

3 February 2005

ERRATA IN THE 5<sup>th</sup> PRINTING OF TRANSPORT PHENOMENA, NEARLY ALL CONTRIBUTED BY PROFESSOR CARLOS A. RAMIREZ of the University of Puerto Rico (Mayagüez).

ENTRIES MARKED WITH # ARE FROM PROFESSOR DAI GANCE (East China Institute of Chemical Technology) RECEIVED ON JUNE 2. ENTRIES MARKED WITH \*\* ARE FROM MICHAEL LUNDIN, NOTRE DAME UNIV.

<u>Page</u>	<u>Location</u>	<u>Reads</u>	<u>Should Read</u>
vii	Entry for Chapter 9	263	265
ix	Ex. 15.5-3	Heat Meters	Head Meters
19	Note: line 3	plane	unit area
19	Note: line 3	and that this is the force	this being the force per unit area
27#	11 lines after 1.4-16	CHOH	CH <sub>3</sub> OH
37	Question 10	Fig. 1.4-2	Fig. 1.4-3
49	1 line above 2.3-7	Eq. (2.3-8)	Eq. 2.3-6 (no parentheses)
83	Eq 3.5-2	$(\mathbf{v} \cdot \nabla \mathbf{c})$	$(\mathbf{v} \cdot \nabla c)$
87	Footnote (2 <sup>nd</sup> line)	... to <i>Fluid Mechanics</i>	... to <i>Fluid Dynamics</i>
89	1 line above 3.6-19	Equation 3.5-16	Equation 3.6-16
90	Fig 3.6-1 (a)	Figure needs to be redrawn—arrows should be drawn <u>parallel</u> to the top of the page	
99	Eq 3.7-22	$y = 0$	$\tilde{y} = 0$
104	Question 6	Example 3.5-3	Example 3.6-3
105	3B.1(a), line 6	torques on	torques exerted by the fluid on
112*	Eq 3C.5-3	In the second line, the first term should be preceded by a minus sign and, the last term	

should be multiplied by  $\left[\left[\rho^{\text{II}}/\rho^{\text{I}}\right]\right]$

113	3D.3, first equation	3D.3-2	3D.3-1
113	3D.3, first equation	$p$	$\mathcal{P}$
116	1 line above 4.1-5	Eq. 4.4-1	Eq. 4.1-1
127	5 lines below Eq 4.3-11	subtracting	subtracting
131	Fig 4.3-2	$Y = 1$ $Y = -1$	$Y = \pi$ $Y = -\pi$
131	Fig 4.3-3(i)	Arc with two arrowheads for $\pi/\alpha$ should be an arc with one arrowhead, pointing in the counterclockwise direction	
131	Fig 4.3-3 legend	$v_r = -cr^{\alpha-1}$ $v_r = +cr^{\alpha-1}$	$v_r = -c\alpha r^{\alpha-1}$ $v_r = +c\alpha r^{\alpha-1}$
132	Fig 4.3-4	Arc with two arrowheads for $\pi/\alpha$ should be an arc with one arrowhead, pointing in the counterclockwise direction	
132	Fig 4.3-4 caption	$v_x = cx^{\alpha-1} = cx^{\beta/(2-\beta)}$	$v_x = c\alpha x^{\alpha-1} = c'x^{\beta/(2-\beta)}$ where $c' = c[2/(2-\beta)]$
132	4 lines after Eq 4.3-45	$\alpha > 0$	$\alpha > 1$
133	Fig 4.3-5	$Y = 1$ $Y = -1$	$Y = \pi$ $Y = -\pi$
135	Eq 4.4-12	$dy$	$d\bar{y}$
137	Line 3a	by a function	be a function
137	2 line above Eq 4.4-20 1.	in Table 4.2-1.	in the first row of Table 4.2-
137	1 line above Eq 4.4-20	in...entries, we get	in Eq. 4.4-11, we get
138	Eq 4.4-26	$\Pi'$	$\Pi$

139	Fig 4.4-3	Delete $\eta = y\sqrt{\frac{U_\infty}{\nu x}}$ , and replace grid line	
139••	Eq 4.4-31	$v_e = cx^{\beta/(2-\beta)}$	$v_e = c[2/(2-\beta)]x^{\beta/(2-\beta)}$
140	Caption to Fig 4.4-4	Fig. 4.3-4(ii)	Fig. 4.3-3(ii)
140	Eq 4.4-33	$\psi(x, y) = \sqrt{c\nu(2-\beta)}x^{1/(2-\beta)}f(\eta)$ $\psi(x, y) = -\sqrt{c\nu(2-\beta)}x^{1/(2-\beta)}f(\eta)$	
140	Eq 4.4-35	$f''' - ff'' - \beta(1-f'^2) = 0$	$f''' + ff'' + \beta(1-f'^2) = 0$
140	4 lines after Eq 4.4-35	Fig. 4.3-4(a) and Fig. 4.3-5	Fig. 4.3-3(i) and Fig. 4.3-4
140	6 lines after Eq 4.4-35	if $\beta > -0.199$	if $\beta < -0.199$
140	Footnote 9	VII, Sec D	VII, Sec C
147	Eq 4C.2-8	$kI$	$\sqrt{kI}$
148	3 lines below Eq 4C.2-15	$\mathfrak{S}\{\theta_R^0\} / \mathfrak{R}\{\theta_R^0\}$	$\mathfrak{S}\{\theta_R^0\} \setminus \mathfrak{R}\{\theta_R^0\}$
148	2 lines after 4C.2-18	$\mu/\rho = 10 \text{ cm}^2/\text{s}$ $I = 2500 \text{ gm}/\text{cm}^2$	$\mu/\rho = 10^{-2} \text{ cm}^2/\text{s}$ $I = 2500 \text{ gm cm}^2$
148*	3 lines after 4C.2-18	$10^6 \text{ dyn cm.}$	$10^6 \text{ dyn cm,}$ $\rho = 1 \text{ gm}/\text{cm}^3, (a-1)R = 10^{-2} \text{ cm.}$
174	Eq 5C.1-10	$\sqrt{J\rho z/W}$	$\sqrt{JW\rho z}$
175	Eq 5C.2-4	$\left[ \frac{(b^2 - a^2)^{3/2}}{\sqrt{a}} + (1 - b^2)^{3/2} \right]$	$\left[ \sqrt{1 - b^2}(1 - a^2) \right]$
176	Above Eq 5C.3-3	Eq. 5B.2-2	Eq. 5C.3-2
176	Eq 5D.2-1	$\frac{1}{2}\overline{\rho v'^2}$ (twice)	$\frac{1}{2}\overline{\rho v'^2}$ (twice)
183	First line of Eq 6.2-19	$\langle v_z \rangle$	$\langle \bar{v}_z \rangle$

183	First line of Eq 6.2-20	$\langle v_z \rangle^2$	$\langle \bar{v}_z \rangle^2$
184	Eq 6.2-21	$\langle v_z \rangle$	$\langle \bar{v}_z \rangle$
184	Eq 6.2-25	$\langle v_z \rangle$	$\langle \bar{v}_z \rangle$
189	Fn 2	University of Bandung	Bandung Institute of Technology
196*	Eq 6C.3-2	$\int_S$	$-\mu \int_S$
199	Fig 7.1-1	Airvent	Air vent
205	2 lines after 7.4-11	Eq. 7.4-10	Eq. 7.4-11
210	Eq 7.6-3	$\mathbf{F}_{f \rightarrow s}$	$F_{f \rightarrow s}$
210	1 line below Eq 7.6-3	$\mathbf{F}_{f \rightarrow s}$	$F_{f \rightarrow s}$
211	Eq 7.6-16, first term	$\frac{1}{2} v_{1a}^2 (\frac{1}{2} w_2)$	$\frac{1}{2} v_0^2 (\frac{1}{2} w_2)$
219	3 lines above Eq 7.7-14	$-W_m$	$W_m$
220	Eq 7.7-20	$L$	$g$
242	Fn 4	1998	1987
244	Eq 8.3-22	$\Omega_o$	$\Omega_o^n$
251	Ex 8.5-1, first line	small amplitude	small-amplitude
252	Line 3b	Eqs. 8.5-14 and 15	Eqs. 8.5-12 and 13
257	1 line after Eq 8.6-15	Replace “This set of equations...can be obtained” by: “This set of equations gives an equation cubic in $\tau_{p,xx} - \tau_{p,zz}$ , or quadratic in $\dot{\epsilon}$ , which may be solved to give $\bar{\eta}(\dot{\epsilon})$ ”	
258	Question 5	...on use...	...on the use...

261	Eq 8C.1-2	$\frac{\tau_{\theta\theta} - \tau_{\phi\phi}}{r}$	$\frac{\tau_{\theta\theta} + \tau_{\phi\phi}}{r}$
262	Prob 8C.5, 2 <sup>nd</sup> line	<i>Computers in Chemistry</i>	<i>Computers &amp; Chemistry</i>
269	Table 9.1-2, fn, line 3	Eq 1.4-18	Eq. 1.4-14
277	Solution, lines 2 and 5	20.183	20.180
278	Ex 9.3-2, soln, line 1	300°K	300 K
278	Last equation number	(9.3-22)	(9.3-21)
286	Eq 9.8-8	$dT, dp$ $\left(\frac{\partial \hat{V}}{\partial T}\right)_p$	$d\bar{T}, d\bar{p}$ $\left(\frac{\partial \hat{V}}{\partial T}\right)_{\bar{p}}$
289	Prob 9.A-11, Ans., (a)	<i>Answers</i> in cal/cm.s.K for water-saturated and completely dry sand, respectively: (a) Eq. 9A.11-1 gives $k_{\text{eff}} = 4.9 \times 10^{-3}$ and $0.38 \times 10^{-3}$ with $g_1 = g_2 = g_3 = \frac{1}{3}$ , vs. $6.2 \times 10^{-3}$ and $0.64 \times 10^{-3}$ with $g_1 = g_2 = \frac{1}{8}$ and $g_3 = \frac{3}{4}$ .	
294	Last line of text	$k\omega$	$kW$
295	Ex 10.2-2 heading	Example 10.2.2	Example 10.2-2
296	1 line after Eq 10.2-24	Subtraction of...from	Addition of...and
309	Ex 10.7-1, line 6	ft <sup>3</sup>	ft
312	Eq 10.8-8, number	(10.8.8)	(10.8-8)
313**	Line 1a	term containing...heating,	of the equation of motion. The term $+\mu(\partial v_z / \partial r)^2$ is the viscous heating,
315**	Eq 10.8-32	$\frac{7}{24}$	$\frac{1}{8}$
319	Question 6	§9.9	§10.9

319	Question 7	Eq. 9.7-9	Eq. 10.7-9
325	Eq 10B.9-2	$\Theta(\xi, \zeta)$	$\Theta(\sigma, \zeta)$
326	2 lines below Eq 10B.11-4	$\frac{1}{30} \text{Gr} b_T$	$-\frac{1}{30} \text{Gr} b_T$
326	Eq 10B.11-5	$+\frac{1}{60} \text{Gr} b_T (\tilde{y}^2 - 1)$	$-\frac{1}{60} \text{Gr} b_T (\tilde{y}^2 - 1)$
332	Line 3 of Prob 10D.2	verify	Verify
332	Eq 10D.2-5	$q_w$	$q_0$
343	Eq 11.4-14	$(1/\kappa^2) - 1 + (1/N)$	$(1/\kappa^2) - 1 - (1/N)$
347	Fig 11.4-3 caption	The temperature and velocity profiles on one side of a thin heated plate suspended in a large body of fluid.	
348	1 line after Eq 11.4-43	$\alpha = k/\rho \hat{C}_p$	$\alpha = k/\bar{\rho} \hat{C}_p$
350	1 line above Fig 11.4-4	the Fig. 11.4-4	Fig. 11.4-4
350	Fig 11.4-4	$P_0, P_a, P_2, P_1$	$p_0, p_a, p_2, p_1$
351	Line 5a	purpose of the example	purpose of this example
351	Line 8a	known for the purposes of this example	known
361	Question 7	$\beta$	$\bar{\beta}$
363	Ans to 11B.1(b)	270 atm	9889 atm
363	2 lines above 11B.2-3	Multiply by	Multiply Eq. 11B.2-1 by
368	Prob 11B.13	(heat per unit per unit time)	(heat per unit area per unit time)
371	Prob 11C.6, line 5	local unit normal	local unit vector normal
371	Eq 11C.6-4, left side,	$+ \mathbf{n}^I (\rho^I v^{I2} - \rho^{II} v^{II2})$	$+ (\mathbf{n}^I \cdot \rho^I (\mathbf{v}^I - \mathbf{v}^s)) (\mathbf{v}^I - \mathbf{v}^{II}) \dots +$

371 Eq 11C.6-4, left side  $+\sigma$   $-\sigma$

371 Eq 11C.6-4, right side  $-\nabla^S \sigma$   $\nabla^S \sigma$

371 Eq 11C.6-5, replace by  

$$\left(\mathbf{n}^I \cdot \rho^I (\mathbf{v}^I - \mathbf{v}^S)\right) \left[ (\hat{U}^I - \hat{U}^{II}) + \frac{1}{2} (v^{I2} - v^{II2}) \right] + \left( \mathbf{n}^I \cdot (\mathbf{q}^I - \mathbf{q}^{II}) \right) + \left( \mathbf{n}^I \cdot [\boldsymbol{\pi}^I \cdot \mathbf{v}^I - \boldsymbol{\pi}^{II} \cdot \mathbf{v}^{II}] \right) = 0$$

371 Last sentence on page Delete: "Equation 11C.6-5 ... elsewhere."<sup>8</sup>

373 Eq 11D.3-1  $\int_V (\mathbf{v} \cdot \mathbf{g}) dV$   $\int_V \rho (\mathbf{v} \cdot \mathbf{g}) dV$

379 Third equation (12.2-34) (12.1-34)

379 Eq 12.1-39  $dT$   $d\bar{T}$   
 $q_y (y, t) dy$   $q_{\bar{y}} (\bar{y}, t) d\bar{y}$

385 Eq 12.2-22  $dT, dy$   $d\bar{T}, d\bar{y}$

385 Eq. 12.2-24 This equation should read:

$$\Theta(\eta, \lambda) = \frac{\sqrt[3]{9\lambda}}{\Gamma(\frac{2}{3})} \left[ \exp(-\chi^3) - \chi \Gamma\left(\frac{2}{3}, \chi^3\right) \right]$$

385 Footnote 15 pp. 255 et seq. pp. 255 et seq.; see also Problem 12D.7.

390 Table 12.4-1 Eqs. 12.4-9 to 12 Eqs. 12.4-6 to 9

391 Eq 12.4-18  $dy$   $d\bar{y}$

392 Fig 12.4-2 the x seems to be a broken type.

393 12.4-31  $d\bar{x}$   $dx$

393 1<sup>st</sup> line of Eq 12.4-33  $\int_{\pi}^0$   $\int_{\pi}^{\theta}$   
 $\sin^2 \theta$   $\sin^2 \bar{\theta}$   
 $\sin \theta d\theta$   $\sin \bar{\theta} d\bar{\theta}$

399 Prob 12B.6, Ans. (c) 1.1981  $(1.1981)^{1/3}$

400	Prob 12B.8	Ex. 12.4-2	Ex. 12.4-3
403	Prob 12C.5(a)	0.0172	0.0176
406	Eq 12D.7-3	This equation should read:	
		$\Theta(\eta, \lambda) = \frac{\sqrt[3]{9\lambda}}{\Gamma(\frac{2}{3})} \left[ \exp(-\lambda^3) - 3\lambda \int_{\lambda}^{\infty} \bar{\lambda} \exp(-\bar{\lambda}^3) d\bar{\lambda} \right]$	
406	1 line after 12D.7-3	$\int_{\lambda}^{\infty}$	$\int_x^{\infty}$ (lower limit is lower case lightface italic "ex")
406	Last line of 12D.703	gamma functions.	gamma functions. <sup>14</sup>
406	Add footnote 14	<sup>14</sup> M. Abramowitz and I. A. Stegun, eds., <i>Handbook of Mathematical Functions</i> , Dover, New York, 9 <sup>th</sup> Printing [1973], p. 255 et seq.	
415	Eq 13.5-2	$= \rho \hat{C}_p$	$= -\rho \hat{C}_p$
416	Eq 13.5-14	$v_z$	$\bar{v}_z$
416	1 <sup>st</sup> line of 13.5-11	$\int_0^{\xi} \frac{F}{\xi} d\xi$	$\int_0^{\bar{\xi}} \frac{F}{\bar{\xi}} d\bar{\xi}$
416	1 <sup>st</sup> line of 13.5-11	$\int_0^{\xi} \frac{C_3^2 \xi}{1 + \frac{1}{4} (C_3 \xi)^2} d\xi$	$\int_0^{\bar{\xi}} \frac{C_3^2 \bar{\xi}}{1 + \frac{1}{4} (C_3 \bar{\xi})^2} d\bar{\xi}$
416	Eq 13.5-15	$\frac{8}{C_3} \frac{1}{1 + 2\text{Pr}^{(t)}}$	$\frac{8\pi}{1 + 2\text{Pr}^{(t)}}$
416	1 line after Eq 13.5-15	Combining...	where the change of variable $u = 1 + \frac{1}{4} (C_3 \bar{\xi})^2$ has been used. Combining...
418	Eq 13.6-7	$\frac{\partial \Theta}{\partial y}$	$\frac{\partial \Theta}{\partial Y}$
420	Fn 6	290-192	190-192

421	Prob 13C.1(b), answer	$\frac{35}{17}, 3$	$k(T_0 - T_b)/q_0B = \frac{17}{35}, \frac{1}{3}$
426	Fig 14.1-2	$T_0$	$T$
428	Fn 1	(1987)	(1977)
429	Fig 14.2-1, 2 <sup>nd</sup> curve	7.341	7.541
437	Eq 14.3-20	1.02	1.03
437	Above Eq. 14.3-21	Fig. 14.3-1	Fig. 14.3-2
437	Eq 14.3-22, 2 <sup>nd</sup> line	72.2	72.8
449	2 lines below Eq 14.7-9	14.7-2 is applicable.	14.7-4 is applicable.
450	Prob 14A.4	...asymptotic value.	...asymptotic value (see Fig. 14.3-2).
450	Prob 14A.4	- 7.8	- 8
451	Prob 14B.3(b) first line	Delete: "given fluid and wire at"	
453	1 line below Eq 14D.1-9	$Nu = 16/\pi = 5.09$	$Nu = h(2R)/k = 8/\pi = 2.55$
453	4 lines below Eq 14D.1-9	5.09	2.55
459	Eq 15.3-4, last line	Btu/hr	Btu/lb <sub>m</sub>
460	3 <sup>rd</sup> line of Solution	Eq. 15.2-3	Eq. 15.1-3
464	4 lines above Eq 15.4-19	70 F	70° F
466	1 line above Fig 15.5-1	20 lb/min	20 lb <sub>m</sub> /min
472	Ex 15.5-4, Soln, line 3	to left of it	to the left of it
474	Eq 15.5-42, in integrand	$d(\rho_1/\rho_0)$ $(\rho_1/\rho_0)$	$d(\bar{\rho}_1/\rho_0)$ $(\bar{\rho}_1/\rho_0)$
474	After Eq 15.5-46	Eqs. 15.5-46 and 42	Eqs. 15.5-46 and 43

485•	Eq 15D.4-1	$p_1$ $S_1$	$p_2$ $S_2$
485	Prob 15D.4	15D.4-1 opposite equation should be flush with right margin	
509	Line 4 of Prob 16B.6	$k = 0.35$	$k = 0.4$
519	1 <sup>st</sup> line of Ex 17.1-1	500K	500C
523	Eq 17.2-4	(24.17)	(0.2417)
524	1 line after Eq 17.2-11	$6.0 \times 10^{-6}$	$6.0 \times 10^{-6}$ g – mole/cm <sup>2</sup> · s
524#	2 lines above 17.2-12	Eq. 17.4-3	Eq. 17.2-3
534	Just above Eqs. $P'$ and $Q'$	binary systems	binary systems
535	6 & 7 lines above Eq 17.7-3	$\mathbf{J}_A^* = c_A (\mathbf{v}_A - \mathbf{v}^*)$	$\mathbf{J}_\alpha^* = c_\alpha (\mathbf{v}_\alpha - \mathbf{v}^*)$
539	Prob 17A.4, line 2	hydrogen and Freon-12	hydrogen ( $A$ ) and Freon-12 ( $B$ )
539	Prob 17A.4, Soln	At $x_A = 0$ , $Sc = 3.43$ ; at $x_A = 1.00$ , $Sc = 0.407$	As $x_A \rightarrow 0$ , $Sc \rightarrow 0.057$ ; as $x_A \rightarrow 1.00$ , $Sc \rightarrow 2.44$
541	Prob 17A.10(b) and Ans.	cm/s (twice)	cm <sup>2</sup> /s (twice)
549	Above Eq 18.2-17	...gas phase:	...gas phase through the interfacial area $S$ :
549	Eq 18.2-18	$(H + h)dh$ $dt$	$(H + \bar{h})d\bar{h}$ $d\bar{t}$
562	1 line above 18.6-1	$\cos \theta$	$\cos \beta$
563	Line after Eq 18.6-8	gamma function of $\frac{4}{3}$ .	gamma function of $\frac{4}{3}$ (see Appendix C.4).
564	Fn 2	265-268	262-268

567	Eqs 18.8-4 and 5	$\frac{dx_2}{x_2}, \frac{dx_3}{x_3}, dz$ (twice)	$\frac{d\bar{x}_2}{\bar{x}_2}, \frac{d\bar{x}_3}{\bar{x}_3}, d\bar{z}$ (twice)
568	Question 13	Eq. 18.7-8	Eq. 18.7-7
576	2 lines above 18B.13-1	$c_O$	$c_0$
576	2 lines above 18B.13-1	oxygen	$O_2$
576	Eq 18B.13-1	$z_f = \sqrt{\frac{2\mathcal{D}_{O_2-MO_x} t c_O}{x c_f}}$	$z_f = \sqrt{\frac{4\mathcal{D}_{O_2-MO_x} t c_0}{x c_f}}$
579	Prob 18C.1	Add a footnote explaining the how these kinds of problems are solved by the superposition of source solutions: Ref. H. S. Carslaw and J. C. Jaeger, <i>Conduction of Heat in Solids</i> , Oxford University Press, 2 <sup>nd</sup> edition (1959), pp. 266-267	
583#	Eq 19.1-7	$A$ (under 4 terms in eq)	$\alpha$ (under 4 terms in eq)
584#	Eq 19.1-11	$A$ (under 4 terms in eq)	$\alpha$ (under 4 terms in eq)
584#	Line 4b	9.1-16	19.1-16
594	Eq 19.4-7, 2 <sup>nd</sup> line	$\tilde{C}_{pA} (T - T_0)$	$[\tilde{H}_{A0} + \tilde{C}_{pA} (T - T_0)]$
598	Eq 19.4-37	$\frac{c\mathcal{D}_{13}}{\delta}$	$\frac{2c\mathcal{D}_{13}}{\delta}$
601	15b	Pr	Sc
602	Ex 19.5-2, lines 3 & 4	from the refrigerant to	to the refrigerant from
605	Fn 3	2, 35-42 (1955)	2, 35-42 (1953)
606	Eq 19B.3-1	$dc_A$ (in numerator)	$d\bar{c}_A$
609	Prob 19D.2(c), line 3	0 to $N$	1 to $N$
618	Fig 20.1-2	According to Sherwood & Pigford's book, the curves for concentration vs. distance should go to 1 at $t = 0$ .	

619	Eq 20.1-39	$dt$	$d\bar{t}$
619	Eq 20.1-43, integrand	$\exp(-k_1''t)$	$\exp(-k_1''t')$
622	Eq 20.1-69	$d(S\delta)^2$	$d(\bar{S}\bar{\delta})^2$
623	Eq 29.1-74	$[S(\bar{t})]^2$	$S(\bar{t})$
626	2 lines above 20.2-14	linear first-order reaction	linear first order equation
628	Eqs 20.2-27 and 30	$dy$	$d\bar{y}$
628	1 line after 20.2-33	(see Problem 20B.3)	<<Delete that phrase
628	Eq 20.2-34, integral	$d\eta$	$d\bar{\eta}$
629	Eq 20.2-38	$d\eta$	$d\bar{\eta}$
629	7 lines after 20.2-37	20.3-37	20.2-37
630	Fig 20.2-3, abscissa	$\eta\sqrt{2} = y\sqrt{\frac{v_\infty}{v_x}}$	$\eta\sqrt{2} = y\sqrt{\frac{v_\infty}{v_x}}$
632	Ex 20.2-3, line 1	Example 12.1-2	Example 12.4-1
632	Eq 20.2-56	$\text{Pr}^{2/3}$	$\text{Pr}^{-2/3}$
635	Eq 20.3-12	$\int_0^x h_x h_z^2 v_s x$	$\int_0^x h_x h_z^2 v_s d\bar{x}$
635	1 line after 20.3-12	20-3-9	20.3-9
636	Eq 20.3-24	$dx$	$d\bar{x}$
636	Eq 20.3-26	$dx$	$d\bar{x}$
636	1 line after 20.3-26	18.6-11	18.6-9
636	Ex 20.3-1, (a) 1 <sup>st</sup> sentence	as follows...coordinates	in terms of the usual spherical coordinates $\theta$ and $\phi$ as follows: $x = \theta$ and

			$z = \phi$ , with $h_\theta = R$ and $h_\phi = R \sin \theta$
636	Eq 20.3-27, 1 <sup>st</sup> line, integral	(upper limit) $R \theta$ $d(R\theta)$ $\sin \theta$ (twice)	(upper limit) $\theta$ $d\bar{\theta}$ $\sin \bar{\theta}$ (twice)
636	Eq 20.3-27, 2 <sup>nd</sup> line, integral	$\sin^3 \theta d\theta$	$\sin^3 \bar{\theta} d\bar{\theta}$
637	Eq 20.3-28, 1 <sup>st</sup> line	$R \sin \theta$	$R^2 \sin \theta$
639	1 line before 20.4-4	$(\partial/\partial w)\mathbf{r}_S$	$(d/dw)\mathbf{r}_S$
639	1 line before 20.4-4	$(d/dy)\mathbf{r}_S$	$(d/dy)\mathbf{r}$
642	Line 3b	$z_R/\sqrt{t}$	$z_R/\sqrt{4t}$
644	Eq 20.5-12	$2\mathcal{D}_{AB}$	$4\mathcal{D}_{AB}$
645	1 line after Eq 20.5-15	Pé	Pé <sub>AB</sub>
646	Fig 20.5-2, ordinate	$\langle v_z \rangle$	$\langle v_z \rangle$
646	Fig 20.5-2, ordinate	Peclet number	Péclet number
646	Fig 20.5-2, box in lower right corner	20.5-15	20.5-19
646	Fig 20.5-2, legend	20.3-15	20.5-15
647	Line 11a	Instead of Eq. 20.3-19,	Instead of Eq. 20.5-19,
647	Last paragraph of text	Equations 20.5-1 and 19	Equations 20.5-1 and 18
649	Prob 20A.4 Answer	1.4 microns	14.2 microns
652	Prob 20B.8	(20B.10-1)	(20B.8-1)
652	Fn 3	(1961)	(1962)
654	Eq 20D.1-1	$\pm$	$\mp$

654	After 20D.1-1	Replace the sentence “Here... $\pm L$ ” by: Here $x_A^\pm$ are the mole fractions of $A$ at $z = \pm L$ .	
656•	Replace Eq 20D.4-2 by	$\langle \rho_A \rangle _{z=L} = \frac{1}{\sqrt{4\pi^3 R^4 K}} \int_{-\infty}^t \frac{f(t')}{\sqrt{t-t'}} \exp\left(-\frac{[L - \langle v_z \rangle(t-t')]^2}{4K(t-t')}\right) dt'$	
660	1 line below Eq 21.4-4	conditions at $r = 0$ have	condition at $r = R$ has
662	Fig 21.4-1, caption	$z^+ = zv_*/D$	$z^+ = zv_*/v$
664	Eq 21.5-14	$\nabla$ (bold face)	$\nabla$ (light face)
667*	Eq 21.5-22	$k'''$	$k_2'''$
669	Eq 21B.2-3	$\xi d\xi$	$\bar{\xi} d\bar{\xi}$
669	Fig 21B.3	Fig. 21B.3	Fig. 21B.4
669	Prob 21B.4, first line	Fig. 21B.3	Fig. 21B.4
670	Line 1a	Fig. 21B.3	Fig. 21B.4
670	Prob 21B.4, Ans (a)	Fig. 21B.3	Fig. 21B.4
673	Fig 22.1-4	Remove left half of line with two arrowheads, labeled $r$ . Delete arrowhead to right of $r$	
675	Fn 4	R. H. Perry and D. W. Green, 8 <sup>th</sup> edition	R. H. Perry, D. W. Green, and J. O. Maloney, 7 <sup>th</sup> Edition
676	Ht trf Péclet number	$l_0 v_0 \hat{C}_p / k$	$\rho l_0 v_0 \hat{C}_p / k$
677	Eq 22.2-5	$(c_A - 0)$	$(c_{A0} - 0)$
677	Eq 22.2-6	0.6415	0.6515
678	Eq 22.2-7	$(c_A - 0)$	$(c_{A0} - 0)$
678#	Eq 22.2-11	$\int_0^x \sqrt{h_z \beta} h_x h_z dx$	$\int_0^x \sqrt{h_z \beta} h_x h_z d\bar{x}$

678#	Eq 22 2-12	$\int_0^x \sqrt{h_z \beta h_x} h_z dx$	$\int_0^x \sqrt{h_z \beta h_x} h_z d\bar{x}$
680	Eqs 22.3-10 & 12	$r$	$\check{r}$
680	Eqs 22.3-11 & 13	$z$	$\check{z}$
684#	1 line below 22.3-33	22.2-32 and 33	22.3-32 and 33
685	3 lines above 22.3-41	Example 22.2-1	Example 22.3-1
685	1 line above 22.3-41	22.3-37	22.3-38
686	Fn 4	Geankopolis	Geankoplis
690	Eq 22.4-14	$\sqrt{\frac{\mathcal{D}_{AB}}{\pi t_{\text{exp}}}}$ , $\sqrt{\frac{\mathcal{D}_{AC}}{\pi t_{\text{exp}}}}$	$\sqrt{\frac{4 \mathcal{D}_{AB}}{\pi t_{\text{exp}}}}$ , $\sqrt{\frac{4 \mathcal{D}_{AC}}{\pi t_{\text{exp}}}}$
691	Eq 22.4-16	(293.5)	(293.15)
692	Line 3a	22.3-20	22.4-20
692	Eq 22.4-30	$\int_0^1 \bar{C}_s \xi d\xi$	$\int_0^1 \bar{C}_s \xi^2 d\xi$
692	Eq 22.4-31	$c_{A0}$	$c_0$
692	Below Eq 22.4-35	getting the ... interface, $M_A(t)$ , without ... [i.e., move " $M_A(t)$ ," up to just after "getting"]	getting $M_A(t)$ , the ... interface, without ...
693	Fig 22.4-4, ordinate label	coeffient	coefficient
695	Line 3a	Eq. 20.3-3	Eq. 20C.3-5
695	3 lines after Eq 22.5.4	$k_1 L / v_s \gg 1$	$k_1'' L / v_s \gg 1$
696•	Fig 22.5-1	The $Sh = \infty$ (and <u>not</u> $N_{Sh} = \infty$ ) curve should be drawn completely and precisely (cf. Fig. 18.4-4, p. 557)	
696	2 lines above 22.5-10	Eq. 20.1-39	Eq. 20.1-38
700	Eqs 22.7-1,2,3	The minus signs on the right sides of these three	

equations should be changed to plus signs

702#	3 <sup>rd</sup> line of “Solution”	shown <sup>9</sup> by	shown by
705	2 lines after 22.8-6	22.7-5 and 6	22.8-5 and 6
705	Eq 22.8-10	$\frac{(1+R)^n}{R}$	$\frac{(1+R)^n - 1}{R}$
708	Line 12b	Figures 22.8-6,7, and 8	Figures 22.8-6 and 7
710	Line 3b	$N_A = 0.400$	$N_A = 0.400 \text{ lb - mole/hr} \cdot \text{ft}^2$
711#	1 line above Eq 22.8-27	Example 22.3-3	Example 22.3-1
714	Eq 22.8-46	$-\rho^{(s)}v_\delta$	$\rho^{(s)}v_\delta$
715	Eq 22.8-51	$\mathcal{D}_{PS}(0)$ $\mathcal{D}_{PS}(\infty)$	$\mathcal{D}_{PS0}$ $\mathcal{D}_{PS\infty}$
715	Eq 22.8-52	$v(0)$ $v(\infty)$	$v_0$ $v_\infty$
715	3 lines after Eq 22.8-52	The subscript...value.”	The subscript “rel” denotes "the value of the property at the upstream membrane surface ( $y = 0$ ) relative to the value in the free stream ( $y \rightarrow \infty$ )."
715	Eq 22.8-53	$\mathcal{D}_{PS}(\infty)$ (twice) $v(\infty)$ (twice)	$\mathcal{D}_{PS\infty}$ (twice) $v_\infty$ (twice)
716	Fig 22.8-9	The fifth experimental data point (14.7 psi, 0.0.66 cm/min) is plotted incorrectly.	
717	Ref 2	<b>10</b>	<b>9</b>
718	Eq 22.9-11	On left side, add a “klitchka” over $x_A$ , and remove the “klitchka” over $v$	
719	Eq 22.9-14	Add a right paren “)” after the entry in the upper left hand	

corner of the square bracket to the right of the equals sign

719	1 line below 22.9-15	$J_{\alpha 0}$	$J_0^*$
719	6 lines before 22.9-17	$r = N_{A0}/N_{B0}$	$r = N_{B0}/N_{A0}$
719	5 lines before 22.9-17	Eq. 21.1-9	Eq. 22.1-10
719	2 lines above Eq 22.9-17	Eq. 22.9-14	Eq. 22.9-15
719	2 lines after Eq 22.9-19	Add a “klitchka” on the symbol “k” of $k_x$	
719	2 lines before 22.9-20	Fig. 22.8-2	Fig. 22.8-6
720	1 line after 22.9-23	$\checkmark$ $k_{\omega}$	$\left[ \checkmark \right]$ $\mathbf{k}_{\omega}$
722	Prob 22A.2, Answer	$x_{A\infty} = 0.0158$ n	$x_{w\infty} = 0.0172$ n
723	Eq 22B.3-1	$(x_A - x_A)$	$(x_A - x_{A0})$
723	Eqs 22B.3-1 and 2	$dy$	$d\bar{y}$
724	Prob 22C.1, line 5	$\rho_P = 2.2\text{g}/100\text{ml}$	$\rho_{P\infty} = 2.2\text{g}/100\text{ml}$
724	Prob 22C.1, line 6	(at pH 6.7) =	(at pH 6.7) = $\mathcal{D}_{PS}(0) =$
724	Prob 22C.1, line 7	buffer =	buffer = $\mu(0)/\rho^{(s)} =$
724	Prob 22C.1, line 9	cm/min.psi	(cm/min)/psi
724	Prob 22C.1, line 11	in g/ml	, with $\rho$ and $\rho_P$ in g/ml
724	Prob 22C.1, line 16	in psi (100 ml/g) <sup>2</sup>	, with $\pi$ in psi and $\rho_P$ in g/100 ml
726	Line 1a of introduction	laws of the conservation	laws of conservation
727	2 lines after 23.1-1	$-\Delta w_a$ (subscript a)	$-\Delta w_{\alpha}$ (subscript alpha)

732	1 line before Eq 23.1-30	$v(y)$ and $v(x)$ around $z$	$v(y)$ and $v(z)$ around $x$
732	Eqs 23.1-30 & 31	Replace these equations by:	
		$v(y) = v(x) + (y-x)v'(x) + \frac{1}{2}(y-x)^2 v''(x) + \dots$	
		$v(z) = v(x) + (z-x)v'(x) + \frac{1}{2}(z-x)^2 v''(x) + \dots$	
732	1 line after Eq 23.1-31	with respect to $z$	with respect to $x$
732	Eq 23.1-32	$\frac{1}{2}\theta(1-\theta)(y-z)^2 v''(z)$	$\frac{1}{2}\theta(1-\theta)(y-x)^2 v''(x)$
732	Eq 23.1-33	$(\alpha-1)z^2(1-z)^2 v''(z)$	$(\alpha-1)^2 x^2(1-x)^2 v''(x)$
732	Eq 23.1-34	$(\alpha-1)$	$(\alpha-1)^2$
735	1 line below Eq 23.1-50	$\rho'$	$\rho'_2$
735	Eq 23.1-59	0.0972 0.00422 1.325	0.1056 0.00462 1.326
738	Fn 1 (§23.3), last line	Table 17-8-1	Table 17.8-1
742	7 lines above Solution	tower height $z$	tower height $Z$
742	1 line above Solution	Eq. 22.2-14	Eq. 22.1-14
747	Eq 23.5-33	$\alpha x_n$	$\alpha x_n$
747	Eq 23.5-36b	$\alpha^N$	$\alpha^{N-1}$
753	Fig 23.6-1	$W_L$ (twice)	$W_B$ (twice)
753	Fig 23.6-1	$c_{A0}$ (twice)	$c_{Al}$ (twice)
753	Fig 23.6-1, caption	absorber	adsorber
754	2 lines before Eq 23.6-10	Eq. 22.3-3	Eq. 23.1-3
754	1 line after Eq 23.6-11	meaning:	meanings:

754	Fig 23.6-2	$W_L$ (twice)	$W_B$ (twice)
754	Fig 23.6-2, caption	absorber	adsorber
756	Fn 4	<b>36</b>	<b>37</b>
757	Eq 23.6-39, second integral	$\int_0^{Q/V}$	$\int_0^{V/Q}$
757	1 line after Eq 23.6-39	$Q/V$	$V/Q$
758	Question 2	$w_{\alpha 0}$	$w_{\alpha,0}$
760•	Prob 23B.6, line 3	cascade.	cascade ( $n = 0$ ).
760•	Eq 23B.6-1	$D_{n-1}$ (twice) $x_{n-1}$	$D_{n+1}$ (twice) $x_{n+1}$
760•	Line 1b	fraction of 0.1	fraction $x_0 = x_W = 0.1$
762#	2 lines after 23C.4-1	$(T_{h1} - T_{c1})$ and $(T_{h1} - T_{c1})$	$(T_{h1} - T_{c1})$ and $(T_{h2} - T_{c2})$
762	5 lines after 23C.4-1	23.6-27	23.6-25
767	Fn 1	<b>39</b> <b>41</b>	<b>38</b> <b>40</b>
770	4 lines after 24.2-9 5 lines after 24.2-9 7 lines after 24.2-9	an auxiliary relation the auxiliary relation its auxiliary relation	$N$ auxiliary relations the auxiliary relations their auxiliary relations
772	1 line after 24.2-14	23.2-13 and 14	24.2-13 and 14
773	Eq 24.2-15	$\Omega$	$\Omega^2$
773	Eqs 24.2-17 & 18	Delete negative sign immediately after equals sign	
773	Eq 24.2-20	$\frac{dx_A}{x_A}, \frac{dx_B}{x_B}, dz$	$\frac{d\bar{x}_A}{\bar{x}_A}, \frac{d\bar{x}_B}{\bar{x}_B}, d\bar{z}$
773	Line 2b	mixing $A-B$	mixture $A-B$

774	Fig 24.3-2, caption	(...(at 25° C)	(...at 25° C)
779	1 line above 24.4-21	$\kappa/R = \tilde{N}$	$R/\kappa = \tilde{N}$
780	Fig 24.4-2 caption	galvonometer	galvanometer
781	Eqs 24.4-26 through 31	All light face italic <i>N</i> should be replaced by boldface roman <b>N</b> (14 of them)	
781	Eq 24.4-34	$z_\alpha$	$ z_\alpha $
783	Line 2b	electro-osmosis especially	electro-osmosis is especially
783•	Eq 24.4-48	$+\varepsilon$	$-\varepsilon$
783	2 lines above Eq 24.4-43	24.4-38	24.4-40
786	Third equation on page	(25.4-3)	(24.5-3)
786	Eq 24.5-4	$(x_\alpha - x_\beta)$	$(\mathbf{v}_\alpha - \mathbf{v}_\beta)$
786	1 line above Eq 24.5-6	boundary	boundary:
786	Eq 24.5-6	Add a term to the left side of the equation: $\ln(a_{\alpha m}/a_{\alpha e}) + \dots$	
788	Line 6a	Problem 24C.8	Problem 24C.9
789	Second equation	(25.5-12)	(24.5-12)
789	Eq 24.5-14	$P = K_D D_{A, \text{eff}}$	$P = K_D D_{A, \text{eff}}/\delta$
789#	1 line after 24.5-15	$A_e 0$ and $A_e \delta$	$A_e 0$ and $A_e \delta$
790	Eqs 24.5-16 and 17	All 6 lower case italic <i>v</i> should be changed to bold face lower case roman <b>v</b>	
790	Eq 24.5-20	Both cap light face italic <i>N</i> should be changed to cap bold face roman <b>N</b>	
791	4 lines after 24.5-24	24.5-24	24.5-23
791	1 line above 24.5-25	24.5-23	24.5-20

791	Eq 24.5-25, 1 <sup>st</sup> term	$N_S \left( \frac{x_W}{c\mathcal{D}_{WS}} - \frac{\phi_S}{c\mathcal{D}'_{SM}} \right)$	$N_S \left( \frac{x_W}{c\mathcal{D}_{SW}} + \frac{\phi_W}{c\mathcal{D}'_{SM}} \right)$
792	Eq 24.5-29	$\frac{\gamma_{Sm}}{\gamma_{Se}} \left( \frac{c_m}{c_e} \right)^2$	$\left( \frac{\gamma_{Sm}}{\gamma_{Se}} \frac{c_m}{c_e} \right)^2$
792	Eq 24.5-31	$\left( -\frac{z_{M^+} F}{RT} \right)$	$\left( \frac{z_{M^+} F}{RT} \right)$
797	Eq 24.6-14	$\nabla p$	$\frac{d\mathcal{P}}{dz}$
798	Eq 24.6-16	$\left( \frac{v_A}{\mathcal{D}'_{AM}} + \frac{v_B}{\mathcal{D}'_{BM}} \right)$	$\left( \frac{x_A v_A}{\mathcal{D}'_{AM}} + \frac{x_B v_B}{\mathcal{D}'_{BM}} \right)$
798	Eqs 24.6-17 and 19	5 light face italic <i>N</i> should be bold face roman <b>N</b>	
799	Prob 24A.3, line 3	definon	definition
799*	Prob 24B.1, line 2	25.4-51	24.4-50
800#	Problem 24B.6	toruous	tortuous
800	Prob 24B.3, Ans	0.064	0.633
800	Prob 24B.6, title	Model insensitivity	Insensitivity of Knudsen diffusion models for flow in tubes and in granular beds
800	Eq 24B.6-2	$\frac{\pi}{4} \left( 1 + \frac{1}{8} \pi \right)$	$\frac{\pi}{2} \left( \frac{1}{1 + \frac{1}{8} \pi} \right)$
800	Eq 24B.6-2	$\nabla p$	$\nabla p_A$
800	Prob 24B.6, last sentence	Compare...0.4.	Compare these two equations for $\varepsilon = 0.6$ .
803	Prob 24C.9, line 4	Fig. 24C.8	Fig. 24C.9
803	Figure at bottom of page	Fig. 24C.8	Fig. 24C.9

831#	1 <sup>st</sup> line of Example A.7-1	$(\nabla \cdot v)$	$(\nabla \cdot \mathbf{v})$
831#	1 <sup>st</sup> line of Example A.7-1	$\nabla v$	$\nabla \mathbf{v}$
838	Line 1a	$\nabla v$	$\nabla \mathbf{v}$
838	Eq A.7-24	Bracket on the right side of the equation needs a subscript “lightface italic <i>r</i> ”	
838	Eq A.7-27	$\frac{1}{r \sin \phi}$	$\frac{1}{r \sin \theta}$
839	Ex 4, line 1	$\nabla^2 v$	$\nabla^2 \mathbf{v}$
839	Ex 4(b), line 2	$[\nabla \cdot \nabla v]$	$[\nabla \cdot \nabla \mathbf{v}]$
845	Eq B.2-4	$\frac{dT}{dr}$	$\frac{\partial T}{\partial r}$
849	Eq B.7-1	Equation number should be flush with right margin	
849	Fn a	for fluid with	for fluids with
849	Eq B.8-3	Bracket on right side should be preceded by a minus sign	
850	Eq B.10-3	Bracket on right side should be preceded by a minus sign	
851	Line 2 of B.11	Both omega and rho should be light face	
851#	Below Table	$\rho \quad \omega_\alpha \quad \mathbf{v} \quad r_\alpha$	$\rho \quad \omega_A \quad \mathbf{v} \quad r_A$
851#	Below Table	$c \quad x_\alpha \quad \mathbf{v}^* \quad R_\alpha - x_\alpha \sum_{\beta=1}^N R_\beta$	$c \quad x_A \quad \mathbf{v}^* \quad x_B R_A - x_A R_B$
861	1 line before §D.7	Eliminate return command after “quite”	
866	2 lines above Eq E.2-1	Jansen	Janzen
872	$C_p$	9.1-7	9.1-8
872	$F_{12}$	16.5-15	16.4-15

872	$h$	14.1-2	16.1-2
873	$k_x$	coefficients	coefficient
873	$k_x^0$	coefficient	coefficients
873	$L$	(2.2-22)	(Figs. 2.2-1, 2.3-1, 2B.3)
873	$q$	9.1-4	9.1-6
874	$u$	direction	the direction
874	$v_\alpha$	Table 17.7-1	Table 17.7-2
874	$\alpha$	9.1-7	9.1-8
874	$\beta$	12.4-6	12.4-26
875	$\pi$ (Greek boldface pi)	1.7-1	1.7-2
875	$\phi$ (Greek boldface phi)	1.7-1	1.7-2
876	Pr	9.1-8	9.1-9
876*	Line 2b	(12.2-24)	(12.2-24), Prob. 12D.7
877	This page is not numbered		
877	Armstrong	805	807
879	Bottom 1 <sup>st</sup> column	Geankopolis	Geankoplis
879	Hassager	805	807
880	Jansen	Jansen	Janzen
881	Oldroyd	32. <b>240</b>	32, <b>240</b>
888	3 <sup>rd</sup> column	Froude number, 98, 355	Froude number, 98, 356
892	3 <sup>rd</sup> column	Slit. Bingham	Slit, Bingham
892	3 <sup>rd</sup> column	Slot, flow toard	Slot, flow toward

Back Cover

Interchange the axes, and put in the horizontal bars in the derivatives.