ENGINEERING THERMOFLUIDS (ISBN: 3-540-22292-8)
ERRATUM

Back of the cover page: Add to the existing e-mail address:

massoud@alum.mit.edu

Nomenclature, Page XIX – XXII:

e	Specific energy	J/kg	Btu/lbm
$\dot{m}$	Mass flow rate	kg/s	lbm/s
$\dot{q}'$	Linear heat generation rate	W/m	kW/ft
$\dot{q}''$	Heat flux	W/m^2	$Btu/h{\cdot}ft^2$
$\dot{q}'''$	Volumetric heat generation rate	W/m^3	$Btu/h{\cdot}ft^3$
$\dot{Q}$	Rate of heat transfer	W	Btu/s
$\dot{V}$	Volumetric flow rate	m^3/s	ft^3/s
$\dot{W}$	Power	W	Btu/s

Page XXIII
after "K Kelvin", Add: "lit liter"

Page 5, Seventh sentence in the second paragraph: Change
from "The breeder reactors convert such *fertile* isotopes as ^{238}U and ^{232}Th to such *fissionable* isotopes as ^{239}Pu and ^{233}U, respectively."

to "The breeder reactors convert such *fertile* isotopes as ^{238}U and ^{232}Th to such *fissile* isotopes as ^{239}Pu and ^{233}U, respectively."

Page 21, fourth line after the title: Change
from: "… in the range of 0.5 to 1.5 MW"
to: "… in the range of 0.5 to 5 MW"

Page 21, fifth paragraph from top: Change
from: "Having determined the systen,…"
to: "Having determined the system,…"

Page 37, Figure IIa.1.2, missing Figure a: Add

Standard Atmospheric Pressure	
1.000	atm
14.696	psia
29.921	in Hg
760	mm Hg
760	torr
1.013	bar
1.013E5	Pa

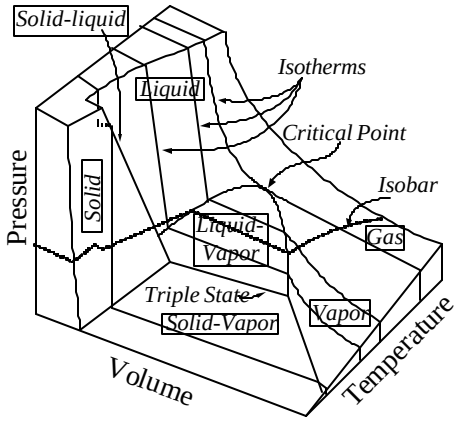
(a)

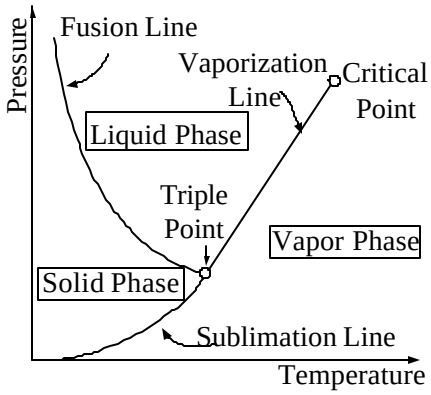
Standard Temperature & Pressure (STP)		
System	Temperature	Pressure
SI	273.15 K	101.325 kPa
Scientific	0.0 C	760 mm Hg
Natural gas	60 F	14.7 psia
Engineering	32 F	14.696 psia

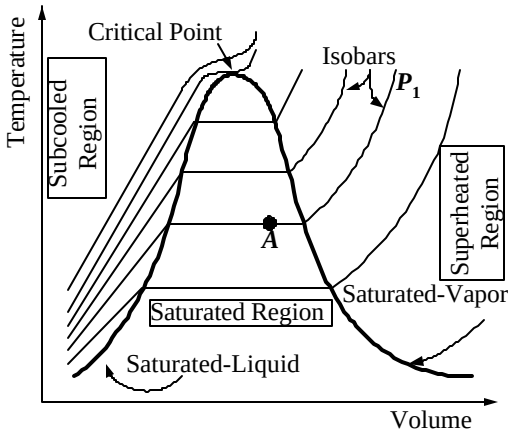
(b)

Page 40, Last word before Table IIa.1.1. Change
from: specific enthalpy, etc.
to: specific entropy, etc.

Page 41, Figure IIa.3.1, missing Figures a, b, and c: Add





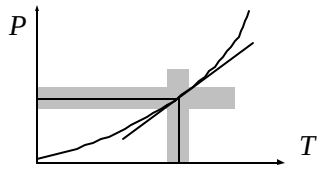


Page 46, Maxwell Relations Change
from: The Maxwell relations correlate…..
to: The Maxwell relations are obtained from four fundamental equations that correlate……

Page 54, Equation IIa.3.8 Change
from: dT/T
to: dT/T^2

from: $\ln P_{sat} = -(h_{fg}/P_{sat})(1/T) + c$
to: $\ln P_{sat} = -(h_{fg}/R)(1/T) + c$

Page 54, Missing Figure for Example IIa.3.6: Add



Page 55, Table IIa.3.1. Change
from: T & u or P & u
to: P & u

from: T & h or P & h
to: P & h

Page 69, Equation IIa.6.3: Add a plus sign so that the equation is changed
from:
"$\sum_i \dot{m}_i \left(h_i + V_i^2/2 + gZ_i\right) + \sum \dot{Q} + \dot{q}'''\forall = \sum \dot{W}_s + P\dot{\forall}$

$\sum_e \dot{m}_e \left(h_e + V_e^2/2 + gZ_e\right) + \frac{d}{dt}\left[m\left(u + V^2/2 + gZ\right)\right]$"

to:
"$\sum_i \dot{m}_i \left(h_i + V_i^2/2 + gZ_i\right) + \sum \dot{Q} + \dot{q}'''\forall = \sum \dot{W}_s + P\dot{\forall}$ +

$\sum_e \dot{m}_e \left(h_e + V_e^2/2 + gZ_e\right) + \frac{d}{dt}\left[m\left(u + V^2/2 + gZ\right)\right]$"

Page 78, Solution to Example IIa.7.7: Change
Change all enthalpies to 3160 kJ/kg and the final answer to $T_2 \approx$ 343 C.

Page 82, Equation IIa.8.2: Add
A + sign between the two integral terms in the left side of the above equation.

Page 129, Problem 39: Change
from: "(76 lit)"
to: "(76 lit/day)

from: "[Ans. 1.57 m^2]"
to: "[Ans. 0.86 m^2]"

Page 129, Problem 39: Change
Line 2, from: "(76 liter)" to "(76 lit/day)'
Line 7, from: "[Ans.: 1.57 m^2] to [Ans.: 0.86 m^2]

Page 129, Problem 42: Add to the end of the problem statement
Treat air as an ideal gas.

Page 131, Problem 54: Change
from: "Use the Maxwell relations to …."
To: "Use the fundamental thermodynamic relations to …."

Page 175, Pump losses: Change,
from: "… by multiplying the …
$w_p = w_{ps}\eta_p = h_2 - h_1 = (h_{2s} - h_1)\eta_p$"

to: "… by dividing the …
$w_p = w_{ps}/\eta_p = h_2 - h_1 = (h_{2s} - h_1)/\eta_p$"

Page 207, line after Equation IIc.4.2: Change
from: "…we then find $P_2 = P_{sat}(T_2) + m_{air}RT/V$."
to: "…we then find $P_2 = P_{sat}(T_2) + m_{air}RT_2/V$."

Page 267, before Equation IIIa.3.36: Change
from: "Since the average specific volume, …."
to: "Obtaining density at the average temperature of $(T_i + T_e)/2$ yields:

$$\frac{1}{\bar{r}} = \frac{1}{2}\left[\frac{1}{r_1} + \frac{1}{r_2}\right]$$"

Page 273, end of part a): Change
from: " $c = \sqrt{gRT} = \sqrt{1.4 \times 286.9 \times (20 + 273)} = 1085$ m/s
Therefore application of the Bernoulli equation is valid here."

to: " $c = \sqrt{gRT} = \sqrt{1.4 \times 286.9 \times (20 + 273)} = 343$ m/s
Therefore application of the Bernoulli equation is marginally valid here."

Page 297, fifth line from top: Change
from: "VII."
to: "VIIe."

Page 299, in solution of Example IIIb.3.1: Change
from: "… by using correlation IIIb.3.7"
to: "… by using correlation IIIb.3.6".

Page 311, first line: Change
from: "… we may apply Equation IIIb.3.31 …"
to: "… we may apply Equation IIIa.3.31 …"

Page 342, Example IIIb.5.2: Change
In the right figure change
from: "1 m^3"
to: "1 lit/s"

Page 345, last equation: Change
In this equation change h to h_o. (Also in the preceding line change $2gh$ to $2gh$)

Page 374, last paragraph before Figure IIIb.7.2: Change
from: "canrelate"
to: "can relate"

Page 375, Table IIIb.7.2: (word is cut off. Change
from: "Aluminur"
to: "Aluminum"

Page 392, Answer to the problems 49 and 50: Change
Change the loss coefficient K
from: italic *K*
to: K.

Page 399, Last line before Equation IIIc.1.2: Add
from: "acting on the control volume:"
to: " acting on the control volume (Equation IIIa.3.35)"

Page 419, Last line in Example IIIc.2.3: Change
from: "Therefore, D_{throat} = "
to "Therefore, D_{exit} = "

Page 441, Title of Figure IVa.2.2b: Add
from: "$\dot{q}''_n + \dot{q}''_r - \dot{q}''_c$"
to: "$\dot{q}''_n + \dot{q}''_r - \dot{q}''_c = 0$"

Page 486, 9th line from top: Change
from: "…conditions in three Cases A, B, and C…."
to: "…conditions in three Cases 1, 2, and 3…."

Page 501, First question: Change
from: "- Are homogeneous substances are necessarily isotropic?"
to: "- Are homogeneous substances necessarily isotropic?"

Page 504, Problem 15: Change
from: "$T(t) = T_f + \left[\left(T_i - T_f \right) + \frac{\dot{Q}}{rc\mathrm{V}} t \right] e^{-t/t} + \frac{\dot{Q}}{rc\mathrm{V}} t$"
to: "$T(t) = T_f + \left[\left(T_i - T_f \right) - \frac{\dot{Q}}{rc\mathrm{V}} t \right] e^{-t/t} + \frac{\dot{Q}}{rc\mathrm{V}} t$"

Page 515, Problem 74: Change
from "A cylindrical spine is used is shown in the figure."
to "A cylindrical spine is used as shown in the figure."

Page 516, Problem statement 80: Change
from: "…, having a source strength of 2.4E8 W/m^3"
to: "…, having a source strength as shown in the figure"

from: "…, one side is maintained at 200 F"
to: "…, one side is maintained at 200 C"

Page 538 & 539, Equation numbers: Change
from: IVb.3.4, IVb.3.4-1,IVb.3.4-2, IVb.3.5, IVb.3.6, IVb.3.7(a), and IVb.3.7(b), IVb.3.8, IVb.3.9"
to: IVb.3.7, IVb.3.7-1,IVb.3.7-2, IVb.3.8, IVb.3.9, IVb.3.9(a), and IVb.3.9(b)" IVb.3.10, IVb.3.11"

Page 545, Problem 38: Add
where μ and Pr are temperature averaged properties.

Page 546, Problem 40: Change and Add
from: "…the pipe diameter is given by:"
to: "…the mass flow rate is given by:

$$\dot{m} = (5.1764\text{E}-6) \times \left[\frac{L}{D^{0.8}} \frac{\mu^{0.2}}{\text{Pr}^{0.6}} \frac{\Delta T_s}{\Delta T_f} \right]^5$$

where μ and Pr are temperature averaged properties."

Page 546, Problem 42: Change and Add
Change the equation to:

$$\Delta P = \left(0.092 \frac{L}{D} \right)^{10} \frac{1}{D^2} \left(\frac{\mu^2}{\rho \, \text{Pr}^{5.4}} \right) \left(\frac{\Delta T_s}{\Delta T_f} \right)^9$$

add: "where ρ, μ and Pr are temperature averaged properties."

Page 547, Problem 46: Change
from: "…length and diameter are *D* and *L*, respectively."
to: "…length and diameter are *L* and *D*, respectively."

Page 547, Problem 48: Add
where μ and Pr are temperature averaged properties.

Page 561, Line 14: Change
from: "Max Planck ingeniously expressed….."
to: "Louis de Broglie, using Max Plank's equation, ingeniously expressed….."

Page 594 through 600: Change
Problem numbers after Problem 12 needs to be changed to reflect correct sequence. The same change applies to the related figures and when a previous problem is cited in the problem statement.

Page 676, fifth line from bottom: Change
from: "…(see Problem 9)"
to: "…(see Problem 17)"

Page 694, Third line from bottom: Change
from: "…V.3.4"
to: "…IVb.3.7"

Page 700, after Example VIa.2.4: Add
Heat exchanger effectiveness and NTU can be easily calculated by using the software on the accompanying CD-ROM.

Page 701, Tables VIa.2.1 and VIa.2.2: Change
from: "Parallel Flow" and Counter Flow"
to: "Concentric Parallel Flow" and "Concentric Counter Flow"

Page 703, Example VIa.3.1: Add
At the end of problem statement add: "Use a square array with $s/d_o = \sqrt{p/2}$."
The same applies to Problems 3, 4, and 5 on Page 724. For Problem 4, use stainless steel tubes.

Page 756, Figure title in Example VIc.3.2: Change
from: "C_Q"
to: "$C_{\dot{V}}$"

Page 758, Figures in Example VIc.3.3: Change
Place $\dot{W}_{BHP}$ on the dotted lines

Page 785, First line from top: Change
from: "**Junctions** or flow path allow separate …"
to: "**Junctions** allow separate …"

Page 845, last sentence from bottom: Change
from: "Fissible isotopes include…."
to: "Fissile isotopes include….."

Page 857, 4th line from bottom: Remove
"Since Σ_a/D is referred to as the diffusion area $L^2 = \Sigma_a/D$ …."

Page 862, Seventh line from top: Change
from "where a is the fuel radius. Substituting Σ_{aF} in Equation VIe.3.1.2, …"
to "where a is the fuel radius. Substituting Σ_f into Equation VIe.3.2, …"

Page 863, before the seventh line from bottom: Add
where $z \cong 2.4$ for actual reactor cores.

Page 863, Equation VIe.3.5: Change
from: "$\dot{Q} = \dot{q}'H = \dot{q}''\mathrm{P}_F\mathrm{H} = \dot{q}'''A_F\mathrm{H}$"
to: "$\dot{Q} = \dot{q}'\mathrm{H} = \dot{q}''\mathrm{P}_C\mathrm{H} = \dot{q}'''A_F\mathrm{H}$"

Page 863, line after Equation VIe.3.5: Change
from: "where H is the rod length, P_F is the fuel pellet perimeter, …"
to: "where H is the rod length, P_C is the fuel cladding perimeter, …"

Page 864, in the data of Example VIe.3.2: Change
from: "$\Omega: \quad \dot{q}'''_{\max}/\dot{q}'''_{av}$" to "$z: \quad \dot{q}'''_{\max}/\dot{q}'''_{av}$"

Page 865, in the solution for Part f: Change P to $\dot{Q}$

Page 866, second and third lines after Equation VIe.3.7: Change
from: "$F_N^{axial} = 2.316$ and $F_N^{radial} = 1.57$"
to: "$F_N^{axial} = 1.57$ and $F_N^{radial} = 2.316$"

Page 869, last line from top: Change
from: "$z_{c2,\max} = (\mathrm{H}/p)/\tan^{-1}(p\dot{m}c_p R_f)$"
to: "$z_{c2,\max} = (\mathrm{H}/p)\tan^{-1}(p\dot{m}c_p R_f)^{-1}$"

Page 882, Figure VIe.5.1: Change
from: "Decay Heat (%)"
to: "Power after shutdown/Power before shutdown"

Page 870, in the solution of Example VIe.3.3: Change
from:
"$Z_{C2,\,max} = (12/p)/\tan^{-1}[p \times (138.5E6/38{,}192) \times 1.392 \times 1.81E{-}4] = (12/p)/1.235 = 3.1$ ft (1 m)"
to:
"$Z_{C2,\,max} = (12/p)\tan^{-1}[p \times (138.5E6/38{,}192) \times 1.392 \times 1.81E{-}4]^{-1} = (12/p) \times 0.335 = 1.3$ ft (0.4 m)"

Pge 873, in the solution for Example VIe.3.5: Change. In the statement for l_4 change
from: "$l_4 = T_{f,in} + C_2 - T_{sat} = \ldots$"
to: "$l_4 = T_{f,in} + l_2 - T_{sat} = \ldots$"

Page 878, Equation VIe.4.1: Change
from P_F to P_C.

Page 878, last sentence: Change
from: "If we substitute from Equation VIe.4.3 into Equation VIe.4.2 and subsequently in Equation VIe.4.1, we find:"
to: "If we substitute for $\dot{q}'''_{\max}$ from Equation VIe.4.3 into Equation VIe.4.2 then in Equation VIe.4.1 and solve for N_{rod}, we find:"

Page 885, Problem 4: Change
from: "$(pkT)^{2/3}$"
to: "$(pkT)^{1/2}$"

from: "k = 1.3806E-23 kJ/K"
to: "k = 1.3806E-23 J/K"

Page 891, Problem 35: Add: "Consider an infinite reflector."

Page 892, Problems 36 and 38: Change
from: "S_o neutrons/s cm^2"
to: "S_o neutrons/s·cm^3"

Page 898, data for Problem 57: Change
from: "Relief Valve flow area (ft^2 – cm^2): 0.01 – 0.01"
to: "Relief Valve flow area (ft^2 – cm^2): 0.01 – 9.29"

Page 933, Line 3 from top: Change
from: "… momentum ($M = E/c = h\nu$), and relativistic mass ($m = W/c^2$)"
to: "… momentum ($M = E/c = h\nu/c$), and relativistic mass ($m = E/c^2$)"

Page 1077, Table A.IV.5(SI): Change entries after 365 K
from "310 K" to "370 K" and from "313 K" to "373 K"

Page 1111, INDEX: Add
Bessel functions, 915, 940, 941

Page 1111, INDEX: Change
from: "Bernoulli Equation, 244"
to: "Bernoulli Equation, 261"

Page 1115, INDEX: Add
Gamma function, 936
Hamiltonian operator, 951

Page 1118, INDEX: Add
Speed of sound, 273, 372, 373, 374, 414, 416

Contact author (massoud@alum.mit.edu or mmassoud@umd.edu) to receive the "*Applications Manual*" and the latest version of the *ToolKit software* on the accompanying CD-ROM.

http://www.springer.com/978-3-540-22292-7

Engineering Thermofluids
Thermodynamics, Fluid Mechanics, and Heat Transfer
Massoud, M.
2005, XXIV, 1120 p., Hardcover
ISBN: 978-3-540-22292-7