Real-time control of stormwater systems using network optimization

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**Introduction**

Stormwater systems are not equipped to handle the current climate issues and smarter stormwater systems are an effective solution for addressing this issue.

Smarter stormwater systems equipped with sensors and actuators can be used to tailor the response of the system to individual rain events.

In this work we present an optimization-based approach for controlling stormwater network.

**Control Algorithms for Stormwater Networks**

Over the years, there have been several control approaches that have been developed for addressing the problem of controlling stormwater networks. But none of these methods explicitly include travel time into their decision process.

There has been some work from the reservoir optimization people on how to control water. But these algorithms are often done on large scale systems with larger time horizon.

Recent work on LQR control is the only control methodology that accounts for time of travel into the decision process.

**Contributions**

But we don’t have to use such an approach for controlling stormwater networks. Where a new linear model has to be calibrated. Though this might be needed for controlling specifically maintaining constant setpoints in the network. We present a control algorithm, that just needs the travel time between the assets.

This approach accounts for the travel time in the systems. Unlike the other approaches where the algorithms are hacked together to work for accounting travel time and most often it is not accounted for.

1. Linear optimization-based control algorithm for controlling stormwater networks
2. Accounts for travel time into the decision making.

**Model**

Describe the stormwater network systems. Stormwater networks are made of retention and routing elements. Retention elements have a capacity to store water and routing elements have a capacity to carry water to other nodes.

Dynamics of the stormwater networks are inherently non-linear, and we have to make some assumptions to create a surrogate system that is linear for using network optimization.

**Assumptions:**

Nodes: Rectangular in shape and the outflows relation is relaxed.

Links : They carry water and similar to the network we have seen in the class.