 13 $\cos\theta = 1$ for small angles.

page 411, Problem 5.13 Last sentence should read: 'How well do these results agree with your conclusions from problem 5.12?'.

page 424, Table 6.4 The Civilian Requirements FAR-23 are updated to the following:

For wheel controllers:

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

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

For stick controllers:

$$\frac{\partial F_s}{\partial n} > \frac{W}{140} \text{ and } \frac{15.0}{n_{limit}}$$

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

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 437, Table 6.12 Sixth line of text from bottom of table, replace vale with value.

page 438, Table 6.14 All inequalities involving the roll mode time constant, T_r should be $\leq$ for all Flight Phase Categories and Levels. For all Flight Phase Categories and Airplane Classes, Level 3 should read $T_r \leq$ 10.0 sec. Also, disregard the footnote referring to MIL-STD-1797A.

page 453, Table 6.22 The number on the last column is referenced from Figure 6.16 instead of Figure 6.15.

page 456, Eqn (6.26)	Should be: $\Delta\delta_{e_{gust}} = \dfrac{(1.10 - 0.0322 S_h)}{-0.023 S_h}\Delta\alpha_{gust}$.
page 457, Fig 6.18	The '$\Delta\delta_{e_{gust}}$' curve is plotted with $\Delta\alpha_{gust} = 1.8\,\text{deg}$.
page 460, Lines 21-22	Reference should be: 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	Address should be: 1440 Wakarusa Drive Suite #500, Lawrence, KS 66049, USA Tel. 785-832-0434 Fax: 785-832-0524
page 466, Lines 26-27	Lines should read " Design, Analysis, and Research Corporation, 1440 Wakarusa Drive Suite #500, Lawrence, KS 66049, USA"
page 466, Lines29-31	Lines should read "Design, Analysis and Research Corporation, 1440 Wakarusa Drive, Suite #500, Lawrence, KS 66049, USA Tel. 785-832-0434 Fax: 785-832-0524
Appendix B	$C_{h_{\beta_r}}$ should be $C_{h_{\beta_v}}$ for all examples.
page 487, B2	C.G. location should be $0.33\,\bar{c}$
page 551, Appendix C	In the first line of text remove the word "those".
page 560, Lines18-19	Reference should be: Roskam, J.; Airplane Design, Parts I through VIII; Design, Analysis, and Research Corporation, 1440 Wakarusa Drive Suite #500, Lawrence, KS 66049, USA; 1990