

**ERRATA: Airplane Flight Dynamics and Automatic Flight Controls Part I**

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- 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  $c_{l_\delta}$  should be deleted
- page xxii – xxviii* Add the following symbols and descriptions

	<u>Symbol</u>	<u>Description</u>	<u>Unit</u>
<i>page xxii</i>	X, Y, Z	Body-fixed (rotating) axis system	--
<i>page xxii</i>	X', Y', Z'	Earth-fixed (non-rotating) axis system	--
<i>page xxvi</i>	1, 2, 3	Eular rotation sequence (the use of the symbol “1” to denote the first Euler rotation is used only in Chapter 1)	
<i>page xxvii</i>	P	Origin of the XYZ system	

- page 47* First paragraph under 2.5.2 second line. “In variant” should be “invariant”
- page 51* Second paragraph 8<sup>th</sup> 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 84, Eq (3.30)* in  $\cos(\alpha + i_w - \varepsilon)$  “ $i_w$ ” should be “ $i_h$ ”

*page 95* Last full paragraph, 4<sup>th</sup> line. After “vortices” add “(at high angles of attack)”

*page 63, Problem 2.3* the set of data under data set “a” should be data set “c”

*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)  $C_{l\delta_r} = C_{L\alpha_v} \alpha_{\delta_r} \eta_v \frac{S_v x_{v_s}}{Sb}$  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 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 121, Eq (3.91) multiply right side quantity by  $\bar{q}Sb$
- page 139 Equation (3.133), change the subscript “x” to “z” in  $\frac{\partial F_{A_z}}{\partial \alpha}$
- page 147 Equation (3.162), replace the variable  $C_{L_1}$  in (2,1) entry to  $C_{D_1}$
- page 148 Equations (3.163a, b, c), the negative signs should be removed
- page 148, Section 3.2.10 First paragraph “changes in sideslip,  $\beta$ ” should be “changes in sideslip rate,  $\dot{\beta}$ ”
- page 167, Eq (3.214) Second paragraph “sideslip angle,  $\beta$ ” should be “sideslip rate,  $\dot{\beta}$ ”  
Insert “+ u” in denominator.  
$$F_{T_x} = \frac{n_p 550 \eta_p BHP}{U_1 + u}$$
- page 173 First paragraph, 5<sup>th</sup> line. The word “be” is duplicated and should be deleted
- page 186 Equation (4.3), remove the variable  $U_1$
- page 187 Entry (5,5), change  $\frac{\partial(M_A + M_T)}{\partial \alpha} > 0$  to  $\frac{\partial(M_A + M_T)}{\partial \alpha} < 0$
- page 189 Equation (4.7), remove the negative sign
- page 189 The line below Equation (4.7), change (4.1) to (4.6)
- page 195 Equation (4.36), remove the variable  $U_1$
- page 226, Eq (4.90)  $\psi_1$  should read  $\dot{\psi}_1$
- page 228, Eq (4.100)  $\delta_{a_1}$  should read  $\delta_{\dot{\eta}_1}$

page 233

Third paragraph, 2<sup>nd</sup> line. The word “forward” should be changed to “aft”

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 256,

3<sup>rd</sup> line above Fig 4.34

‘stick-force-per-‘g’ should be just ‘stick-force’.

page 267

Definitions for each variable should be:  $C_{h_{\delta_r}}$ ,  $C_{h_{\delta_a}}$ ,  $C_{h_{\delta_b}}$  normally negative, negative, positive respectively

page 268

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

page 269 Eqn (4.203)

$$\frac{\partial F_r}{\partial \beta} = -\frac{G_r \eta_v \bar{q}_1 S_r \bar{c}_r C_{h_{\delta_r}}}{C_{n_{\delta_r}}} C_{n_{\beta free}}$$

replaces:

$$\frac{\partial F_r}{\partial \beta} = \frac{G_r \eta_v \bar{q}_1 S_r \bar{c}_r C_{h_{\delta_r}}}{C_{n_{\delta_r}}} C_{n_{\beta free}}$$

page 281

List at end of page is inconsistent with Figure 4.49

page 291

Last paragraph, 1<sup>st</sup> line. The word “are” should be “area”

page 307, Eqn (5.1a)

Insert  $\theta$  after  $mg$ . Remove  $\frac{C_D}{U_1}$ .

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

page 307, Eqn (5.1b)

Insert  $\theta$  after  $mg$ .

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

page 307, Eqn (5.1c)

Should be

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

page 318

First line of second paragraph, change  $\theta$  to  $\bar{\theta}$

page 319

Table 5.1, third last equation, change  $C_{m_\alpha}$  to  $C_{m_{\dot{\alpha}}}$

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, 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), 
$$\frac{\theta(s)}{\delta_e(s)} = - \frac{(Z_{\delta_e} s - X_u Z_{\delta_e} + X_{\delta_e} Z_u)}{U_1 \left( s^2 - X_u s - \frac{g Z_u}{U_1} \right)}$$

page 340

3<sup>rd</sup> 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 371

Equations (5.136) to (5.138), change  $D_2$  to  $\bar{D}_2$

page 424, Table 6.4

The Civilian Requirements FAR-23 are updated to the following:

For wheel controllers:

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

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

For stick controllers:

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

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

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