

Chapter 1: Introduction to Transport Phenomena in Materials Processing

p. 43: Equation 1.57 should be $a_1 + 2a_2t + 3a_3t^2 = g - \left(\frac{\rho_f C_D A}{2m_b} \right) a_1^2 t^2$.

Chapter 2: Steady State Conduction Heat Transfer

p. 109: Problem 2.1:

- $q'' = 10 \text{ W/m}^2\text{K}$, not $100 \text{ W/m}^2\text{K}$
- The Ar is effectively not moving, even though it is a fluid, because the thickness of the gap between the two panes is so small.
- In part (c), where it says "thickness of the air gap", it should read "thickness of the Ar gap".

p. 110: Problem 2.3: The last line in the problem description should read "and the outer and inner heat transfer coefficients are, respectively, $h_o = 75$ and $h_i = 225 \text{ W/m}^2\text{K}$."

p. 111: Problem 2.7: Assume $L = 1 \text{ m}$.

p. 112: Problem 2.11: Use $T_{\text{sink}} = 40^\circ\text{C}$.

p. 113: Problem 2.13: The height and width of the aluminum are H and W , while the thickness of the trough wall is t .

p. 115: Problem 2.15: Use **(c)** graphite ($k = 1.9 \text{ W/mK}$) and **(e)** magnesia ($k = 0.085 \text{ W/mK}$).

Chapter 3: Transient Conduction Heat Transfer

p. 139: The equation at the bottom of the page should read

$$\lim_{x \rightarrow \infty} \theta(\varepsilon, \tau) = \exp(-\infty) [1^2 - 2(1)] + 1 = 1$$

p. 139: Eqtn. (3.42) should read

$$\theta = \exp(-3\tau) [\varepsilon^2 - 2\varepsilon] + 1$$

p. 172: Eqtn. (3.129) should read

$$C_o = \left[\frac{2(k\rho c)_m (T_M - T_i)}{3k_s \rho_s L_f} \right]^{1/2}$$

p. 177, Problem 3.8: Part (b) should end with " $(t < t_{\text{crit}})$ ", not " $(t = 0)$."

p. 178, problem 3.10: The phrase "...on the Figure 3.28." should be removed.

p. 179, problem 3.13: The first sentence should read: "The temperature of an effectively semi-infinite slab of steel, initially at uniform temperature ($T_i = 25^\circ\text{C}$) is raised instantaneously to 50°C at the wall."

p. 181, problem 3.23: Assume $T_i = 35^\circ\text{C}$.

p. 181, problem 3.24: $\alpha_m = 2.7 \times 10^{-7} \text{ m}^2/\text{s}$.

p. 182, problem 3.25: Use $M_f = 0.1 \text{ m}$ and $T_o = 70^\circ\text{C}$.

p. 182, problem 3.26: Use $L_f = 2.98 \times 10^5 \text{ J/kg}$.

p. 183, problem 3.28(c): The latent heat release rate should be $\left[\rho_L L_f A \frac{dM}{dt} \right]_{r=M}$.

Chapter 4: Mass Diffusion in the Solid State

p. 205: The right hand side of eqn (4.45) should read

$$= \left(\frac{C_{Ai}^2 - C_A^{2*}}{C_A^{1*} - C_A^{2*}} \right) \sqrt{\frac{D_A^2}{3t}}$$

p. 205: The quadratic equation between (4.46) and (4.47) should read

$$\phi^2 - \frac{1}{\sqrt{3}} \left[\frac{C_{Ai}^2 - C_A^{2*}}{C_A^{1*} - C_A^{2*}} \right] \phi + \frac{1}{2} \frac{D_A^1}{D_A^2} \left[\frac{C_A^{1*} - C_{Ao}^1}{C_A^{1*} - C_A^{2*}} \right] = 0$$

p. 205: Equation (4.47) should read

$$\phi = \frac{1}{2\sqrt{3}} \left[\frac{C_{Ai}^2 - C_A^{2*}}{C_A^{2*} - C_A^{1*}} \right] \left[1 + \sqrt{1 - 6 \left(\frac{D_A^1}{D_A^2} \right) \left(\frac{C_A^{1*} - C_A^{2*}}{C_{Ai}^2 - C_A^{2*}} \right) \left(\frac{C_A^{1*} - C_{Ao}^1}{C_A^{2*} - C_A^{1*}} \right)} \right]$$

p. 228, problem 4.5: The diffusion coefficient for austenite should read

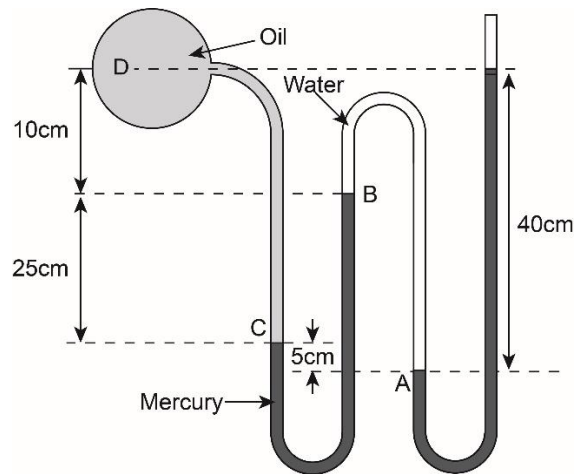
$$D_C^\gamma = 7 \times 10^{-6} \left(\text{m}^2/\text{s} \right) \exp \left[- (133,900 \text{ J/gmol}) / RT \right]$$

p. 228, problem 4.6: Part (c) should read: “**(c)** Write the expression for solute flux continuity at the interface. Scale this relationship using these reference values, $\Delta C^A = C_o^A - C_{Int}$ and $\Delta C^B = C_{Int} - C_o^B$, and the result from part (b). Find an estimate for the interface composition, C_{Int} , in terms of properties and the initial compositions.”

p. 231, problem 4.10: Part (c) should read $D_{Al}^\alpha \approx 3.9 \times 10^{-5} \left(\frac{\text{m}^2}{\text{s}} \right) \exp \left(- \frac{155,000 \text{ J/mole}}{RT} \right)$

Chapter 5: Hydrostatics

p. 249, problem 5.10: The figure 5.15 should read:



Chapter 6: Mechanical Energy Balance in Fluid Flow

p. 278, problem 6.2: Assume a smooth pipe (no roughness).

p. 279, problem 6.4: The mass flow rate should be $\dot{m} = 7500 \text{ kg/s}$.

p. 281, problem 6.8: The maximum allowable depth of the moving Al layer is $h = 0.1 \text{ m}$ and the relative roughness is 0.0001.

p. 281, problem 6.10: The frictional loss should be 120 J/kg , not 120 J/km . Use $\rho = 870 \text{ kg/m}^3$ and $\mu = 0.8 \text{ kg/ms}$

Chapter 7: Equations of Fluid Motion

p. 287: The second part of the equation between Eq. (7.7) and Eq. (7.8) should read

$$\dot{m}_{y+dy} = \rho v_{y+dy} A_{y+dy}$$

p. 303, problem 7.2: Use $\delta = 0.01 \text{ m}$.

p. 304, problem 7.3: The second sentence should read “Motion in the fluid is started by a sudden change in fluid velocity from zero to a characteristic value, U_o , uniform in the x direction.”

Chapter 8: Internal Flow

p. 320, Figure 8.8: label of gravitational force in figure should read

$$\bar{g} = g_z \hat{z} = -g \hat{z}$$

p. 354, problem 8.1: “ $r = 1000 \text{ rpm}$ ” should be “ $\omega = 1000 \text{ rpm}$ ”.

p. 355, problem 8.8: The last section should read “Solve the system for the velocity field and sketch $w(r)$.” A sketch of $u(r)$ would be a horizontal line at $u = 0$!

p. 355, problem 8.9: This problem should refer to Figure 8.23, not Figure 8.24.

Chapter 9: External Flows

p. 401, problem 9.12: $u_{ref} \ll \Omega R = v_{ref}$ should be added to the list of assumptions in problem statement. Also, The density of the photoresist is 1200 kg/m^3 .

Chapter 10: Convection Heat Transfer

p. 441, Equation 10.77: Should be $\overline{Nu} = C Re_D^m Pr^{1/3}$

p. 458: Re range on Eq. (10.124) should be $2500 < Re_D < 10^7$.

p.464: The term $\left(\frac{\alpha x}{\delta_T^2}\right)$ in Eq. (10.142) should be $\left(\frac{\alpha x}{\delta_T^2}\right)^2$.

p.465: The term $\left(\frac{x}{\delta}\right)$ in Eq. (10.144) should be $\left(\frac{x}{\delta}\right)^2$.

p. 466, Equation (10.148): Should be $\overline{Nu}_H = 0.68 + \left[\frac{0.67}{(Pr^{9/16} + 0.671)^{4/9}} \right] (Ra_H Pr)^{1/4}$

p. 472, Eq. 10.160: Should have $(C_{sf})^{-3}$, not $(C_{sf})^3$.

p. 475, problem 10.2: Use $D = 0.01 \text{ m}$.

p. 478-479, problem 10.13: Use $q = 0.004 \text{ W} = 4 \text{ mW}$

p.479, problem 10.16: Use $0.05 \text{ m/s} < V_a < 5 \text{ m/s}$

p. 480, problem 10.19: All the temperatures should be in Kelvin.

p. 480, problems 10.20 and 10.21: Use $h_{fg} = 2.3 \times 10^6 \frac{\text{J}}{\text{kg}}$ and $\sigma = 0.060 \text{ N/m}$.

Chapter 11: Mass Transfer in Fluids

p. 521, problem 11.3: $Le = 1$

Chapter 12: Radiation Heat Transfer

p. 529, The beginning of the first full paragraph should read "Setting $dE_\lambda/d\lambda = 0 \dots$ "

p. 559, The set of three equations to calculate the three radiosities should read:

$$\begin{aligned}
 &\left[\left(\frac{1-\varepsilon_1}{\varepsilon_1}\right)(F_{12}+F_{13})+1\right]J_1 && -\left(\frac{1-\varepsilon_1}{\varepsilon_1}\right)F_{12}J_2 && -\left(\frac{1-\varepsilon_1}{\varepsilon_1}\right)F_{13}J_3 && =E_{b,1} \\
 &-\left(\frac{1-\varepsilon_2}{\varepsilon_2}\right)F_{21}J_1 && \left[\left(\frac{1-\varepsilon_2}{\varepsilon_2}\right)(F_{21}+F_{23})+1\right]J_2 && -\left(\frac{1-\varepsilon_2}{\varepsilon_2}\right)F_{23}J_3 && =E_{b,2} \\
 &-\left(\frac{1-\varepsilon_3}{\varepsilon_3}\right)F_{31}J_1 && -\left(\frac{1-\varepsilon_3}{\varepsilon_3}\right)F_{32}J_2 && \left[\left(\frac{1-\varepsilon_3}{\varepsilon_3}\right)(F_{31}+F_{32})+1\right]J_3 && =E_{b,3}
 \end{aligned}$$

p. 569, problem 12.3: Instead of reading that the plate “is insulated on the backside,” the problem statement should read that the plate is “heated on the backside.”

p. 571, problem 12.15: Use Figure 12.27 for this problem.

p. 572, problem 12.17:

- $T_H = 600 \text{ K}$
- “Panel” should be replaced with “plate.”
- The variable “ w_s ” should be replaced with “ w_H .”

p. 573, problem 12.19: The tabulated view factor, F_{21} , is $F_{21} = \frac{1}{2} \left\{ 1 - \left[1 + \left(\frac{D}{L} \right)^2 \right]^{-1/2} \right\}$

Appendix I: MATH PRACTICE FOR TRANSPORT PHENOMENA COURSE

p. 575: problem 2.f: Use $A = B = 2$.

Appendix II: Equations of motion and thermal energy balance

p. 579: The next to last terms in the three Navier-Stokes equations in Cartesian coordinates

should be $\frac{\partial}{\partial y} \left(\frac{\partial u}{\partial y} \right)$, $\frac{\partial}{\partial y} \left(\frac{\partial v}{\partial y} \right)$, and $\frac{\partial}{\partial y} \left(\frac{\partial w}{\partial y} \right)$.

Appendix IV: