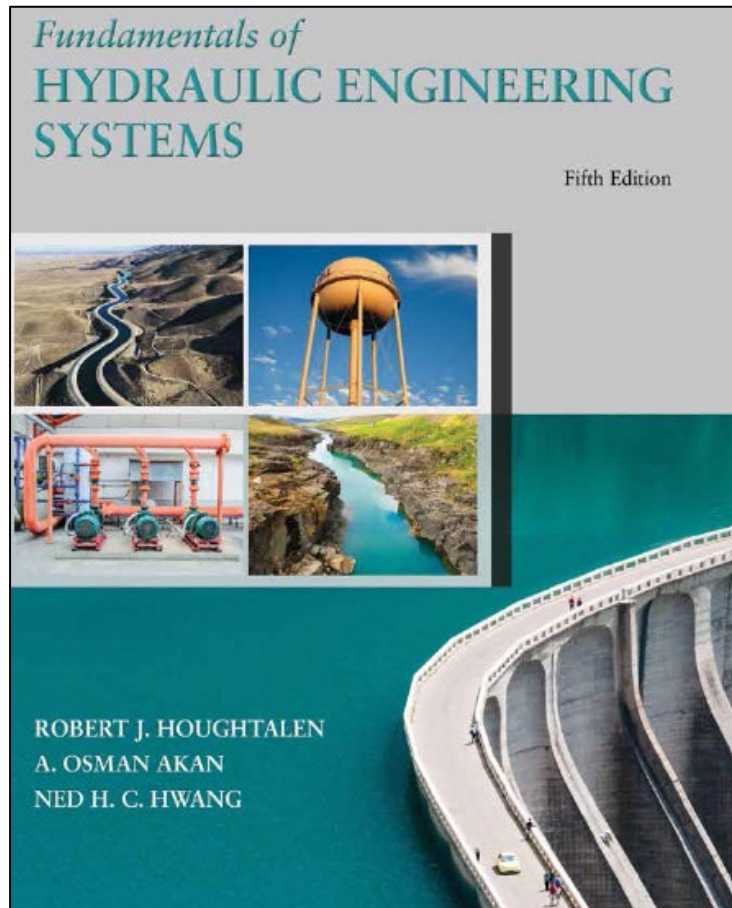


Fundamentals of Hydraulic Engineering Systems

Fifth Edition



Chapter 0

Introduction to Hydraulic Engineering

Learning Objectives

1. Understand **why** we study hydraulics.
2. Identify **typical topics** that are related to the study of hydraulic engineering.
3. Explain which hydraulic engineering **topics we will study** and why.
4. Depict various **projects** that will **require** a significant amount of **hydraulic design**.
5. Build **enthusiasm** for what you will learn in this class and how it will help your career.

Course Program Themes

Hydraulic Engineering

- Fundamental Water Properties
- Water Pressure
- Flow in Pipes
- Pipelines and Networks
- Pumps
- Flow in Open Channels
- Selected Hydraulic Structures
- Special Hydraulic Applications (Design Storms, SLR)

Chapter 1: Fundamental Properties of Water

Water vapor rising from cooling towers at a nuclear power plant



U.S. Nuclear Regulatory Commission

http://energy.gov/sites/prod/files/oeprod/DocumentsandMedia/Cooling_Tower_Report.pdf

Chapter 2: Water Pressure and Pressure Forces

Hoover Dam - Jet Flow Gate Testing (1998)



U.S. Bureau of Reclamation

<http://www.usbr.gov/lc/hooverdam/gallery/damviews.html>

Chapter 3: Water Flow in Pipes

Pipeline Construction - Central Arizona Project

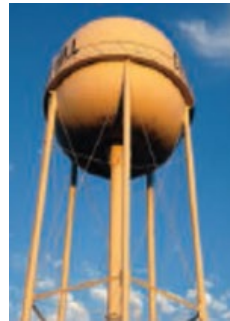
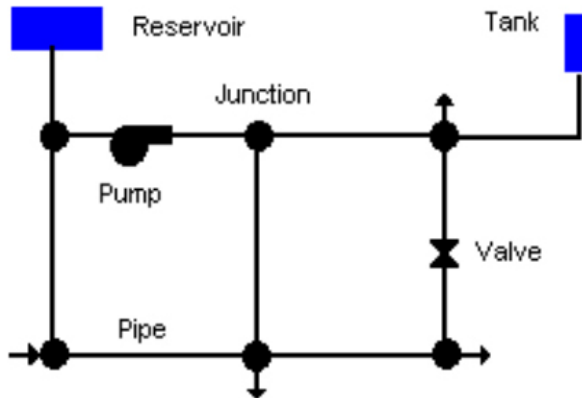


U.S. Bureau of Reclamation

www.usbr.gov/lc/phoenix/AZ100/1980/photogallery.html

Chapter 4: Pipelines and Pipe Networks

Municipal Water Distribution System Modeling



Link ID	Flow GPM	Velocity fps	Headloss ft/Kft	Status
Pipe 1	617.42	1.29	0.80	Open
Pipe 2	382.51	1.09	0.69	Open
Pipe 3	159.91	1.02	1.00	Open
Pipe 4	29.34	0.19	0.04	Open
Pipe 5	-90.09	0.57	0.34	Open
Pipe 6	292.42	1.19	1.03	Open
Pipe 7	55.58	0.63	0.57	Open
Pipe 8	-44.42	0.50	0.38	Open

U.S. EPA → EPA Net

<http://nepis.epa.gov/Adobe/PDF/P1007WWU.pdf>

Chapter 5: Water Pumps

Water Treatment Plant



City of Lakeland, Florida

<http://lakelandgov.net/>

Chapter 6: Water Flow in Open Channels

Firehole River

Yellowstone Park Wyoming, U.S.

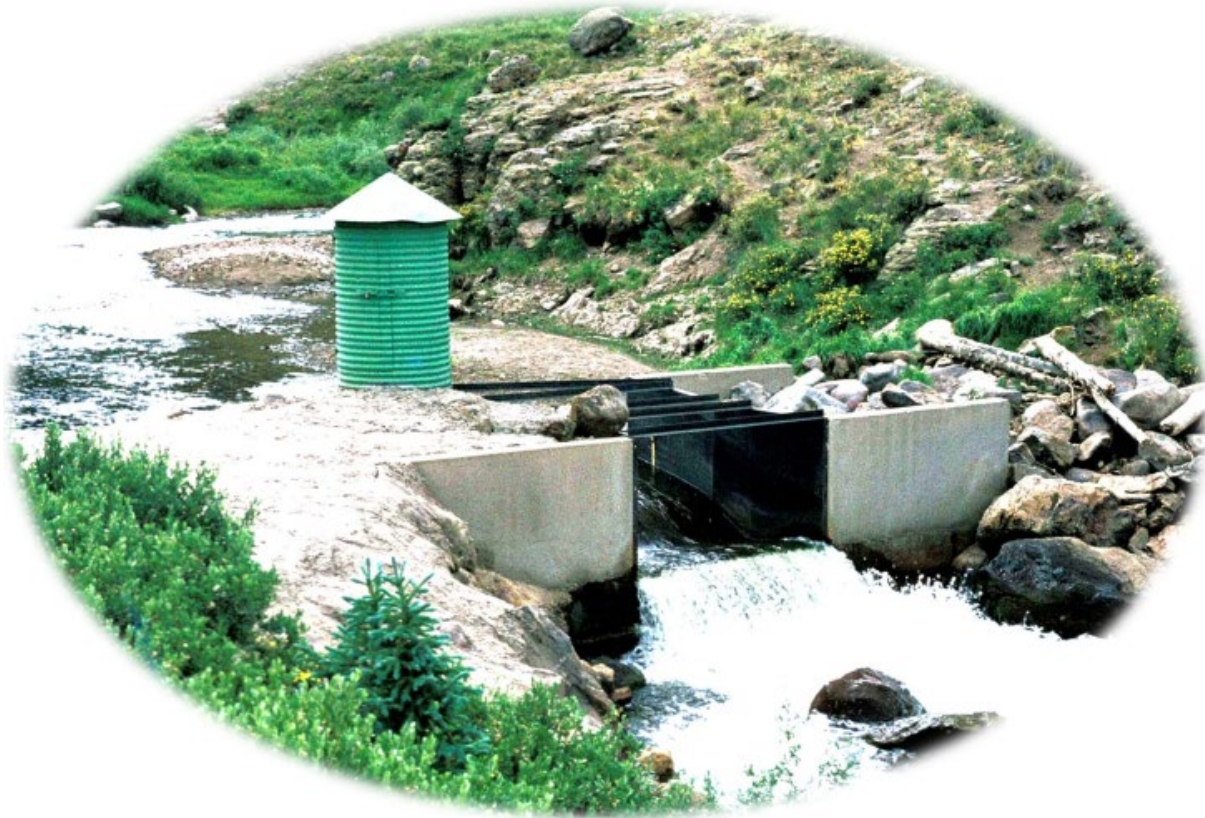


Irrigation Canals

Eastern Sudan and Western U.S.

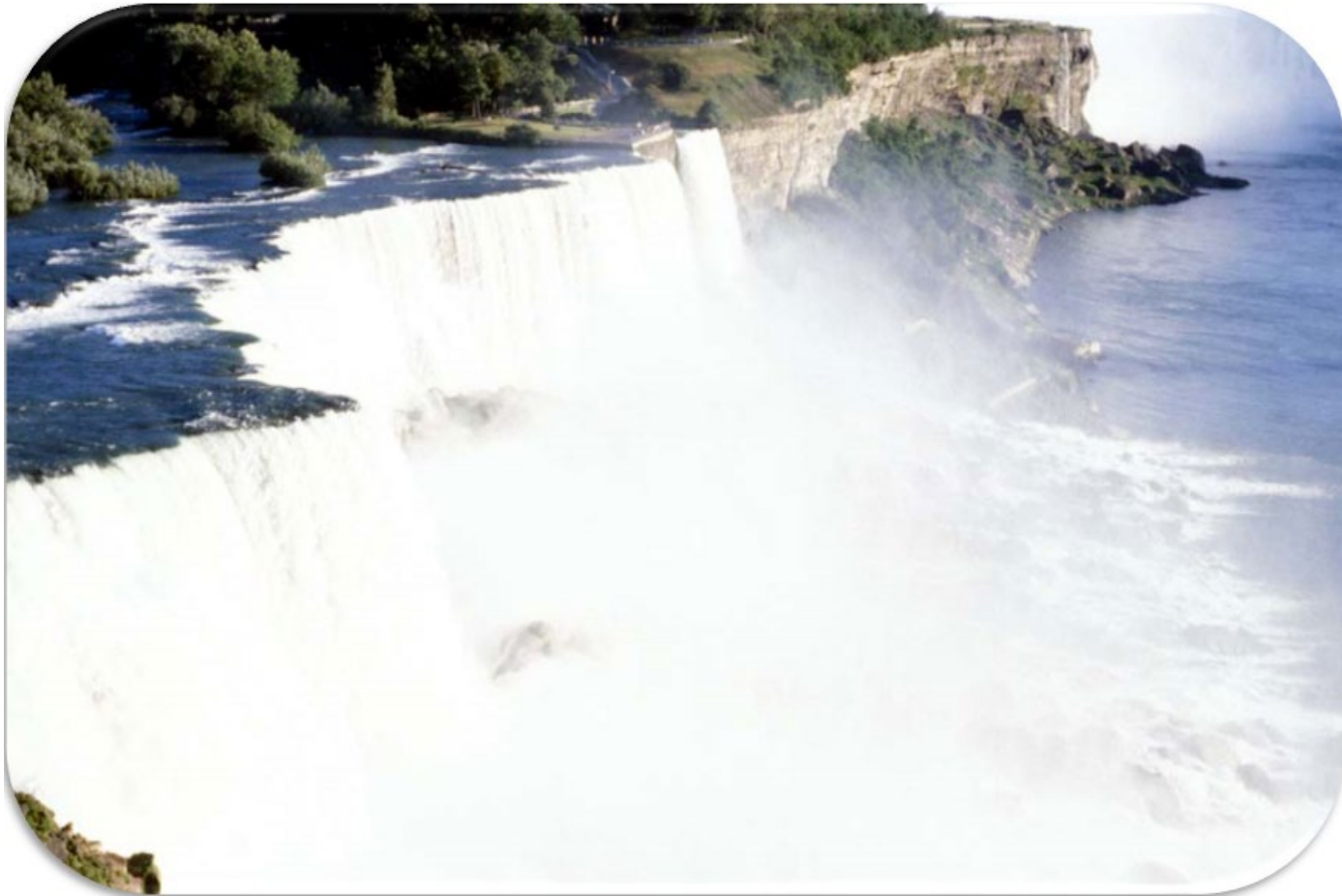


Chapter 9: Water Pressure, Velocity, and Discharge Measurements (1 of 2)



Parshall Flume: Western Colorado

Chapter 9: Water Pressure, Velocity, and Discharge Measurements (2 of 2)



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