

# EE361. Feedback Control Systems

## Lectures on “Control Engineering for Environment & Sustainability”

Spring 2015. Abubakr Muhammad

### Lecture #2. Control Engineering for Water Resources (Part 2)

#### Review of Lec 1

1. River basins and canal systems
2. Smart water grids: a CPS approach towards water management
3. Modeling open channels: physical distributed parameter models and how to interpret them

#### Obtaining Plant Models for a Smart Water Grid

1. What is the difference between physics-based and data-driven (or empirical) models?
2. What is the advantage of thinking about water channels in the signals and systems language?
3. Why can't you obtain a transfer function for a nonlinear model?
4. Why do we try to obtain “simple models” from “complex models” in a computer simulation?
5. What is the difference between initial conditions and boundary conditions in distributed model?
6. What is “empirical” or “physical” about flow modeling in canal gates?
7. Why do we discretize continuous time-models in system identification experiments?
8. How do you obtain “parameters” of a simplified canal model from a step test?
9. What is least-squares technique for model fitting?
10. What is meant by verification in system identification?

#### Building & Modeling Sensors

11. What is hydrometry?
12. What is a telemetry system?
13. What is a smart meter?
14. What are different ICT components in a smart metering system?
15. What is a stilling well?
16. Why do we measure water level instead of water flow in a canal?
17. What is ultrasonic ranging?
18. Why do we need to calibrate water level and flow measurements?
19. Why would you need a mathematical model for a stilling well + smart meter measurement system?