Errata for the book
The Science of Vehicle Dynamics

Massimo Guiggiani

April 18, 2018

These are all the errors and omissions for the book *The Science of Vehicle Dynamics*, published by Springer (2014), reported as of **April 18, 2018**.

They are listed here in two ways:

- by page number (better for first reading), right hereafter;

- in chronological order (better for updating), beginning on page 17.

Positions in the book are indicated by page and line number, where the top line of a page is number 1 and the bottom line is number −1. A running head and a page number are not considered to be lines, but all other lines are.

Please report any additional errors to `massimo.guiggiani@unipi.it`

Updates will be available at `www.dimnp.unipi.it/guiggiani-m/SVDErrata.pdf`
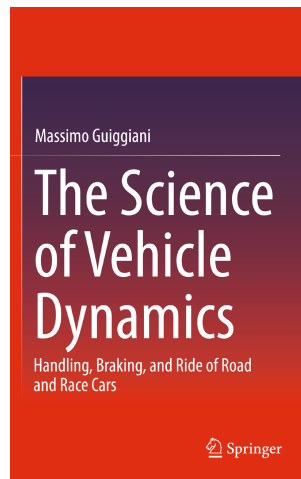
Errata ordered by page number

Chapter 1 - Introduction

Ch. 1, page 2, lines 5 and 8

Replace "kart" with "cart".
[First reported by *Basilio Lenzo* on 20 November 2015]

Ch. 1, page 4, line −15

Replace "from the axis" with "from the longitudinal axis x".
[First reported by *Basilio Lenzo* on 20 November 2015]

Chapter 2 - Mechanics of the Wheel with Tire

Ch. 2, page 7, lines 14–17

Replace

> In the lower part, the sidewalls bend and, thanks to the air pressure p_a, they apply more vertical forces F_a in the bead area than in the upper part. The overall effect on the rim is a vertical load F_z. The higher the air pressure p_a, the lower the sidewall bending.
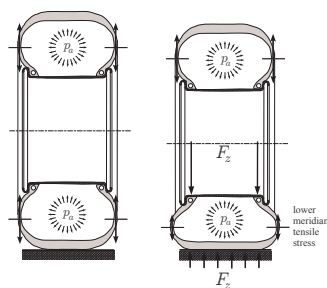
with

> In the lower part the radial cords encased in the sidewalls undergo a reduction of tension because they no longer have to balance the air pressure p_a acting on the contact patch. The net result is that the total upward pull of the cords on the bead exceeds that of the downward pull by an amount equal to the vertical load F_z.

[First reported in the book review by Jon W. Mooney, Noise Control Engineering Journal, Vol. 62 (3), May–June, 2014, added here on 31 January 2015]

Ch. 2, page 8, Fig. 2.1

The correct figure is

[First reported in the review by Jon W. Mooney, Noise Control Engineering Journal, Vol. 62 (3), May-June, 2014, added here on 31 January 2015]

Ch. 2, page 29, line 1

Replace "breaking" with "braking".
[First reported by *Bengt J. H. Jacobson* on 14 October 2014]

Ch. 2, page 31, eqn. (2.69)

The correct equation is

$$\tan\alpha = -\frac{\sigma_y}{1+\sigma_x}$$

without the last part.
[First reported by *Massimo Guiggiani* on 8 November 2015]

Ch. 2, page 32, Fig. 2.14

Replace x with y and y with x in the axis labels.
[First reported by *Cecilia Moreschini* on 6 March 2018]

Ch. 2, page 39, line -1

Add the sentence "All forces are in kN.".
[First reported by *Basilio Lenzo* on 26 November 2015]

Ch. 2, page 41, captions of Figs. 2.23 and 2.24

Replace the first two instances of F_y with F_x.
[First reported by *Massimo Guiggiani* on 12 November 2015]

Chapter 3 - Vehicle Model for Handling and Performance

Ch. 3, page 49, Fig. 3.2

Replace β with $\hat{\beta}$.
[First reported by *Matteo Pergoli* on 16 October 2017]

Ch. 3, page 49, eqn. (3.5)

Replace $-\sin\psi$ with $\sin\psi$.
[First reported by *Basilio Lenzo* on 20 November 2015]

Ch. 3, page 51, Fig. 3.4

Replace β with $\hat{\beta}$.
[First reported by *Matteo Pergoli* on 16 October 2017]

Ch. 3, page 52, eqn. (3.15)

Insert the unit vector $\mathbf{j}$ before the last $=$. The correct equation is

$$\mathbf{a}_C = (a_x - r^2 S - \dot{r} R)\mathbf{i} + (a_y - r^2 R + \dot{r} S)\mathbf{j} = r(\dot{R}\mathbf{i} - \dot{S}\mathbf{j})$$

[First reported by *Antonio Sponziello* on 13 March 2014]

Ch. 3, page 52, line -9

Add the sentence
"Actually, in most cases $\beta \simeq \hat{\beta}$, and they can be considered as synonymous (Fig. 3.2)."
[First reported by *Massimo Guiggiani* on 10 January 2015]

Ch. 3, pages 53 and 54

All instances of $\sin(\beta)$ and $\cos(\beta)$ should be replaced by $\sin(\hat{\beta})$ and $\cos(\hat{\beta})$, respectively.
[First reported by *Massimo Guiggiani* on 10 January 2015]

Ch. 3, page 54, eqn. (3.32)

A $\cos^2 \hat{\beta}$ is missing. The correct equation is

$$\rho_G = \frac{r + \dot{\beta}\cos^2 \hat{\beta}}{u}\cos \hat{\beta} = \frac{r}{\sqrt{u^2 + v^2}} + \frac{\dot{v}u - v\dot{u}}{(u^2 + v^2)^{\frac{3}{2}}}$$

[First reported by *Basilio Lenzo* on 3 December 2015]

Ch. 3, page 55, eqn. (3.40)

Unit vectors $\mathbf{i}$ and $\mathbf{j}$ are missing. The correct equation is

$$GK = \frac{a_x r^2 - a_y \dot{r}}{r^4 + \dot{r}^2}\mathbf{i} + \frac{a_x \dot{r} + a_y r^2}{r^4 + \dot{r}^2}\mathbf{j}$$

[First reported by *Massimo Guiggiani* on 3 December 2014]

4

Ch. 3, page 57, eqn. (3.45)

In the third and fourth equations change the sign in front of $(v - ra_2)$. The correct equations are

$$\sigma_{x_{21}} = \frac{[(u - rt_2/2)\cos(\delta_{21}) + (v - ra_2)\sin(\delta_{21})] - \omega_{21}\, r_2}{\omega_{21}\, r_2}$$

$$\sigma_{x_{22}} = \frac{[(u + rt_2/2)\cos(\delta_{22}) + (v - ra_2)\sin(\delta_{22})] - \omega_{22}\, r_2}{\omega_{22}\, r_2}$$

[First reported by *Riccardo Bartolozzi* on 10 January 2015]

Ch. 3, page 57, eqn. (3.46)

In the last equation change the sign in front of $rt_2/2$. The correct equation is

$$\sigma_{y_{22}} = \frac{(v - ra_2)\cos(\delta_{22}) - (u + rt_2/2)\sin(\delta_{22})}{\omega_{22}\, r_2}$$

[First reported by *Riccardo Bartolozzi* on 10 January 2015]

Ch. 3, page 59, lines under eqn. (3.52)

To be replaced with
"since $J_{yz} \simeq 0$. Moreover, it is worth noting that typically $|J_{zx}| \ll J_z$. Therefore, we can often safely assume $\dot{\mathbf{K}}_G^r \simeq J_z \dot{r} \mathbf{k}$."
[First reported by *Basilio Lenzo* on 3 December 2015]

Ch. 3, page 59, line 14

Replace "couple" with "moment".
[First reported by *Riccardo Bartolozzi* on 10 January 2015]

Ch. 3, page 63, line -2

Replace (3.63) with (3.53).
[First reported by *Riccardo Bartolozzi* on 10 January 2015]

Ch. 3, page 63, eqn. (3.63)

Replace Z_{a1} and Z_{a2} with Z_1^a and Z_2^a, respectively.
[First reported by *Francesco Bucchi* on 9 October 2014]

Ch. 3, page 64, eqn. (3.65)

Replace the second Z_{a1} with Z_2^a.
[First reported by *Francesco Bucchi* on 9 October 2014]

Ch. 3, page 64, eqn. (3.65) and (3.66)

Replace Z_{a1} and Z_{a2} with Z_1^a and Z_2^a, respectively.
[First reported by *Francesco Bucchi* on 9 October 2014]

Ch. 3, page 65, line 14

Delete ΔZ.
[First reported by *Riccardo Bartolozzi* on 10 January 2015]

Ch. 3, page 70, line -6

Delete the sentence
"An alternative selection could be the roll angle ϕ and the track variations Δt_1 and Δt_2."
[First reported by *Stelios (Stylianos) Markolefas* on 3 February 2017]

Ch. 3, page 79, eqn. (3.101')

Change the sign in front of N_Y/Y.
[First reported by *Stelios (Stylianos) Markolefas* on 5 October 2016]

Ch. 3, page 80, eqn. (3.110)

The last two terms in both equations must be changed. Moreover, in the denominator of the next to last term in the second equation the subscript should be 2. The correct equation is

$$\phi_1^s = \frac{1}{k_{\phi_1}^s} \frac{k_{\phi_1} k_{\phi_2}}{k_\phi} \left[\frac{Y(h - q^b)}{k_{\phi_2}} - \frac{Y_1 q_1}{k_{\phi_1}^p} + \frac{Y_2 q_2}{k_{\phi_2}^p} \right]$$

$$\phi_2^s = \frac{1}{k_{\phi_2}^s} \frac{k_{\phi_1} k_{\phi_2}}{k_\phi} \left[\frac{Y(h - q^b)}{k_{\phi_1}} - \frac{Y_2 q_2}{k_{\phi_2}^p} + \frac{Y_1 q_1}{k_{\phi_1}^p} \right]$$

The same equation (3.110) is repeated on page 88 and hence must be corrected as well.
[First reported by *Daniele Calderini* on 30 September 2014]

Ch. 3, page 85, line -12

Change m_n to m_u. However, throughout the book, m_n and m_u should be considered as synonymous.
[First reported by *Aurele Verne* on 13 March 2014]

Ch. 3, page 87, eqn. (3.122)

The correct equation is

$$\sqrt{X_{ij}^2 + Y_{ij}^2} \le \mu_p Z_{ij} \qquad \text{and} \qquad Z_{ij} \ge 0$$

[First reported by *Marco Gabiccini* on 22 December 2016]

Ch. 3, page 88, eqn. (3.45')

In the third and fourth equations change the sign in front of $(v - ra_2)$. The correct equations are

$$\sigma_{x_{21}} = \frac{[(u - rt_2/2)\cos(\delta_{21}) + (v - ra_2)\sin(\delta_{21})] - \omega_{21}\, r_2}{\omega_{21}\, r_2}$$

$$\sigma_{x_{22}} = \frac{[(u + rt_2/2)\cos(\delta_{22}) + (v - ra_2)\sin(\delta_{22})] - \omega_{22}\, r_2}{\omega_{22}\, r_2}$$

[First reported by *Stelios (Stylianos) Markolefas* on 5 October 2016]

Ch. 3, page 89, eqn. (3.46')

In the last equation change the sign in front of $rt_2/2$. The correct equation is

$$\sigma_{y_{22}} = \frac{(v - ra_2)\cos(\delta_{22}) - (u + rt_2/2)\sin(\delta_{22})}{\omega_{22}\, r_2}$$

[First reported by *Stelios (Stylianos) Markolefas* on 5 October 2016]

Ch. 3, page 90, eqn. (3.126)

The second equation should be $M_l M_h \le 0$.
[First reported by *Massimo Guiggiani* on 7 October 2016]

Chapter 4 - Braking Performance

Ch. 4, page 107, eqn. (4.21)

In the next to last term of the third equation the subscript should be 2. The correct equation is

$$0 = (X_1 + X_2 + X_a)\, h - (Z_1 - Z_1^a)\, a_1 + (Z_2 - Z_2^a)\, a_2$$

[First reported by *Mauro Scalise* on 2 October 2014]

Chapter 5 - The Kinematics of Cornering

Ch. 5, page 117, line 3

Change $\dot{r}$ to r.
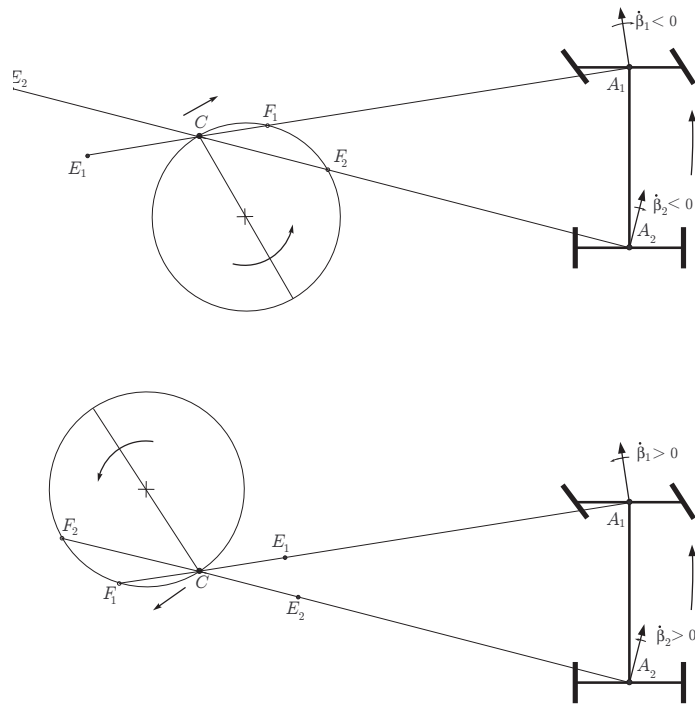[First reported by *Massimo Guiggiani* on 17 July 2014]

Ch. 5, pages 126–130

All instances of $\cos(\beta)$, $\cos(\beta_1)$ and $\cos(\beta_2)$ should be replaced, respectively, by $\cos(\hat{\beta})$, $\cos(\hat{\beta}_1)$ and $\cos(\hat{\beta}_2)$, consistently with eqn. (3.18).
[First reported by *Massimo Guiggiani* on 10 January 2015]

Ch. 5, page 127, Fig. 5.19

The correct figure is

[First reported by *Matteo Pergoli* on 28 November 2016]

Chapter 6 - Handling of Road Cars

Ch. 6, page 132, eqn. (6.3)

In the last two equations the sign in front of $(v - ra_2)$ is $+$.
[First reported by *Massimo Guiggiani* on 12 December 2016]

Ch. 6, page 132, eqn. (6.5)

Insert a minus sign in front of mvr. The beginning of the correct equation is

$$ma_x = -mvr = \ldots$$

[First reported by *Marco Gabiccini* on 15 April 2016]

Ch. 6, page 133, eqn. (6.8)

There are the same errors as above, that is the last two terms in both equations must be changed. Moreover, in the denominator of the next to last term in the second equation the subscript should be 2. The correct equation is

$$\phi_1^s = ma_y \frac{1}{k_{\phi_1}^s} \frac{k_{\phi_1} k_{\phi_2}}{k_\phi} \left[\frac{h - q}{k_{\phi_2}} - \frac{a_2 q_1}{l k_{\phi_1}^p} + \frac{a_1 q_2}{l k_{\phi_2}^p} \right] = ma_y \, \rho_1^s$$

$$\phi_2^s = ma_y \frac{1}{k_{\phi_2}^s} \frac{k_{\phi_1} k_{\phi_2}}{k_\phi} \left[\frac{h - q}{k_{\phi_1}} - \frac{a_1 q_2}{l k_{\phi_2}^p} + \frac{a_2 q_1}{l k_{\phi_1}^p} \right] = ma_y \, \rho_2^s$$

[First reported by *Francesco Bucchi* on 9 October 2014]

Ch. 6, page 134, eqn. (6.12)

The mass m is missing in the last term of the second line. The correct equation is

$$= \delta_{ij}^0 + \delta_v \tau_{ij} + \Upsilon_{ij} m \rho_i^s a_y$$

[First reported by *Niccolò Galeotti* on 29 January 2015]

Ch. 6, page 135, eqn. (6.14)

Replace a_y with ma_y in all last terms.
[First reported by *Massimo Guiggiani* on 9 December 2015]

Ch. 6, page 135, eqn. (6.17)

Change the sign of both terms within square brackets. The correct equation is

$$\Delta\gamma_i \simeq ma_y \left[-\left(\frac{q_i - b_i}{b_i}\right) \rho_i^s + \rho_i^p \right] = ma_y \, \chi_i$$

[First reported by *Francesco Bucchi* on 9 October 2014]

Ch. 6, page 135, eqn. (6.18)

Delete the term $\cos\big(\delta_{ij}(\delta_v)\big)$.
[First reported by *Francesco Bucchi* on 9 October 2014]

Ch. 6, page 137, eqn. (6.23) and (6.25)

Replace a_y with ma_y in all last terms.
[First reported by *Massimo Guiggiani* on 9 December 2015]

Ch. 6, page 152, eqn. (6.59)

The sign of the last term is wrong. The correct equation is

$$m\tilde{a}_y = Y_1(\alpha_1) + Y_2(\alpha_2)$$

$$0 = Y_1(\alpha_1)a_1 - Y_2(\alpha_2)a_2$$

[First reported by *Aurele Verne* on 23 September 2014]

Ch. 6, page 152, eqn. (6.60)

Exchange a_1 and a_2. The correct equation is

$$\frac{Y_1(\alpha_1)l}{ma_2} = \tilde{a}_y \qquad \text{and} \qquad \frac{Y_2(\alpha_2)l}{ma_1} = \tilde{a}_y$$

[First reported by *Aurele Verne* on 23 September 2014]

Ch. 6, page 152, eqn. (6.61)

Exchange a_1 and a_2. The correct equation is

$$\frac{Y_1(\alpha_1)l}{mga_2} = \frac{Y_1(\alpha_1)}{Z_1^0} = \frac{\tilde{a}_y}{g} \qquad \text{and} \qquad \frac{Y_2(\alpha_2)l}{mga_1} = \frac{Y_2(\alpha_2)}{Z_2^0} = \frac{\tilde{a}_y}{g}$$

[First reported by *Aurele Verne* on 23 September 2014]

Ch. 6, page 153, eqn. (6.66)

The third terms must be exchanged. The correct equation is

$$\operatorname{grad} \rho_p = \left(\frac{\partial \rho_p}{\partial \tilde{a}_y}, \frac{\partial \rho_p}{\partial \delta_v} \right) = (\rho_y, \rho_\delta) = -\left(K_{\rho_y}, K_{\rho_\delta} \right)$$

$$\operatorname{grad} \beta_p = \left(\frac{\partial \beta_p}{\partial \tilde{a}_y}, \frac{\partial \beta_p}{\partial \delta_v} \right) = (\beta_y, \beta_\delta) = -\left(K_{\beta_y}, K_{\beta_\delta} \right)$$

[First reported by *Nicola Boscolo Zemelo* on 26 May 2014]

Ch. 6, page 157, line 8

Replace "two intersecting lines" with "the two lines intersecting at the vertical axis".
[First reported by *Francesco Bucchi* on 9 October 2014]

Ch. 6, page 157, line 12

Replace "In Fig. 6.15" with "In Fig. 6.14".
[First reported by *Cristiano Pieralice* on 10 February 2015]

Ch. 6, page 164, line 3

Replace 6.24 with 6.23
[First reported by *Davide Malatesta* on 31 January 2018]

Ch. 6, page 164, line 4

Replace 6.18 with 6.19
[First reported by *Davide Malatesta* on 31 January 2018]

Ch. 6, page 168, line −1

Replace "negative" with "positive".
[First reported by *Giulio De Simone* on 20 November 2015]

Ch. 6, page 172, line 15

Replace "damping coefficient" with "damping ratio"
[First reported by *Alessio Artoni* on 15 May 2016]

Ch. 6, page 172, eqn. (6.91)

Delete all the last term (it is not correct), thus leaving only

$$\omega_s = \omega_n \sqrt{1 - \zeta^2}$$

[First reported by *Emanuele Abbatessa* on 17 April 2018]

Ch. 6, page 174, eqn. (6.101)

The correct equation is

$$\ddot{\beta}_t + 2\zeta\omega_n\dot{\beta}_t + \omega_n^2\beta_t = -a_{22}b_1 + a_{12}b_2 + \dot{b}_1 = F_\beta$$

$$\ddot{\rho}_t + 2\zeta\omega_n\dot{\rho}_t + \omega_n^2\rho_t = a_{21}b_1 - a_{11}b_2 + \dot{b}_2 = F_\rho$$

[First reported by *Massimo Guiggiani* on 17 March 2016]

Ch. 6, page 176, eqn. (6.66')

To be corrected like eqn. (6.66)
[First reported by *Niccolò Galeotti* on 29 January 2015]

Ch. 6, page 183, eqn. (6.142)

Replace C_1 with Φ_1 in the last equation.
[First reported by *Francesco Bucchi* on 28 November 2014]

Ch. 6, page 184, Table 6.1

In the last column, replace deg/g with deg/(mg).
[First reported by *Massimo Guiggiani* on 2 March 2016]

Ch. 6, page 195, line 10

The sentence "If we assume $\delta_v = 0$" should appear at the beginning of line 10, instead of line 12.
[First reported by *Aurele Verne* on 30 September 2014]

Ch. 6, page 198, Fig. 6.44

Reverse the sign of α_1 and α_2.
[First reported by *Nicola Cambri* on 17 February 2017]

Chapter 7 - Handling of Race Cars

Ch. 7, page 206, eqn. (7.5)

In the third equation change the sign of the right-hand side term. The correct equation is

$$\Delta X_1 = \left[F_{y_{11}} \sin(\delta_{11}) - F_{y_{12}} \sin(\delta_{12}) \right]/2 \simeq 0$$

[First reported by *Daniele Calderini* on 15 April 2015]

Ch. 7, page 207, eqn. (7.13)

In the denominators replace 2 with 4. The correct equation is

$$D_1 = -\frac{1}{4}\rho_a S_a C_{z1} \qquad \text{and} \qquad D_2 = -\frac{1}{4}\rho_a S_a C_{z2}$$

[First reported by *Samuele Barsacchi* on 3 February 2015]

Ch. 7, page 208, eqn. (7.17)

In the third equation, t_1 is missing in the left-hand side term. Moreover, change the sign. The correct equation is

$$\left[F_{y_{11}} \sin(\delta_{11}) - F_{y_{12}} \sin(\delta_{12}) \right] t_1/2 = \Delta X_1(v, r, u, \delta_v, N_d) t_1$$

[First reported by *Aurele Verne and Daniele Calderini* on 30 September 2014 and 15 April 2015]

Ch. 7, page 208, eqn. (7.18)

In the fourth equation, t_2 is missing twice. The correct equation is

$$N_d = \left(F_{x_{22}} - F_{x_{21}} \right) t_2/2 = \Delta X_2(v, r, u, \delta_v, N_d, \omega_{21}, \omega_{22}) t_2$$

[First reported by *Aurele Verne* on 30 September 2014]

Ch. 7, page 220, caption of Fig. 7.23

Replace "steer angle" with "lateral acceleration"
[First reported by *Massimo Guiggiani* on 15 July 2016]

Chapter 8 - Ride Comfort and Road Holding

Ch. 8, page 246, line -17

Replace $z(t) = -25y(t)$ with $y(t) = -25z(t)$.
[First reported by *Massimo Guiggiani* on 4 January 2018]

Ch. 8, page 247, line 5

Insert a minus sign before Ω^2.
[First reported by *Giacomo Bianco* on 10 April 2014]

Ch. 8, page 248, line 11

The correct subscript is 2. Therefore, it should be: "$\zeta_2 = 0.44$ and $\omega_2\sqrt{1-\zeta_2^2} = 77.0$ rad/s for the second mode"
[First reported by *Massimo Guiggiani* on 3 January 2018]

Ch. 8, pages 249–252, Figs. 8.8, 8.11 and 8.12

Frequency in Hertz (Hz) is shown along the abscissa, not radians per second.
[First reported by *Massimo Guiggiani* on 16 December 2015]

Ch. 8, page 258, eqn. (8.70)

The correct equation is

$$\mathbf{x}_1 = (Z_{s_1}, 1) = \left(\frac{z_{s_1}(t)}{\theta_1(t)}, 1\right) \qquad \text{and} \qquad \mathbf{x}_2 = (Z_{s_2}, 1) = \left(\frac{z_{s_2}(t)}{\theta_2(t)}, 1\right)$$

[First reported by *Niccolò Galeotti* on 29 January 2015]

Ch. 8, page 258, eq. (8.72)

Insert a minus sign in front of the two fractions.
[First reported by *Cecilia Moreschini* on 6 March 2018]

Ch. 8, page 265, eq. (8.101)

Insert a minus sign in front of the last term.
[First reported by *Cecilia Moreschini* on 6 March 2018]

Chapter 9 - Handling with Roll Motion

Ch. 9, page 284, eqn. (9.31)

Change the sign from minus to plus within the last parentheses of each row. The correct equation is

$$\begin{aligned}
\dot{\mathbf{K}}_G^r = \quad & [J_x\dot{p} - (J_y - J_z)qr - J_{xy}(\dot{q} - rp) - J_{yz}(q^2 - r^2) - J_{zx}(\dot{r} + pq)]\mathbf{i}_3 \\
& + [J_y\dot{q} - (J_z - J_x)rp - J_{yz}(\dot{r} - pq) - J_{zx}(r^2 - p^2) - J_{xy}(\dot{p} + qr)]\mathbf{j}_3 \\
& + [J_z\dot{r} - (J_x - J_y)pq - J_{zx}(\dot{p} - qr) - J_{xy}(p^2 - q^2) - J_{yz}(\dot{q} + rp)]\mathbf{k}_3
\end{aligned}$$

Ch. 9, page 284, eqn. (9.32)

Change the sign from minus to plus within the last parentheses in the first row. The correct equation is

$$\dot{\mathbf{K}}_G^r = \quad [J_x \dot{p} - (J_y - J_z)qr - J_{zx}(\dot{r} + pq)]\mathbf{i}_3$$
$$+ \ldots$$

Ch. 9, page 287, eqn. (9.44)

Change the second instance of Z_{a1} to Z_{a2}. The correct equation is

$$Z = Z_1 + Z_{a1} + Z_2 + Z_{a2} - mg$$

Chapter 10 - Tire Models

Ch. 10, page 299, eqn. (10.27)

Replace CP with DP. The correct equation is

$$\mathbf{V}_P = \mathbf{V}_d + \Omega_{s_z}\mathbf{k} \times DP = \mathbf{V}_c + \dot{\mathbf{q}} + \Omega_{s_z}\mathbf{k} \times (\hat{x}\mathbf{i} + \hat{y}\mathbf{j})$$

Ch. 10, page 337, eqn. (10.113)

Replace s_{xy} with s_{yy} in the last term.

Ch. 10, page 337, line -4

Replace $\leq$ with $\geq$ in both occurrences.

Ch. 10, page 340, eqn. (10.128)

In the seventh equation replace e_x by e_y. The correct equation is

$$k|e_y(\hat{x}_s(t), t)| = \mu p(\hat{x}_s(t))$$

[First reported by *Aurele Verne* on 10 December 2014]

2014

Ch. 3, page 52, eqn. (3.15)

Insert the unit vector $\mathbf{j}$ before the last $=$. The correct equation is

$$\mathbf{a}_C = (a_x - r^2 S - \dot{r}R)\mathbf{i} + (a_y - r^2 R + \dot{r}S)\mathbf{j} = r(\dot{R}\mathbf{i} - \dot{S}\mathbf{j})$$

[First reported by *Antonio Sponziello* on 13 March 2014]

Ch. 3, page 85, line -12

Change m_n to m_u. However, throughout the book, m_n and m_u should be considered as synonymous.
[First reported by *Aurele Verne* on 13 March 2014]

Ch. 8, page 247, line 5

Insert a minus sign before Ω^2.
[First reported by *Giacomo Bianco* on 10 April 2014]

Ch. 9, page 287, eqn. (9.44)

Change the second instance of Z_{a1} to Z_{a2}. The correct equation is

$$Z = Z_1 + Z_{a1} + Z_2 + Z_{a2} - mg$$

[First reported by *Giacomo Bianco* on 10 April 2014]

Ch. 6, page 153, eqn. (6.66)

The third terms must be exchanged. The correct equation is

$$\operatorname{grad} \rho_p = \left(\frac{\partial \rho_p}{\partial \tilde{a}_y}, \frac{\partial \rho_p}{\partial \delta_v} \right) = (\rho_y, \rho_\delta) = -\left(K_{\rho_y}, K_{\rho_\delta} \right)$$

$$\operatorname{grad} \beta_p = \left(\frac{\partial \beta_p}{\partial \tilde{a}_y}, \frac{\partial \beta_p}{\partial \delta_v} \right) = (\beta_y, \beta_\delta) = -\left(K_{\beta_y}, K_{\beta_\delta} \right)$$

[First reported by *Nicola Boscolo Zemelo* on 26 May 2014]

17

Ch. 5, page 117, line 3

Change $\dot{r}$ to r.
[First reported by *Massimo Guiggiani* on 17 July 2014]

Ch. 6, page 152, eqn. (6.59)

The sign of the last term is wrong. The correct equation is

$$m\tilde{a}_y = Y_1(\alpha_1) + Y_2(\alpha_2)$$

$$0 = Y_1(\alpha_1)a_1 - Y_2(\alpha_2)a_2$$

[First reported by *Aurele Verne* on 23 September 2014]

Ch. 6, page 152, eqn. (6.60)

Exchange a_1 and a_2. The correct equation is

$$\frac{Y_1(\alpha_1)l}{ma_2} = \tilde{a}_y \qquad \text{and} \qquad \frac{Y_2(\alpha_2)l}{ma_1} = \tilde{a}_y$$

[First reported by *Aurele Verne* on 23 September 2014]

Ch. 6, page 152, eqn. (6.61)

Exchange a_1 and a_2. The correct equation is

$$\frac{Y_1(\alpha_1)l}{mga_2} = \frac{Y_1(\alpha_1)}{Z_1^0} = \frac{\tilde{a}_y}{g} \qquad \text{and} \qquad \frac{Y_2(\alpha_2)l}{mga_1} = \frac{Y_2(\alpha_2)}{Z_2^0} = \frac{\tilde{a}_y}{g}$$

[First reported by *Aurele Verne* on 23 September 2014]

Ch. 7, page 208, eqn. (7.18)

In the fourth equation, t_2 is missing twice. The correct equation is

$$N_d = \left(F_{x_{22}} - F_{x_{21}}\right)t_2/2 = \Delta X_2(v, r, u, \delta_v, N_d, \omega_{21}, \omega_{22})t_2$$

[First reported by *Aurele Verne* on 30 September 2014]

Ch. 6, page 195, line 10

The sentence "If we assume $\delta_v = 0$" should appear at the beginning of line 10, instead of line 12.
[First reported by *Aurele Verne* on 30 September 2014]

Ch. 3, page 80, eqn. (3.110)

The last two terms in both equations must be changed. Moreover, in the denominator of the next to last term in the second equation the subscript should be 2. The correct equation is

$$\phi_1^s = \frac{1}{k_{\phi_1}^s} \frac{k_{\phi_1} k_{\phi_2}}{k_\phi} \left[\frac{Y(h - q^b)}{k_{\phi_2}} - \frac{Y_1 q_1}{k_{\phi_1}^p} + \frac{Y_2 q_2}{k_{\phi_2}^p} \right]$$

$$\phi_2^s = \frac{1}{k_{\phi_2}^s} \frac{k_{\phi_1} k_{\phi_2}}{k_\phi} \left[\frac{Y(h - q^b)}{k_{\phi_1}} - \frac{Y_2 q_2}{k_{\phi_2}^p} + \frac{Y_1 q_1}{k_{\phi_1}^p} \right]$$

The same equation (3.110) is repeated on page 88 and hence must be corrected as well.
[First reported by *Daniele Calderini* on 30 September 2014]

Ch. 6, page 133, eqn. (6.8)

There are the same errors as above, that is the last two terms in both equations must be changed. Moreover, in the denominator of the next to last term in the second equation the subscript should be 2. The correct equation is

$$\phi_1^s = ma_y \frac{1}{k_{\phi_1}^s} \frac{k_{\phi_1} k_{\phi_2}}{k_\phi} \left[\frac{h - q}{k_{\phi_2}} - \frac{a_2 q_1}{lk_{\phi_1}^p} + \frac{a_1 q_2}{lk_{\phi_2}^p} \right] = ma_y \, \rho_1^s$$

$$\phi_2^s = ma_y \frac{1}{k_{\phi_2}^s} \frac{k_{\phi_1} k_{\phi_2}}{k_\phi} \left[\frac{h - q}{k_{\phi_1}} - \frac{a_1 q_2}{lk_{\phi_2}^p} + \frac{a_2 q_1}{lk_{\phi_1}^p} \right] = ma_y \, \rho_2^s$$

[First reported by *Francesco Bucchi* on 9 October 2014]

Ch. 4, page 107, eqn. (4.21)

In the next to last term of the third equation the subscript should be 2. The correct equation is

$$0 = (X_1 + X_2 + X_a) h - (Z_1 - Z_1^a) a_1 + (Z_2 - Z_2^a) a_2$$

[First reported by *Mauro Scalise* on 2 October 2014]

Ch. 3, page 63, eqn. (3.63)

Replace Z_{a1} and Z_{a2} with Z_1^a and Z_2^a, respectively.
[First reported by *Francesco Bucchi* on 9 October 2014]

Ch. 3, page 64, eqn. (3.65)

Replace the second Z_{a1} with Z_2^a.
[First reported by *Francesco Bucchi* on 9 October 2014]

Ch. 3, page 64, eqn. (3.65) and (3.66)

Replace Z_{a1} and Z_{a2} with Z_1^a and Z_2^a, respectively.
[First reported by *Francesco Bucchi* on 9 October 2014]

Ch. 6, page 135, eqn. (6.17)

Change the sign of both terms within square brackets. The correct equation is

$$\Delta\gamma_i \simeq ma_y \left[-\left(\frac{q_i - b_i}{b_i}\right)\rho_i^s + \rho_i^p \right] = ma_y\,\chi_i$$

[First reported by *Francesco Bucchi* on 9 October 2014]

Ch. 6, page 135, eqn. (6.18)

Delete the term $\cos\big(\delta_{ij}(\delta_v)\big)$.
[First reported by *Francesco Bucchi* on 9 October 2014]

Ch. 6, page 157, line 8

Replace "two intersecting lines" with "the two lines intersecting at the vertical axis".
[First reported by *Francesco Bucchi* on 9 October 2014]

Ch. 2, page 29, line 1

Replace "breaking" with "braking".
[First reported by *Bengt J. H. Jacobson* on 14 October 2014]

Ch. 6, page 183, eqn. (6.142)

Replace C_1 with Φ_1 in the last equation.
[First reported by *Francesco Bucchi* on 28 November 2014]

Ch. 3, page 55, eqn. (3.40)

Unit vectors **i** and **j** are missing. The correct equation is

$$GK = \frac{a_x r^2 - a_y \dot{r}}{r^4 + \dot{r}^2}\mathbf{i} + \frac{a_x \dot{r} + a_y r^2}{r^4 + \dot{r}^2}\mathbf{j}$$

[First reported by *Massimo Guiggiani* on 3 December 2014]

Ch. 10, page 340, eqn. (10.128)

In the seventh equation replace e_x by e_y. The correct equation is

$$k|e_y(\hat{x}_s(t), t)| = \mu p(\hat{x}_s(t))$$

[First reported by *Aurele Verne* on 10 December 2014]

2015

Ch. 3, page 57, eqn. (3.45)

In the third and fourth equations change the sign in front of $(v - ra_2)$. The correct equations are

$$\sigma_{x_{21}} = \frac{[(u - rt_2/2)\cos(\delta_{21}) + (v - ra_2)\sin(\delta_{21})] - \omega_{21}\, r_2}{\omega_{21}\, r_2}$$

$$\sigma_{x_{22}} = \frac{[(u + rt_2/2)\cos(\delta_{22}) + (v - ra_2)\sin(\delta_{22})] - \omega_{22}\, r_2}{\omega_{22}\, r_2}$$

[First reported by *Riccardo Bartolozzi* on 10 January 2015]

Ch. 3, page 57, eqn. (3.46)

In the last equation change the sign in front of $rt_2/2$. The correct equation is

$$\sigma_{y_{22}} = \frac{(v - ra_2)\cos(\delta_{22}) - (u + rt_2/2)\sin(\delta_{22})}{\omega_{22}\, r_2}$$

[First reported by *Riccardo Bartolozzi* on 10 January 2015]

Ch. 3, page 59, line 14

Replace "couple" with "moment".
[First reported by *Riccardo Bartolozzi* on 10 January 2015]

Ch. 3, page 63, line -2

Replace (3.63) with (3.53).
[First reported by *Riccardo Bartolozzi* on 10 January 2015]

Ch. 3, page 65, line 14

Delete ΔZ.
[First reported by *Riccardo Bartolozzi* on 10 January 2015]

Ch. 3, pages 53 and 54

All instances of $\sin(\beta)$ and $\cos(\beta)$ should be replaced by $\sin(\hat{\beta})$ and $\cos(\hat{\beta})$, respectively.
[First reported by *Massimo Guiggiani* on 10 January 2015]

Ch. 5, pages 126–130

All instances of $\cos(\beta)$, $\cos(\beta_1)$ and $\cos(\beta_2)$ should be replaced, respectively, by $\cos(\hat{\beta})$, $\cos(\hat{\beta}_1)$ and $\cos(\hat{\beta}_2)$, consistently with eqn. (3.18).
[First reported by *Massimo Guiggiani* on 10 January 2015]

Ch. 3, page 52, line −9

Add the sentence
"Actually, in most cases $\beta \simeq \hat{\beta}$, and they can be considered as synonymous (Fig. 3.2)."
[First reported by *Massimo Guiggiani* on 10 January 2015]

Ch. 6, page 134, eqn. (6.12)

The mass m is missing in the last term of the second line. The correct equation is

$$= \delta_{ij}^0 + \delta_v \tau_{ij} + \Upsilon_{ij} m \rho_i^s a_y$$

[First reported by *Niccolò Galeotti* on 29 January 2015]

Ch. 6, page 176, eqn. (6.66')

To be corrected like eqn. (6.66)
[First reported by *Niccolò Galeotti* on 29 January 2015]

Ch. 8, page 258, eqn. (8.70)

The correct equation is

$$\mathbf{x}_1 = (Z_{s_1}, 1) = \left(\frac{z_{s_1}(t)}{\theta_1(t)}, 1 \right) \qquad \text{and} \qquad \mathbf{x}_2 = (Z_{s_2}, 1) = \left(\frac{z_{s_2}(t)}{\theta_2(t)}, 1 \right)$$

[First reported by *Niccolò Galeotti* on 29 January 2015]

Ch. 10, page 299, eqn. (10.27)

Replace CP with DP. The correct equation is

$$\mathbf{V}_P = \mathbf{V}_d + \Omega_{s_z} \mathbf{k} \times DP = \mathbf{V}_c + \dot{\mathbf{q}} + \Omega_{s_z} \mathbf{k} \times (\hat{x}\mathbf{i} + \hat{y}\mathbf{j})$$

[First reported by *Samuele Barsacchi* on 31 January 2015]

Ch. 2, page 7, lines 14–17

Replace

> In the lower part, the sidewalls bend and, thanks to the air pressure p_a, they apply more vertical forces F_a in the bead area than in the upper part. The overall effect on the rim is a vertical load F_z. The higher the air pressure p_a, the lower the sidewall bending.
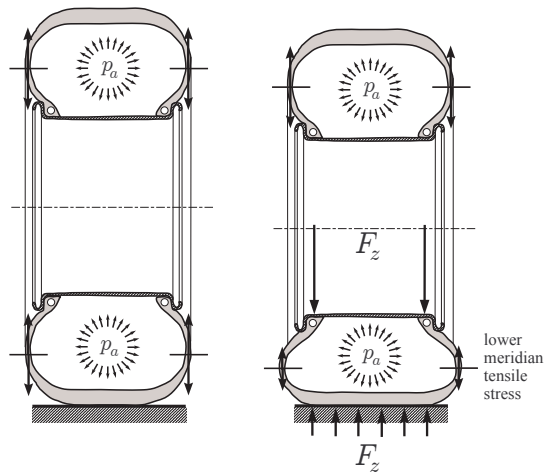
with

> In the lower part the radial cords encased in the sidewalls undergo a reduction of tension because they no longer have to balance the air pressure p_a acting on the contact patch. The net result is that the total upward pull of the cords on the bead exceeds that of the downward pull by an amount equal to the vertical load F_z.

[First reported in the review by Jon W. Mooney, Noise Control Engineering Journal, Vol. 62 (3), May-June, 2014, added here on 31 January 2015]

Ch. 2, page 8, Fig. 2.1

The correct figure is

[First reported in the review by Jon W. Mooney, Noise Control Engineering Journal, Vol. 62 (3), May-June, 2014, added here on 31 January 2015]

Ch. 7, page 207, eqn. (7.13)

In the denominators replace 2 with 4. The correct equation is

$$D_1 = -\frac{1}{4}\rho_a S_a C_{z1} \qquad \text{and} \qquad D_2 = -\frac{1}{4}\rho_a S_a C_{z2}$$

[First reported by *Samuele Barsacchi* on 3 February 2015]

Ch. 6, page 157, line 12

Replace "In Fig. 6.15" with "In Fig. 6.14".
[First reported by *Cristiano Pieralice* on 10 February 2015]

Ch. 7, page 206, eqn. (7.5)

In the third equation change the sign of the right-hand side term. The correct equation is

$$\Delta X_1 = \left[F_{y_{11}} \sin(\delta_{11}) - F_{y_{12}} \sin(\delta_{12}) \right]/2 \simeq 0$$

[First reported by *Daniele Calderini* on 15 April 2015]

Ch. 7, page 208, eqn. (7.17)

In the third equation, t_1 is missing in the left-hand side term. Moreover, change the sign. The correct equation is

$$\left[F_{y_{11}}\sin(\delta_{11}) - F_{y_{12}}\sin(\delta_{12})\right]t_1/2 = \Delta X_1(v, r, u, \delta_v, N_d)t_1$$

[First reported by *Aurele Verne and Daniele Calderini* on 30 September 2014 and 15 April 2015]

Ch. 2, page 31, eqn. (2.69)

The correct equation is

$$\tan\alpha = -\frac{\sigma_y}{1 + \sigma_x}$$

without the last part.
[First reported by *Massimo Guiggiani* on 8 November 2015]

Ch. 2, page 41, captions of Figs. 2.23 and 2.24

Replace the first two instances of F_y with F_x.
[First reported by *Massimo Guiggiani* on 12 November 2015]

Ch. 1, page 2, lines 5 and 8

Replace "kart" with "cart".
[First reported by *Basilio Lenzo* on 20 November 2015]

Ch. 1, page 4, line -15

Replace "from the axis" with "from the longitudinal axis x".
[First reported by *Basilio Lenzo* on 20 November 2015]

Ch. 3, page 49, eqn. (3.5)

Replace $-\sin\psi$ with $\sin\psi$.
[First reported by *Basilio Lenzo* on 20 November 2015]

Ch. 6, page 168, line -1

Replace "negative" with "positive".
[First reported by *Giulio De Simone* on 20 November 2015]

Ch. 9, page 284, eqn. (9.31)

Change the sign from minus to plus within the last parentheses of each row. The correct equation is

$$\dot{\mathbf{K}}_G^r = \quad [J_x\dot{p} - (J_y - J_z)qr - J_{xy}(\dot{q} - rp) - J_{yz}(q^2 - r^2) - J_{zx}(\dot{r} + pq)]\mathbf{i}_3$$
$$+ [J_y\dot{q} - (J_z - J_x)rp - J_{yz}(\dot{r} - pq) - J_{zx}(r^2 - p^2) - J_{xy}(\dot{p} + qr)]\mathbf{j}_3$$
$$+ [J_z\dot{r} - (J_x - J_y)pq - J_{zx}(\dot{p} - qr) - J_{xy}(p^2 - q^2) - J_{yz}(\dot{q} + rp)]\mathbf{k}_3$$

[First reported by *Oleg Yuri Giovannini* on 22 November 2015]

Ch. 9, page 284, eqn. (9.32)

Change the sign from minus to plus within the last parentheses in the first row. The correct equation is

$$\dot{\mathbf{K}}_G^r = \quad [J_x\dot{p} - (J_y - J_z)qr - J_{zx}(\dot{r} + pq)]\mathbf{i}_3$$
$$+ \ldots$$

[First reported by *Oleg Yuri Giovannini* on 22 November 2015]

Ch. 2, page 39, line -1

Add the sentence "All forces are in kN.".
[First reported by *Basilio Lenzo* on 26 November 2015]

Ch. 3, page 54, eqn. (3.32)

A $\cos^2 \hat{\beta}$ is missing. The correct equation is

$$\rho_G = \frac{r + \dot{\beta}\cos^2\hat{\beta}}{u}\cos\hat{\beta} = \frac{r}{\sqrt{u^2 + v^2}} + \frac{\dot{v}u - v\dot{u}}{(u^2 + v^2)^{\frac{3}{2}}}$$

[First reported by *Basilio Lenzo* on 3 December 2015]

Ch. 3, page 59, lines under eqn. (3.52)

To be replaced with
"since $J_{yz} \simeq 0$. Moreover, it is worth noting that typically $|J_{zx}| \ll J_z$. Therefore, we can often safely assume $\dot{\mathbf{K}}_G^r \simeq J_z\dot{r}\mathbf{k}$."
[First reported by *Basilio Lenzo* on 3 December 2015]

Ch. 6, page 135, eqn. (6.14)

Replace a_y with ma_y in all last terms.
[First reported by *Massimo Guiggiani* on 9 December 2015]

Ch. 6, page 137, eqn. (6.23) and (6.25)

Replace a_y with ma_y in all last terms.
[First reported by *Massimo Guiggiani* on 9 December 2015]

Ch. 8, pages 249–252, Figs. 8.8, 8.11 and 8.12

Frequency in Hertz (Hz) is shown along the abscissa, not radians per second.
[First reported by *Massimo Guiggiani* on 16 December 2015]

2016

Ch. 10, page 337, eqn. (10.113)

Replace s_{xy} with s_{yy} in the last term.
[First reported by *Alberto Bortolini* on 10 January 2016]

Ch. 6, page 184, Table 6.1

In the last column, replace $\deg/g$ with $\deg/(\mathrm{m}g)$.
[First reported by *Massimo Guiggiani* on 2 March 2016]

Ch. 6, page 174, eqn. (6.101)

The correct equation is

$$\ddot{\beta}_t + 2\zeta\omega_n\dot{\beta}_t + \omega_n^2\beta_t = -a_{22}b_1 + a_{12}b_2 + \dot{b}_1 = F_\beta$$

$$\ddot{\rho}_t + 2\zeta\omega_n\dot{\rho}_t + \omega_n^2\rho_t = a_{21}b_1 - a_{11}b_2 + \dot{b}_2 = F_\rho$$

[First reported by *Massimo Guiggiani* on 17 March 2016]

Ch. 6, page 132, eqn. (6.5)

Insert a minus sign in front of mvr. The beginning of the correct equation is

$$ma_x = -mvr = \ldots$$

[First reported by *Marco Gabiccini* on 15 April 2016]

Ch. 6, page 172, line 15

Replace "damping coefficient" with "damping ratio"
[First reported by *Alessio Artoni* on 15 May 2016]

Ch. 7, page 220, caption of Fig. 7.23

Replace "steer angle" with "lateral acceleration"
[First reported by *Massimo Guiggiani* on 15 July 2016]

Ch. 3, page 88, eqn. (3.45')

In the third and fourth equations change the sign in front of $(v - ra_2)$. The correct equations are

$$\sigma_{x_{21}} = \frac{[(u - rt_2/2)\cos(\delta_{21}) + (v - ra_2)\sin(\delta_{21})] - \omega_{21}\,r_2}{\omega_{21}\,r_2}$$

$$\sigma_{x_{22}} = \frac{[(u + rt_2/2)\cos(\delta_{22}) + (v - ra_2)\sin(\delta_{22})] - \omega_{22}\,r_2}{\omega_{22}\,r_2}$$

[First reported by *Stelios (Stylianos) Markolefas* on 5 October 2016]

Ch. 3, page 89, eqn. (3.46')

In the last equation change the sign in front of $rt_2/2$. The correct equation is

$$\sigma_{y_{22}} = \frac{(v - ra_2)\cos(\delta_{22}) - (u + rt_2/2)\sin(\delta_{22})}{\omega_{22}\,r_2}$$

[First reported by *Stelios (Stylianos) Markolefas* on 5 October 2016]
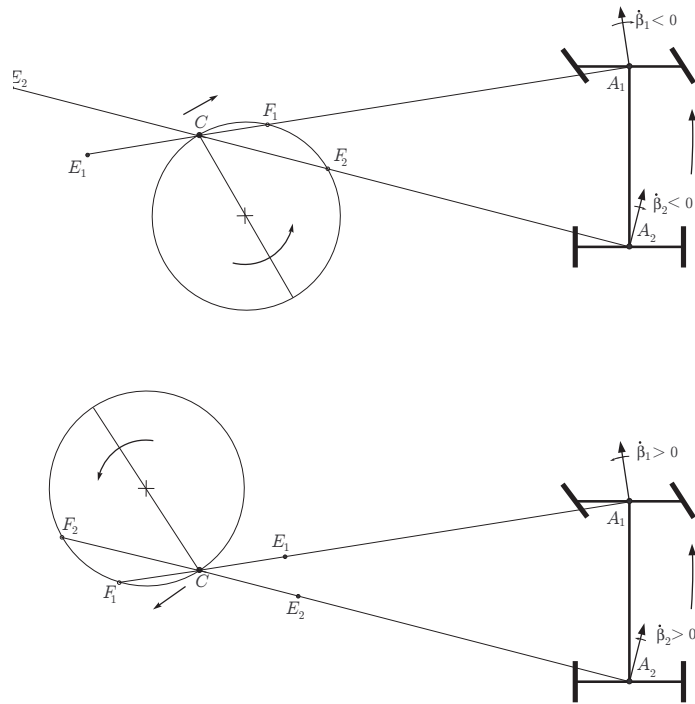

Ch. 3, page 79, eqn. (3.101')

Change the sign in front of N_Y/Y.
[First reported by *Stelios (Stylianos) Markolefas* on 5 October 2016]

Ch. 3, page 90, eqn. (3.126)

The second equation should be $M_l M_h \leq 0$.
[First reported by *Massimo Guiggiani* on 7 October 2016]

Ch. 5, page 127, Fig. 5.19

The correct figure is

[First reported by *Matteo Pergoli* on 28 November 2016]

Ch. 6, page 132, eqn. (6.3)

In the last two equations the sign in front of $(v - ra_2)$ is $+$.
[First reported by *Massimo Guiggiani* on 12 December 2016]

Ch. 3, page 87, eqn. (3.122)

The correct equation is

$$\sqrt{X_{ij}^2 + Y_{ij}^2} \leq \mu_p Z_{ij} \qquad \text{and} \qquad Z_{ij} \geq 0$$

[First reported by *Marco Gabiccini* on 22 December 2016]

Ch. 3, page 70, line -6

Delete the sentence
"An alternative selection could be the roll angle ϕ and the track variations Δt_1 and Δt_2."
[First reported by *Stelios (Stylianos) Markolefas* on 3 February 2017]

Ch. 6, page 198, Fig. 6.44

Reverse the sign of α_1 and α_2.
[First reported by *Nicola Cambri* on 17 February 2017]

Ch. 10, page 337, line -4

Replace $\leq$ with $\geq$ in both occurrences.
[First reported by *Massimo Guiggiani* on 16 August 2017]

Ch. 3, page 49, Fig. 3.2

Replace β with $\hat{\beta}$.
[First reported by *Matteo Pergoli* on 16 October 2017]

Ch. 3, page 51, Fig. 3.4

Replace β with $\hat{\beta}$.
[First reported by *Matteo Pergoli* on 16 October 2017]

Ch. 8, page 248, line 11

The correct subscript is 2. Therefore, it should be: "$\zeta_2 = 0.44$ and $\omega_2\sqrt{1 - \zeta_2^2} = 77.0$ rad/s for the second mode"
[First reported by *Massimo Guiggiani* on 3 January 2018]

Ch. 8, page 246, line -17

Replace $z(t) = -25y(t)$ with $y(t) = -25z(t)$.
[First reported by *Massimo Guiggiani* on 4 January 2018]

Ch. 6, page 164, line 3

Replace 6.24 with 6.23
[First reported by *Davide Malatesta* on 31 January 2018]

Ch. 6, page 164, line 4

Replace 6.18 with 6.19
[First reported by *Davide Malatesta* on 31 January 2018]

Ch. 2, page 32, Fig. 2.14

Replace x with y and y with x in the axis labels.
[First reported by *Cecilia Moreschini* on 6 March 2018]

Ch. 8, page 258, eq. (8.72)

Insert a minus sign in front of the two fractions.
[First reported by *Cecilia Moreschini* on 6 March 2018]

Ch. 8, page 265, eq. (8.101)

Insert a minus sign in front of the last term.
[First reported by *Cecilia Moreschini* on 6 March 2018]

Ch. 6, page 172, eqn. (6.91)

Delete all the last term (it is not correct), thus leaving only

$$\omega_s = \omega_n \sqrt{1 - \zeta^2}$$

[First reported by *Emanuele Abbatessa* on 17 April 2018]