

Errata Sheet for *Fluid Mechanics: Fundamentals and Applications, Ed. 3* – Çengel and Cimbala

Latest update: 12/16/2016

This is a list of errors (and *enhancements*) in the textbook. If you find any additional errors in the book, or have suggestions for improvement, please contact **John M. Cimbala** at 814-863-2739 or jmc6@psu.edu to report it. [By way of acknowledgment, the person (other than the authors) who first reports an error is listed in brackets, unless requested otherwise.]

Note: Check the copyright page to see which printing you have. E.g., “12 3 4 5 6 7 8 9 0 DOW/DOW 1 0 9 8 7 6 5 4 3” where the circled 1 indicates the first printing. As new printings are made, the errors and enhancements from previous printings may have already been fixed. The first printing was in January 2013.

We categorize the changes as *major errors*, *minor errors*, or *enhancements*:

- **Major errors** are important and significant (e.g., incorrect equations or numerical values) – *these must be changed*.
- **Minor errors** are spelling or typo errors and other minor changes – *these may be skipped without impacting understanding of the material*.
- **Enhancements** are changes that clarify something and/or help you to understand the material better (e.g., improvements to a figure or wording changes) – *these may be skipped since they are not really errors, but are useful changes that enhance understanding of the material*.

Major Errors:

- p. 59, Figure 2-39: Change label “ $2\pi R\sigma_s \cos\phi$ ” to “ $2\pi R\sigma_s$ ” (the cosine should not be there; it is correct in the figure above this one).
- p. 65, Prob. 2-40, line 1: Change “100” to “95”; otherwise the given answer is incorrect. [Jan Huang]
- p. 71, Prob. 2-126, equations for V_1 and V_2 : The equations themselves are okay, but the ranges of y are not correct. In the first equation, change “ $-0.5 \leq y \leq 0$ ” to “ $0 \leq y \leq 0.5$ ”. In the second equation, change “ $0 \leq y \leq -0.5$ ” to “ $-0.5 \leq y \leq 0$ ”.

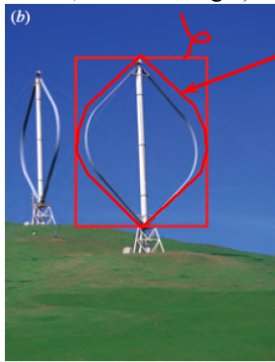
The final equations should look like this:

$V_1 = 6 + ay - 3y^2$	$0 \leq y \leq 0.5$
$V_2 = b + cy - 9y^2$	$-0.5 \leq y \leq 0$

[Suat Canbazoglu]

- p. 128, Prob. 3-163: Change the answer from “0.72 m” to “1.72 m”.
- p. 152, Eq. 4-22: In two places (one right above the other), change $\frac{d}{dt}$ to $\frac{1}{dt}$ [Hooman Azad Gilani and Parsa Ghadermarzi]
- p. 153, Fig. 4-37: The ∂ symbol got lost in four places. The two equations on the right should be as follows:
$$u_\alpha + \frac{\partial u_\alpha}{\partial x_\alpha} dx_\alpha \quad \text{and} \quad \left(u_\alpha + \frac{\partial u_\alpha}{\partial x_\alpha} dx_\alpha \right) dt$$
- p. 309, Table 7-5, entry for Biot number: Swap the numerator and denominator in the right-most column, i.e., change “ $\frac{\text{Surface thermal resistance}}{\text{Internal thermal resistance}}$ ” to “ $\frac{\text{Internal thermal resistance}}{\text{Surface thermal resistance}}$ ”. [Suat Canbazoglu]
- p. 309, Table 7-5, entry for Grashof number: The absolute value should include ΔT not just Δ . It should be $|\Delta T|$.
- p. 558, line 7: The subscripts “transition” and “critical” need to be swapped. The correct line should be “regardless of the units of x . Thus $Re_{x,\text{critical}}$ occurs at $x \approx 1$ and $Re_{x,\text{transition}}$ ”
- p. 615, Figure 11-11: Change “ $C_D = \frac{F_D}{\frac{1}{2}\rho V^2 LD}$ ” to “ $C_D = \frac{F_D}{\frac{1}{2}\rho V^2 bD}$ ”. [Laura Pauley]
- p. 615, Caption for Fig. 11-11: change the last line from “area rather than frontal area.” to “area bL rather than frontal area bD where b is the width of the body into the page.”
- p. 647, Problem 11-25E, last line: Change “engine” to “drive train”. [Suat Canbazoglu]
- p. 647, Problem 11-29, last line on the page: Change “engine” to “drive train”. [Suat Canbazoglu]
- p. 649, Problem 11-45, last line on the page: Change “engine” to “drive train”. [Suat Canbazoglu]
- p. 672, Fig. 12-18: The sketch is fine, but the labels are incorrect. Replace the entire left set of labels with “ P_i, T_i, V_i ”, where the values of these inlet properties are defined in the problem statement. Also replace the entire right set of labels with “ P_b, A_t ”, where throat area is defined in the problem statement, and back pressure is varied. [Mehmet Kanoglu]
- p. 722, Prob. 12-157: Change “(d) 280 m/s” to “(d) 274 m/s”. [Mehmet Kanoglu]
- p. 755, 6th line from bottom: Change “ $((10/3))/1$ ” to “ $(10/3)/1$ ” (remove the extra right parenthesis). [Suat Canbazoglu]
- p. 800, top left of the equation for NPSH: Change “10,300” to “101,300” (a “1” was left out). [Suat Canbazoglu]
- p. 850, 5th line of the 3rd bullet item (Cut-out speed): Change “blue” to “red”. [Suat Canbazoglu]
- p. 870, Problem 14-60, line 2: Change “above” to “below”. [Suat Canbazoglu]

- p. 851, Fig. 14-107b: Change to (the disk area actually swept out by the turbine blades as they rotate is an oblong shape as shown, *not* a rectangle).



Remove the rectangle and replace the rectangle with this oblong shape

- p. 870, Problem 14-63E, line 2: Change “ \dot{V}_{lobe} ” to “ V_{lobe} ” (remove the overdot). [Suat Canbazoglu]
- p. 870, Problem 14-64E, line 3: Change “ \dot{V}_{lobe} ” to “ V_{lobe} ” (remove the overdot). [Suat Canbazoglu]
- p. 870, Problem 14-65, line 3: Change “ \dot{V}_{lobe} ” to “ V_{lobe} ” (remove the overdot). [Suat Canbazoglu]
- p. 953, label for the density curve in the bottom figure: Change “ ρ / ρ^* ” to “ ρ / ρ_0 ”.
- p. 514, Prob. 9-135: Change problem statement to “Which property is not expected to be constant for the isothermal flow of an incompressible fluid?” and in the answer list, change “(e) Specific heat” to “(e) Enthalpy”. [Mehmet Kanoglu]

Minor Errors:

- p. 6, 4th line of 2nd paragraph: Change “King Hiero I” to “King Hiero II”. [Nurudin Abd Settari]
- p. 12, Permission credit in caption for Figure 1-22: Change “Eric A. Paterson” to “Eric G. Paterson”. [Eric G. Paterson]
- p. 310, Table 7-5, entry for Stanton number: Change “ $\frac{\text{Heat transfer}}{\text{Thermal capacity}}$ ” to “ $\frac{\text{Convection heat transfer}}{\text{Thermal capacity}}$ ” in the right-most column. [Suat Canbazoglu]
- p. 416, Caption for Figure 8-89: Change “MRI-PIV measurements” to “MRI-PCV (Phase Contrast Velocimetry) measurements”. [Jean Hertzberg]
- p. 418, Reference 3, line 4. Change “*Biomechonical*” to “*Biomechanical*” (spelling typo). [Grant Younger]
- p. 509, Prob. 9-96, line 4: Change “Fig. P9-95” to “Fig. P9-96”. [Mehmet Kanoglu]
- p. 513, Prob. 9-126, line 7: Change “Fig. P9-124” to “Fig. P9-126”. [Mehmet Kanoglu]
- p. 589, Fig. 10-134: Under each figure, change “3” to “ \times ”. E.g., under the first figure, it should be “(a) $Re_L = 1 \times 10^{-1}$ ”.

Enhancements:

- p. 491, 2nd line from bottom: Change “Çengel, 2010” to “Çengel and Ghajar, 2011” [Mehmet Kanoglu]
- p. 499, References: Change the first reference to “Y. A. Çengel and A. J. Ghajar. *Heat and Mass Transfer: Fundamentals and Applications*, 4th ed. New York: McGraw-Hill, 2011.” [Mehmet Kanoglu]
- p. 615, Caption for Fig. 11-12: change the last line from “where b is the width of the body.” to “where b is the width of the body into the page.”.
- p. 806, line 2 from the bottom: Change “called the **scroll**” to “called the **scroll** (also called the **volute**)”. [Suat Canbazoglu]
- p. 807, Figure 14-32, line 2 of the caption: Change “scroll” to “scroll or volute”. [Suat Canbazoglu]
- p. 807, line 11 of the full paragraph: Change “into the scroll (also called the **volute**)” to “into the scroll”. [Suat Canbazoglu]
- p. 828, Caption of Fig. 14-72, line 2: Change “conventional” to “customary”.
- p. 828, Caption of Fig. 14-72, line 3: Change “conventional” to “customary”.
- p. 867, Problem 14-39E, line 8: Change “ $a = 2.50 \text{ ft/gpm}^2$ ” to “ $a = 2.50 \text{ ft}/(\text{gpm})^2$ ” (add parentheses for clarity). [Suat Canbazoglu]
- p. 867, Problem 14-43, line 8: Change “ $a = 0.06780 \text{ m/Lpm}^2$ ” to “ $a = 0.06780 \text{ m}/(\text{Lpm})^2$ ” (add parentheses for clarity). [Suat Canbazoglu]
- p. 869, Problem 14-58E, 3rd line from bottom: Change “(0.0054 ft/gpm²)” to “[0.0054 ft/(gpm)²]” (change existing parentheses to square brackets and add parentheses around “gpm” for clarity). [Suat Canbazoglu]
- p. 870, Problem 14-60, 4th line above the figure for this problem: Change “(0.0013 m/Lpm²)” to “[0.0013 m/(Lpm)²]” (change existing parentheses to square brackets and add parentheses around “Lpm” for clarity). [Suat Canbazoglu]
- p. 871, Problem 14-71, line 4: Change “ $a = 0.0633 \text{ m/Lpm}^2$ ” to “ $a = 0.0633 \text{ m}/(\text{Lpm})^2$ ” (add parentheses for clarity). [Suat Canbazoglu]
- p. 871, Problem 14-71, line 5: Change “ $a = 0.0472 \text{ m/Lpm}^2$ ” to “ $a = 0.0472 \text{ m}/(\text{Lpm})^2$ ” (add parentheses for clarity). [Suat Canbazoglu]