

BASIC HEAT AND TRANSFER, 2<sup>nd</sup> Ed.  
1<sup>st</sup> Printing ERRATA, October 1, 1999

<i>Page</i>	
7	Line 8: 0.65 $\rightarrow$ 0.065
126	Exercise 2-102: in figure 2 mm $\rightarrow$ 1 cm
183	Line 12: Bi = 40; 2.321 $\rightarrow$ 2.349
230	Exercise 3-88: $0.2 \times 10^{-4} \rightarrow 0.2 \times 10^4$
272	Equation (4.49): 0.017 $\rightarrow$ 0.033 Line 12: 340 $\rightarrow$ 660
345	Table 4.10, Items 1-3: Comments, Turbulent Liquids Heating n = -0.25 $\rightarrow$ -0.11 Cooling n = -0.11 $\rightarrow$ -0.25
443	Exercise 5-18: increase $\rightarrow$ change
525	Line 11: Insert: RAD3 cannot be used to extrapolate $\epsilon_g$ outside the temperature ranges of Figs. 6.34(a), 6.35(a) and 6.36(a).
696	Line 11: 0.017 $\rightarrow$ 0.033; 1 $\rightarrow$ 2.
705	Eqs. (8.64), (8.66): n $\rightarrow$ m
715	Line 6: $A_f/A_w \rightarrow A_f/A$
724	Exercise 8-15: 400 $\rightarrow$ 4000
741	Exercise 8-89, line 8: ...unity. Take a maximum allowable chip temperature of 90°C
968	Two lines f.b. $e^{-\beta^2} \rightarrow e^{-t^2}$

(Some of these errors have been corrected in later printings of BHMT)

**Additional items, June 10, 2001**

<i>Page</i>	
35	Line 11: includes $\rightarrow$ involves
364	Exercise 4-57 figure: 150 m/s $\rightarrow$ 50 m/s
588	Line 20: 1.2946 $\rightarrow$ 1.2936 Line 21: 2.5892 $\rightarrow$ 2.5872
728	Exercise 8-30: Delete icon.
735	Exercise 8-61: Delete diskette icon.
743	Exercise 8-97: 1.25 kg/s $\rightarrow$ 0.31 500 J/kg K $\rightarrow$ 2015

## Additional items, March 10, 2004

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- 52 Exercise 1-62, line 5: 50  $\rightarrow$  2500
- 123 Exercise 2-92, line 7: kg/s meter
- 163 The superposition analysis is incorrect: see BASIC HEAT AND MASS TRANSFER: COMMENTS at <http://www.mae.ucla.edu/academics/faculty/mills.htm> for the correct analysis.
- 258 2 lines f.b.:  $(\rho - \rho_e) \rightarrow (\rho_e - \rho)$ ; also pg. 251, line 1
- 302 Last line:  $10^5 \rightarrow 10^8$  for air. For liquids the limit is  $10^5$  – see p.304, line 1.
- 430 Line 8:  $\partial t \rightarrow \partial z$ .
- 431 3 and 2 lines from bottom should read: ...Taylor series and canceling terms gives
- 436 Line 6: force  $\rightarrow$  stress
- 520 Figure 6.33: ordinate is %
- 542 Exercise 6-11, line 5: W/L  $\rightarrow$  L/W
- 546 Exercise 6-27, (iii), line 1: aluminumized  $\rightarrow$  aluminized  
Exercise 6-28: gas  $\rightarrow$  pipe
- 557 Exercise 6-83: 2<sup>nd</sup> line: 2.4m
- 563 Exercises 6-110, 6-111:  $\Delta I_x/I_x \rightarrow \Delta I_x/I$  (4 places).
- 565 Exercise 6-122: add computer icon.
- 607 Figure 7.18b: reverse arrow on abscissa; also  $T_{sat}(P_\infty)$
- 623 Equation (7.81) and lines 10, 13: Strictly speaking, we should replace capillary head by capillary pressure, and gravitational head by gravitational force per unit area.
- 643 Exercise 7-40: use a cavity size of 7.5  $\mu\text{m}$ .
- 656 Figure 8.79(c): curvature is incorrect—slopes should be higher where  $\Delta T$  is larger.
- 670 Figure 8.14(a): counterflow—as for pg.656 above.
- 716 Line 15: cold  $\rightarrow$  hot.
- 741 Line 17: increases  $\rightarrow$  decreases
- 753 5 lines f.b.: CO2  $\rightarrow$  CO<sub>2</sub>
- 918 Line 6: 149, 387  $\rightarrow$  14,387
- 988 Fo: add Eq. (3.90)
- 995 Fo: add, 203

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- 13 7 Lines from bottom: Delete flux, two places.
- 40 Exercise 1-2, 1-3. Strictly speaking we should say rate of heat transfer, but we usually drop the rate of. The former is precise and appropriate to thermodynamics; the latter is simply common usage in heat transfer practice.
- 105 Exercise 2-6 figure: the arrows at each end of specimen indicate force applied in a load cell.
- 173 Nonsymmetrical Boundary Conditions.  
The analysis is incorrect: to do the analysis we let the slab be of thickness L with  $0 \leq x \leq L$ , and specify temperatures  $T_{s'}$  at  $x = 0$  and  $T_s$  at  $x = L$ . Again, we let:

$$T(x,t) = T_1(x) + T_2(x,t)$$

$$\frac{d^2 T_1}{dx^2} = 0$$

$$x = 0, T_1 = T_{s'}; \quad x = L, T_1 = T_s$$

$$\text{then } T_1 = T_{s'} + (T_s - T_{s'}) \frac{x}{L}$$

$$\frac{\partial T_2}{\partial t} = \alpha \frac{\partial^2 T_2}{\partial x^2}$$

$$x = 0, L : T_2 = 0$$

$$t = 0, T_2 = T_0 - T_1$$

Referring to the analysis following Eq. (3.38),

$$T_2(\zeta, \eta) = e^{-\lambda^2 \zeta} (A \cos \lambda \eta + B \sin \lambda \eta)$$

$$T_2 = 0 \text{ at } \eta = 0, 1$$

$$T_2 = 0 \text{ at } \eta = 0 : 0 = e^{-\lambda^2 \zeta} (A + 0), A = 0$$

$$T_2 = 0 \text{ at } \eta = 1 : 0 = e^{-\lambda^2 \zeta} B \sin \lambda$$

$$\sin \lambda = 0, \lambda = n\pi, n = 0, 1, 2, \dots$$

$$T_2 = \sum_{n=1}^{\infty} B_n e^{-n^2 \pi^2 \zeta} \sin n\pi\eta$$

$$T_2 = \sum_{n=1}^{\infty} B_n e^{-n^2 \pi^2 Fo} \sin n\pi\eta \frac{x}{L}$$

- 245 Line 2: For an incompressible liquid we take  $c_p = c_v = c$ , and neglect  $\Delta P/\rho$ ;  
see Eq. (1.6b).
- 394 Line 17: Notice that, for a constant density and fully developed velocity  
profile, there is no change in kinetic energy along the tube.
- 401 Line 6: The statement “negligible work done by the viscous stresses” applies  
only to the derivation of the energy conservation equation. The viscous  
stresses do work to reduce the kinetic energy of the freestream fluid as it  
enters the boundary layer. Consistent with the negligible work for the energy  
equation is a negligible change in kinetic energy when using Eq. (1.4) to  
derive Eq. (5.40).
- 417 Figure 5.22: The indicated value of  $u_{\max}/U$  is too high—should be 0.146
- 443 Exercise 5-19: Some texts interpret the  $\frac{1}{2} \rho u_b^2$  in the definition of  $f$  as kinetic  
energy; others interpret  $\rho u_b^2$  as the dynamic pressure. Actually, both are  
incorrect. The Darcy friction factor essentially applies to fully developed  
turbulent flow in a tube. The governing equation is the time-averaged  
momentum conservation equation: if this equation is made dimensionless it is  
seen that  $\rho u_b^2$  is properly interpreted as scaling the turbulent shear stress. For  
laminar flow, the laminar (molecular) shear stress is appropriate.
- 444 Exercise 5-20:  $k$  in the table is the conductivity of fluid inside the tube surface  
held normal to the sun’s rays.
- 468 Comments should not be in bold type.
- 486 Of course,  $G_0$  is the flux incident on a surface held normal to the sun’s rays.
- 492 Example 6.10: By assuming a well-insulated roof we obtain an upper limit on  
 $T_s$ . Of course, if the roof were perfectly insulated there would be no additional  
load on the cabin air conditioner.
- 587 Equation (7.38): the coordinate  $x$  is measured from  $\phi = 0$ .
- 704 Comment No.1: Note also that  $St/f$  is independent of Reynolds number, so no  
iteration is required.