Vehicle Accident Analysis and Reconstruction Methods

Raymond M. Brach and R. Matthew Brach, SAE, 2005 **First Printing**

August 10, 2012

page	Eq/Line	Correction	Comment
33	(2.32)	$F_y(\alpha,s)=\dfrac{F_x(s)F_y(\alpha)}{\sqrt{s^2F_y^2(\alpha)+F_x^2(s)\tan^2\alpha}}\dfrac{\sqrt{(1-s)^2\cos^2\alpha F_y^2(\alpha)+\sin^2\alpha C_s^2}}{C_s\cos\alpha}$	subscript, s, and superscript, 2, missing on C
41	line 3	$\tau=\dfrac{-11.11}{-7.86}=1.4\ s.$	incorrect number in denominator
41	line 4	. . . skids to a stop in 1.4 s . . .	skid time is 1.4 s, not 1.3 s
45	line 24	$f_r=\dfrac{F_{tr}}{F_{zr}}=\dfrac{T/R_w}{F_{zr}}=\dfrac{1935/0.34}{13947}=0.408$	F_{tr} should be torque, T, divided by the rolling radius R_w
48	line 9	calculation for μ_s has units ft/s	units should be ft not ft/s
49	line 3	$\sigma_d = v_0\ \sigma_{PDR} = 44 \times 0.833 = 3.65$ ft	$\sigma_d = v_0\ \sigma_{PDR} = 44 \times 0.0833 = 3.65$ ft
	line 5	$\sigma_t = \sigma_{PDR} = 0.83$ s	$\sigma_t = \sigma_{PDR} = 0.083$ s
	line 8	...and a standard deviation of 0.83 s.	...and a standard deviation of 0.083 s.
47	Ex 3.4	grade is 5° ($f_{eq} = 0.585$)	grade is not 5%
60	line 25	$F_y(s)\approx f_yF_z$	symbol for frictional drag coefficient is f, not μ
	(4.8)	$F_y(\alpha,s)\approx f_yF_z$	no subscript on α; frictional drag coefficient is f
	(4.9)	$F_x(\alpha,s)\approx 0$	no subscript on α
69	(5.2)	$f_E=f_t\sin\alpha+f_p\cos\alpha+\sin\theta$	subscript on last f should be p
77	Eq 5.8	$\frac{1}{2}I_0\dot{\theta}^2=mg\left(\sqrt{\left(\frac{T}{2}\right)^2+h^2}-h\right)$	$\dot{\theta}$ should be squared
77	Eq. 5.6	$V=\sqrt{2gh\sqrt{\left(\frac{T}{2h}\right)^2+1}-1}$	the 1 under the second square root should be positive
85	line 8	. . .using Eq. 5.15	the equation number should be 5.15, not 5.16
93	last - 4	. . . lated using Eq. 5.15.	cited equation should be Eq. 5.15, not Eq. 5.16
93	last	using Eq 5.12.	cited equation should be Eq. 5.12, not Eq. 5.13
94	line 1	Equation 5.12 is used . . .	cited equation should be Eq. 5.12, not Eq. 5.13
94	line 5	(Eq. 5.13)	cited equation should be Eq. 5.13, not Eq. 5.14

110	last	= 9.18 m/s should be = -9.18 m/s	missing negative sign
115	(6.27)	$e_k = \sqrt{\frac{e_1^2 k_2 + e_2^2 k_1}{k_1 + k_2}}$	missing square root sign
125	(6.65b)	$+\frac{1}{2} P_t \left[(v_{1t} - d_d \omega_1) - (v_{2t} + d_b \omega_2) + (V_{1t} - d_d \Omega_1) - (V_{2t} + d_b \Omega_2) \right]$	V_{2t} in second parenthesized term should be lower case
146	fig 7.16	units of speed for solid curve are ft/s	change mph to ft/s on right side of figure
150	last	. . .range of 5.22 ft/s to 6.07 ft/s (2.3m/s	units should be ft/s not mph
151	first	. . .range of -4.31 ft/s to -4.93 ft/s (-1.9 m/s to	units should be ft/s not mph
152	last	. . *in Chapter 11*. should be . . *in Reference 6 of Chapter 7*.	Chapter 11 does not cover low-speed impact simulation.
154	Sol'n A	V = 43.8 mph (64.2 ft/s, 70.5 kph)	units in the equation in Figure 8.1 are mph
154	Sol'n B	. . , C = 0 occurs at a speed of V = 6.85 mph (10.1 ft/s, 11.0 kph), when the kinetic energy is 7059.9 ft-lb (9.57 kJ).	units in the equation in Figure 8.1 are mph
		$d_0 = \sqrt{\frac{2(7059.5)}{6.58}} = 46.31,\ lb^{1/2}$	
		$d_1 = \frac{1}{C}\left(\sqrt{\frac{2E_C}{w}} - d_0 \right) = \frac{1}{3.5}\left(\sqrt{\frac{2(288,631)}{6.58}} - 46.31 \right)$	
		$= 71.39\ lb^{1/2}/ft\ (4.59\ N^{1/2}/cm)$	
158	line 21	. . . should not be computed by Eq 8.10.	citation should be to Eq 8.10, not Eq 8.8
162	line 12	Equation 8.14 gives d_1 . . .	citation should be to Eq 8.14, not Eq 8.12
164	line 6	. . . methods, but this is not done here.	insert "this is"
169	last-5	. . . from $\tau = \tau_0$ to $\tau = \tau_{c1}$ . . .	s_1 begins when s_0 ends
170	Eq 9.9	$\tau_R = \frac{v_{p0} \sin\theta}{g \cos\varphi} + \frac{\sqrt{v_{p0}^2 \sin^2\theta + 2gh\cos\varphi}}{g\cos\varphi}$	second equal sign should be a plus sign
192	line 4	. . . two lines in three dimensional space.	insert the word "dimensional"
192	(10.4b)	$y_m = \frac{c_6 + c_7 x_p + c_8 y_p}{c_4 x_p + c_5 y_p + 1}$	second x_p in denominator should be y_p; see Eq 10A.6
192	¶ 4, line 4	*Insert:* No more than two of the four points can be collinear.	Sentence was omitted.

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