

ERRATA: Airplane Flight Dynamics and Automatic Flight Controls Part I

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- page 14, Section 1.4* Last paragraph, 1st line “ $\Theta = 90$ ” should be “ $\Theta = 90^\circ$ ”
- page 26, Eq (1.62)* First equation set “ $\bar{\omega} = k\dot{\Theta}$ ” should be “ $\bar{\omega} = j_2\dot{\Theta}$ ”
- 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 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 66, Figure 3.2* β should be β_1 in Note 3.
- page 84, Eq (3.30)* in $\cos(\alpha + i_w - \varepsilon)$ “ i_w ” should be “ i_h ”
- page 84, Eqn (3.30)* The wing incidence should be removed
- 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)”

<i>page 97, Figure 3.28</i>	Normal velocity vector on left wing should not be present.
<i>page 99, Figure 3.30</i>	Axis labeled as “Z” should be labeled as “X”.
<i>page 104</i>	Last paragraph, last line “right wheel deflection are activated” should be “right wheel deflection) are activated”
<i>page 106, Eqn (3.67)</i>	K_{SW} needs to be defined: is the gearing constant between cockpit control wheel or stick and aileron or spoiler deflection.
<i>page 108, Eqn (3.71)</i>	change $C_{l\delta_r} = C_{L\alpha_v} \alpha_{\delta_r} \eta_v \frac{S_v x_{v_s}}{Sb}$ to $C_{l\delta_r} = C_{L\alpha_v} \alpha_{\delta_r} \eta_v \frac{S_v z_{v_s}}{Sb}$
<i>page 109, Eq (3.72)</i>	multiply right side quantity by $\bar{q}Sb$
<i>page 111, Eqn (3.76)</i>	Should read: $F_{A_{y_v}} = C_{y\beta_v} \beta \bar{q} S = -C_{L\alpha_v} \left(1 - \frac{d\sigma}{d\beta}\right) \beta \bar{q}_v S_v$
<i>page 115, Line 14</i>	“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:”
<i>page 117, Line 20</i>	Line 20 should be between Lines 13 and 14.
<i>page 118, Figure 3.46</i>	“Positive rolling moment” should be labeled as “Yawing moment”.
<i>page 118, Figure 3.46, 1.)</i>	“induces drag” should be “induced drag”
<i>page 121, Eq (3.91)</i>	multiply right side quantity by $\bar{q}Sb$
<i>page 122, Eqn 3.92a</i>	The summation should say $i = 1$
<i>page 122, Eqn 3.92b</i>	The summation should say $i = 1$
<i>page 122, Eqn 3.92c</i>	The summation should say $i = 1$
<i>page 124, Eqn 3.95b</i>	The summation should say $i = 1$
<i>page 126, Table 3.4</i>	“ V_1 ” should be “ Q_1 ”
<i>page 127, Line 4</i>	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_i} ” in this figure should be “ V_p ”
- page 134, Figure 3.52 Equation “ $\arctan \frac{\partial C_D}{\partial M} \Big|_{M=M_2} > 0$ ” should be “ $\arctan \frac{\partial C_D}{\partial M} \Big|_{M=M_2} < 0$ ”.
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 141, Eqn (3.142) change “airplane, caused by” to “airplane, ΔC_L caused by”
- 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, Egn (3.162) “ $\frac{\alpha\bar{c}}{2U_1}$ ” should be “ $\frac{\dot{\alpha}\bar{c}}{2U_1}$ ”
- 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 162, Eqn (3.197) “ C_{n_p} ” and “ C_{n_r} ” should be “ $C_{n_{\dot{p}}}$ ” and “ $C_{n_{\dot{r}}}$,” respectively.
- page 167, Eq (3.214) Insert “+ u” in denominator.

$$F_{T_x} = \frac{n_p 550 \eta_p BHP}{U_1 + u}$$
- page 173 First paragraph, 5th line. The word “be” is duplicated and should be deleted
- page 182, Lines 2-3, 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

<i>page 190</i>	Line 6, “criterion (4.1)” should be “criterion (4.10)”
<i>page 190</i>	Line 11, $C_{Z_{T\alpha}} \ll C_{L\alpha}$ should be $C_{T_{z\alpha}} \ll C_{L\alpha}$
<i>page 195, Line 6</i>	“Table 5.1” should be “Table 4.1”.
<i>page 196, Line 2</i>	“Table 5.1” should be “Table 4.1”.
<i>page 206</i>	Last paragraph, 3 rd line, “in Example 1.” should be “in Example 1).”
<i>page 209, Fig 4.11b</i>	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.
<i>page 211, 11th line</i>	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.
<i>page 211</i>	11 th line, “degrespectively” should be “deg respectively”
<i>page 216</i>	15 th line, “Appendix A..” should be “Appendix A.”
<i>page 220, Eqn (4.81)</i>	change $V_{mc} = \sqrt{\frac{2(N_{T1} + \Delta N_{D1})}{\rho C_{n\delta_r} \delta_{r\max} Sb}}$ to $V_{mc} = \sqrt{\frac{-2(N_{T1} + \Delta N_{D1})}{\rho C_{n\delta_r} \delta_{r\max} Sb}}$
<i>page 225, Eqn (4.86b)</i>	“ C_{Y_r} ” should be “ C_{y_r} ”.
<i>page 225</i>	Line 20, “three of these” should be “four of these”
<i>page 226, Eq (4.90)</i>	ψ_1 should read $\dot{\psi}_1$
<i>page 227, Eqn (4.96)</i>	“ C_{Y_r} ” should be “ C_{y_r} ”.
<i>page 227, Eqn (4.97)(4.103)</i>	“ Φ ” should be “ Φ_1 ”
<i>page 227, Line 6</i>	The first sentence should be removed
<i>page 228, Eqn (4.98)</i>	Variables a_{11} , b_{11} , and c_{11} should be a, b, and c

<i>page 228, Eqn (4.99)</i>	Variables a_{11} , b_{11} , and c_{11} should be a, b, and c
<i>page 228, Eq (4.100)</i>	δ_{a_1} should read δ_{τ_1} , Variables a_{11} , b_{11} , and c_{11} should be a, b, and c
<i>page 228, Eqn (4.102)</i>	“ Φ ” should be “ Φ_1 ”
<i>page 228, Eqn (4.102a)</i>	Variable a_{11} should be a.
<i>page 228, Eqn (4.102b)</i>	Variable b_{11} should be b.
<i>page 228, Eqn (4.102c)</i>	Variable c_{11} should be c.
<i>page 232, Eqn (4.113b)</i>	“ γ_1 ” should be “ Θ_1 ”
<i>page 232, Eqn (4.114a)</i>	“ γ_1 ” should be “ Θ_1 ”
<i>page 233</i>	Third paragraph, 2 nd line. The word “forward” should be changed to “aft”
<i>page 235</i>	Last line, “for a conventional airplane” should be “for a canard airplane”
<i>page 237, Line 7</i>	“in Eqn (4.10)” should be “in Eqn (4.131)”
<i>page 237, Lines 10-11</i>	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’).
<i>page 242, Eqn (4.136)</i>	change $HM = C_h \bar{q} S_e \bar{c}_e$ to $HM = C_h \bar{q}_h S_e \bar{c}_e$
<i>page 244, Section 4.5.1</i>	Last paragraph, change $\eta_h = \frac{\bar{q}}{\bar{q}_h}$ to $\eta_h = \frac{\bar{q}_h}{\bar{q}}$
<i>page 253</i>	Last paragraph, 1 st line, “found by by” should be “found by”
<i>page 255</i>	Last paragraph, 2 nd line, “from Eqn 4.169)” should be “from Eqn (4.169)”
<i>page 259, Figure 4.36</i>	In graph a) “ $\delta_e = 2^\circ$ ” should be “ $\delta_{\tau_e} = 2^\circ$ ”
<i>page 259, Figure 4.36</i>	In graph b) “dFe/dV” should be “dFs/dV”
<i>page 263, Line 2</i>	Second “the” should be removed.

- page 269, Eqn 4.199 “ $C_{n_{\beta_{fix}}} - C_{n_{\delta_r}}$ ” should be $C_{n_{\beta_{fix}}} + C_{n_{\delta_r}}$
- page 267 Definitions for each variable should be: $C_{h_{\delta_r}}, C_{h_{\delta_q}}, C_{h_{\beta_v}}$ 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 273, Line 4 “and (4.209)” should be removed.
- 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 $x_{cg_g} = 38 \text{ ft}$ and $x_{cg_g} = 39 \text{ ft}$
- 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 322, Eqn (5.35) change $B_u = -X_{\delta_e} \left\{ (U_1 - Z_{\dot{\alpha}}) M_q + Z_{\alpha} + M_{\dot{\alpha}} (U_1 + Z_q) + Z_{\delta_e} X_{\alpha} \right\}$

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

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

$$T_1 = -0.35 \text{ and } T_2 = 0.28$$

page 333, Eq (5.56)

the equation should have a minus “ - “ before $\zeta_{3,4}\omega_{n3,4}$ and $\zeta_{3rd}\omega_{n3rd}$

page 340

3rd line. The word “ration” should be “ratio”

page 342, Eqn (5.82a)

In equation, “ $\frac{2\zeta_p s}{\omega_{nsp}}$ ” should be “ $\frac{2\zeta_p s}{\omega_{np}}$ ”

page 342, Eqn (5.82b)

In equation, “ $\frac{2\zeta_p s}{\omega_{nsp}}$ ” should be “ $\frac{2\zeta_p s}{\omega_{np}}$ ” and “ $\frac{2\zeta_{\alpha}}{\omega_{n\alpha}}$ ” should be “ $\frac{2\zeta_{\alpha} s}{\omega_{n\alpha}}$ ”

page 342, Eqn (5.82c)

In equation, “ $\frac{2\zeta_p s}{\omega_{nsp}}$ ” should be “ $\frac{2\zeta_p s}{\omega_{np}}$ ”

page 350, Line 5

“ $\phi(s) / \delta_e(s)$ ” should be “ $\phi(s) / \delta(s)$ ”

page 364, Line 28

Eqn (5.120) should be Eqn (5.121)

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 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

Omit paragraph contained by lines 24-28.

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

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 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, Lines 29-31 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 560, Lines 18-19 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