

EE361. Feedback Control Systems

Lectures on “Control Engineering for Environment & Sustainability”

Spring 2015. Abubakr Muhammad

Lecture #3. Control Engineering for Water Resources (Part 3)

Designing Controllers for Downstream Control

1. What is the difference between supply based and demand based irrigation systems?
2. What is wara'bandi in our irrigation systems and how is it practiced?
3. Why would you approximate delays in an LTI model?
4. What is the role of higher order oscillatory modes in a plant model?
5. What is disturbance in downstream control model and why would you choose a PI controller?
6. Why do you choose a low-pass filter in your controller?
7. Why would you choose lead compensation?
8. What will be advantage and disadvantage of incorporating higher modes in the plant model?

Networked Control Systems for Irrigation Systems

9. What causes a networked control system to emerge in an irrigation canal system?
10. What are physical network effects in water level regulation of multiple canal reaches?
11. What is the difference between a distributed control scheme and a centralized control scheme?
12. How does adding feedforward paths from neighboring controllers help in irrigation control?
13. What is the major advantage of a centralized controller?
14. What is the major disadvantage of a centralized controller?
15. What is CPS security? How is it different from computer security?
16. How can a covert agent steal water in an irrigation control system?
17. How did Stuxnet worm destroy centrifuges in Iran's nuclear program?