CHANGES to
FE Reference Handbook 10.1
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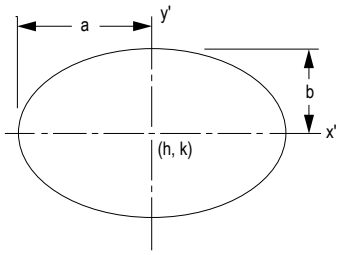
MATHEMATICS

p. 39, Ellipse
Added the area equation: A = πab



$$A = \pi ab$$
$$P_{approx} = 2\pi\sqrt{\left(a^2 + b^2\right)/2}$$

p. 55, Fourier Transform Pairs table
Revised formula for $u(t)$ as shown:

$u(t)$	$\frac{1}{2}\delta(f) + \frac{1}{j2\pi f}$

STATICS

p. 107, Force
Force changed to **Force (Two Dimensions)** as shown:

Statics

Force (Two Dimensions)

A *force* is a *vector* quantity. It is defined when its **(1)** magnitude, **(2)** point of application, and **(3)** direction are known.

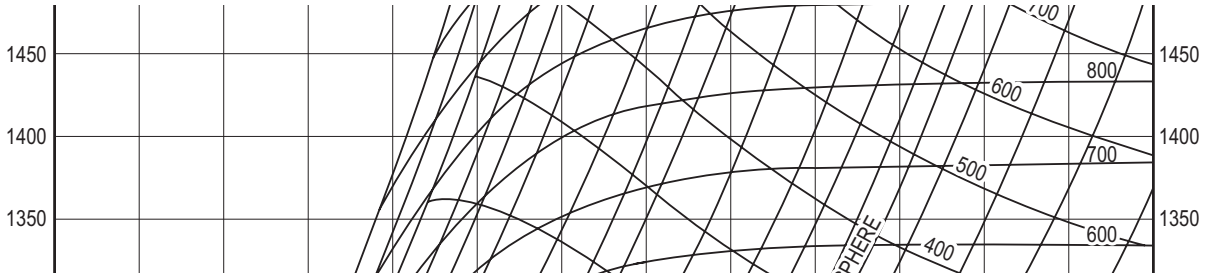
The vector form of a force is

$$\boldsymbol{F} = F_x\,\mathbf{i} + F_y\,\mathbf{j}$$

THERMODYNAMICS

p. 159, Mollier (h, s) Diagram for Steam

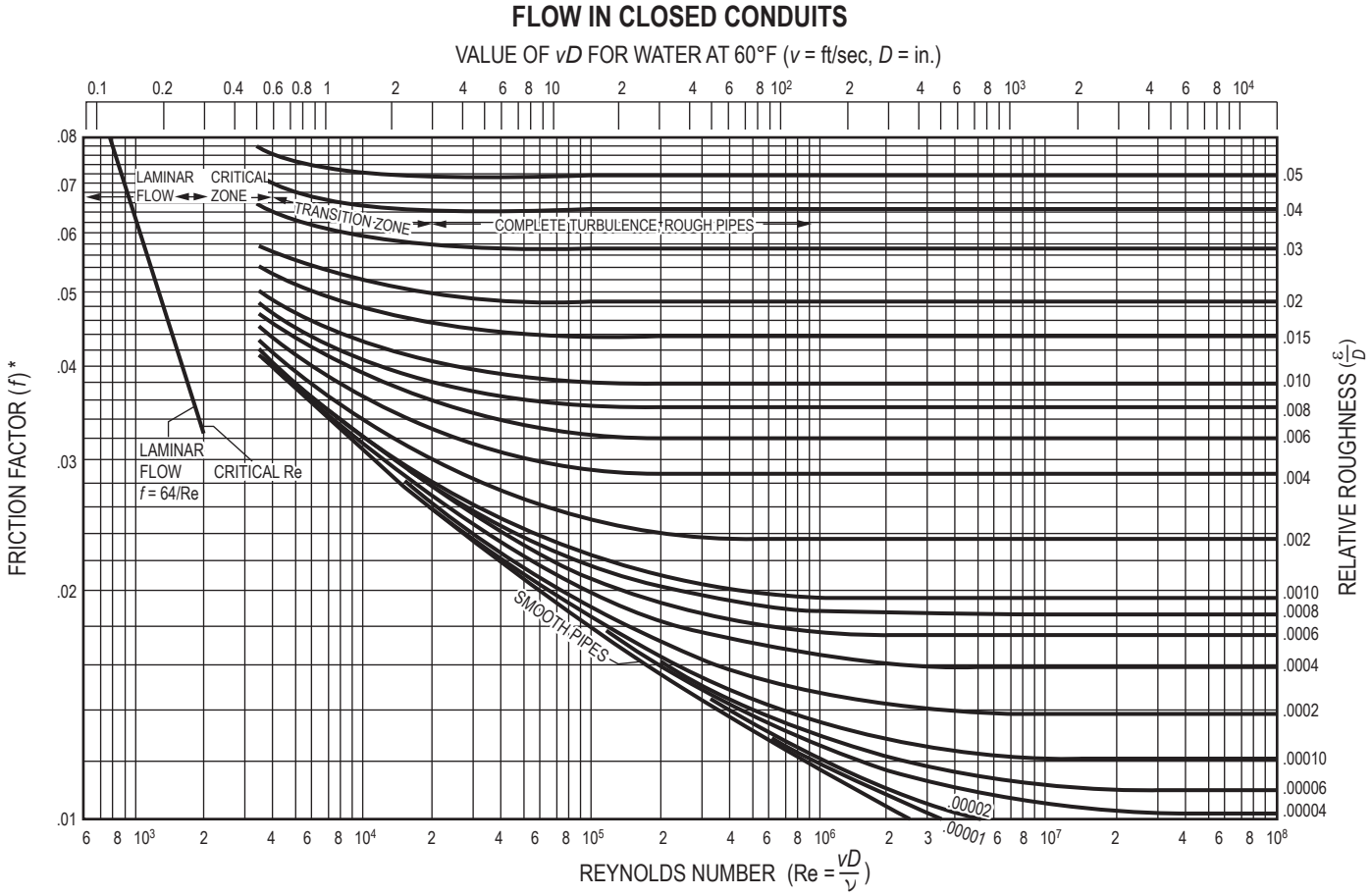
Enthalpy, Btu/lb measurement 1400 corrected as shown:



FLUID MECHANICS

p. 201, Moody, Darcy, or Stanton Friction Factor Diagram

Changed VD to vD in Flow in Closed Conduits figure as shown:



CIVIL ENGINEERING

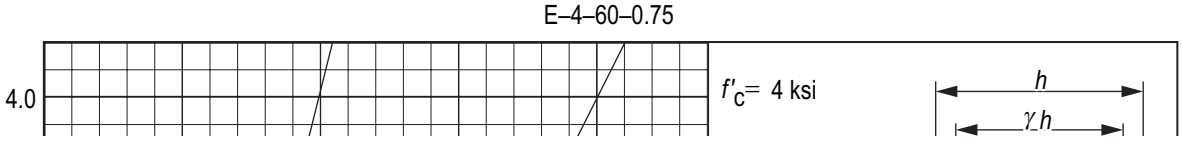
p. 276, Beams—Shear

Changed "for NWC" in definitions to "for Normal Weight Concrete (NWC)" as shown:

λ = 1.0 for normal weight concrete (NWC)

p. 280, Short Columns
Added "Section with" in diagram title as shown:

Factored Strength Interaction Diagram for Rectangular Section with Bars on End Faces and $\gamma = 0.75$



p. 282, Tension Members, Flat Bars or Angles, Bolted or Welded
Changed formulas in "Net area" definitions as shown:

Net area (parallel holes): $A_n = \left[b_g - \Sigma \left(d_h + \frac{1}{16}" \right) \right] t$

Net area (staggered holes):

$$A_n = \left[b_g - \Sigma \left(d_h + \frac{1}{16}" \right) + \Sigma \frac{s^2}{4g} \right] t$$

p. 290, Hydrologic Mass Balance (Budget), Surface Water System Hydrologic Budget
Updated definitions for Q_g and ΔS_s as shown:

Surface Water System Hydrologic Budget

Q_g = groundwater flow into the stream
ΔS_s = change in water storage of surface water system

p. 291, Darcy's Law
Updated definition of Unit hydrograph to replace "runoff" with "rainfall" as shown:

Unit hydrograph: The direct runoff hydrograph that would result from one unit of rainfall occurring uniformly in space and time over a specified period of time.

p. 293, Thiem Equation
Corrected spelling of Thiem, and moved title for Open-Channel Flow section to page 293:

Thiem Equation

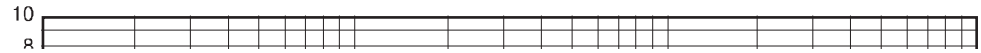
$$Q = \frac{2\pi T \left(h_2 - h_1 \right)}{\ln \left(\frac{r_2}{r_1} \right)}$$

where

T = Kb = transmissivity (ft^2/sec)
b = thickness of confined aquifer (ft)
h_1, h_2 = heights of piezometric surface above bottom of aquifer (ft)
r_1, r_2 = radii from pumping well (ft)
ln = natural logarithm
H = height of peizometric surface prior to pumping (ft)

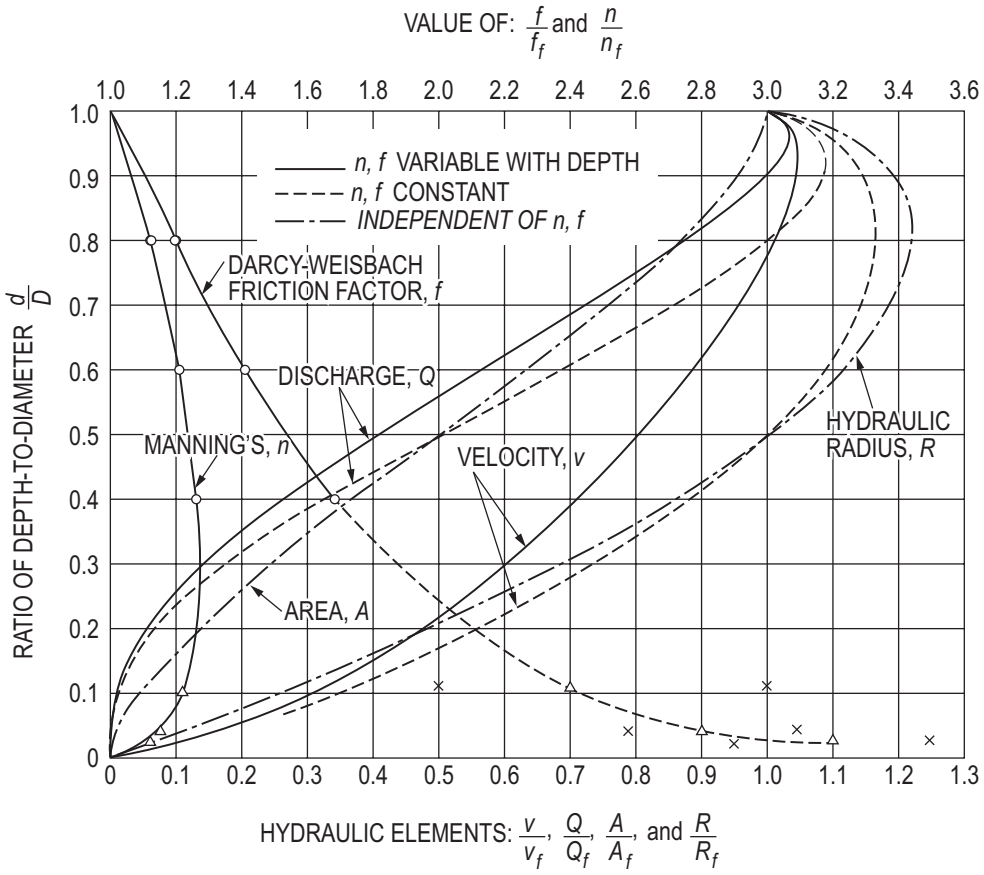
Open-Channel Flow

Sewage Flow Ratio Curves



p. 294, Hydraulic-Elements Graph for Circular Sewers figure
Updated title of figure and changed *V* to *v* on figure as shown:

Hydraulic-Elements (Partial Flow) Graph for Circular Sewers



p. 294, Specific Energy
Bolded section title and revised *V* to *v* in formula and definition as shown:

Specific Energy

$$E = \alpha\frac{v^2}{2g} + y = \frac{\alpha Q^2}{2gA^2} + y$$

v = velocity

p. 296-297, Manning's Equation and Hazen-Williams Equation

Revised V to v in formula and definition as shown:

Manning's Equation

$$v = \frac{K}{n} R_H^{2/3} S^{1/2}$$

v = velocity (ft/sec or m/s)

Hazen-Williams Equation

$$v = k_1 C R_H^{0.63} S^{0.54}$$

v = velocity (ft/sec or m/s)

p. 299, Traffic Signal Timing and Stopping Sight Distance

Revised definition of deceleration to remove "rate" as shown:

a = deceleration (ft/sec^2)

p. 303, Basic Freeway Segment Highway Capacity

Revised to add table titles and source information as shown:

Adjustment to FFS for Average Lane Width for Basic Freeway and Multilane Highway Segments

Average Lane Width (ft)	Reduction in FFS, f_{LW} (mph)
≥12	0.0
≥11 – 12	1.9
≥10 – 11	6.6

HCM: Highway Capacity Manual, 6th ed., A Guide for Multimodal Mobility Analysis, Transportation Research Board of the National Academies, Washington, DC, 2016, Exhibit 12-20, p. 12-29.

Adjustment to FFS for Right-Side Lateral Clearance, f_{RLC} (mph), for Basic Freeway Segments

Right-Side Lateral Clearance (ft)	Lanes in One Direction			
	2	3	4	≥5
≥6	0.0	0.0	0.0	0.0
5	0.6	0.4	0.2	0.1
4	1.2	0.8	0.4	0.2
3	1.8	1.2	0.6	0.3
2	2.4	1.6	0.8	0.4
1	3.0	2.0	1.0	0.5
0	3.6	2.4	1.2	0.6

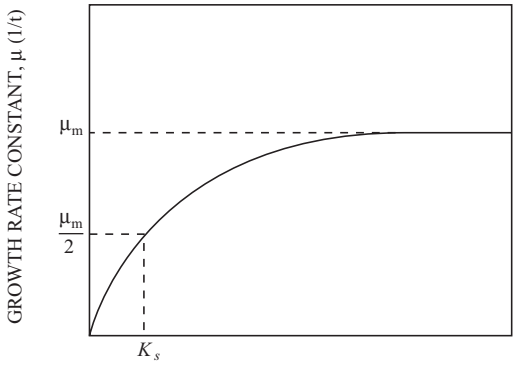
HCM: Highway Capacity Manual, 6th ed., A Guide for Multimodal Mobility Analysis, Transportation Research Board of the National Academies, Washington, DC, 2016, Exhibit 12-21, p. 12-29.

ENVIRONMENTAL ENGINEERING

p. 321, Microbial Kinetics

Moved formula for "Product production at steady state, single substrate limiting" from top of page to underneath "Monod growth rate constant…" figure as shown.

Monod growth rate constant as a function of limiting food concentration.



Product production at steady state, single substrate limiting

$$X_1 = Y_{P/S}\left(S_0 - S_i\right)$$

p. 347, Combustion

Revised equation for "Carbon to carbon dioxide" as shown:

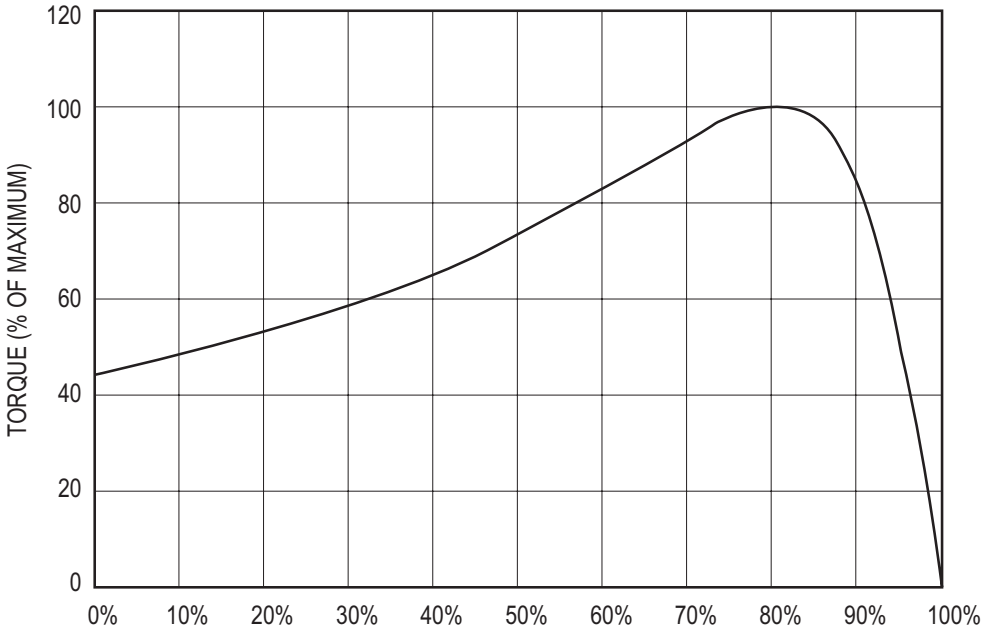
Carbon to carbon dioxide	$C + O_2 = CO_2$	$1 + 1 = 1$	$12 + 32 = 44$

ELECTRICAL AND COMPUTER ENGINEERING

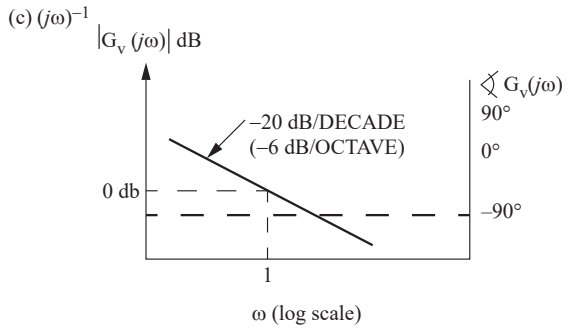
p. 367, Induction Machines

Added "normalized to maximum (break down) torques." to figure heading and revised curve on figure to end at 100% as shown:

A sample torque-speed characteristic of an induction motor is shown below, normalized to maximum (break down) torques.



p. 374, Decibels and Bode Plots
Revised diagram (c) as shown:



p. 383, Differential Amplifier
Revised formulas to show $/V_T$ as part of the exponent as shown:

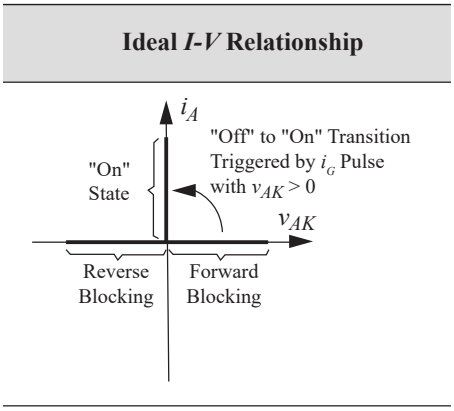
$$\frac{i_{E1}}{i_{E2}} = e^{(v_{B1}-v_{B2})/V_T}$$

$$i_{E1} + i_{E2} = I$$

$$i_{E1} = \frac{I}{1 + e^{(v_{B2}-v_{B1})/V_T}} \qquad i_{E2} = \frac{I}{1 + e^{(v_{B1}-v_{B2})/V_T}}$$

$$i_{C1} = \alpha I_{E1} \qquad i_{C2} = \alpha I_{E2}$$

p. 385, Thyristor or Silicon Controlled Rectifier (SCR), Ideal I-V Relationship
Revised V to v to match axis label as shown:



INDEX
pp. 464 and 470
Remove "flow nets, 260" and "two-port parameters, 368" from listings.