

EE361. Feedback Control Systems

Lectures on “Control Engineering for Environment & Sustainability”

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Lecture #1. Control Engineering for Water Resources (Part 1)

By the end of Lecture 1, you should be able to answer some questions, know some terminology and think about certain issues. These include:

Background Issues

1. What is a river basin? What is the Indus river basin.
2. What is surface water, groundwater, freshwater and saline water?
3. What is the role of silt, salt and water in a river basin?
4. What is the critical link between water and agriculture, especially in Pakistan?
5. What are canals? Why did we build canals in Pakistan?
6. What is the hierarchy of surface water and canal systems in the Indus Basin? (rivers, main canals, branch canals, distributary canals, minor canals)

Smart Water Grids

7. What are smart grids?
8. What is a smart water grid? (and a smart power grid)
9. What are Cyber Physical Systems (CPS)?
10. What is an Internet of Things (IoT)?
11. What is a Networked Control System (NCS)?
12. What type of problems in water management can be solved by a smart water grid?

Modeling Open Channel Hydraulics

13. What is an open channel? (and a closed channel)
14. What are physical models for an open channel?
15. What is the difference between a distributed parameter model and a lumped parameter model?
16. How do we model distributed parameter systems?
17. How do we model lumped parameter system?
18. How do we solve distributed parameter models in a computer?
19. What are hydrographs?
20. What are the Saint Venant Equations?
21. What are the advantages and disadvantages of complicated and simple models?