In the operation of sewer systems, it is important to be able to keep the sewage inside the system, and not overflow into the streets and basements. For such scenarios to occur as seldom as possible, one has to account for the future weather affecting the sewers. One method of control for accounting the future is the method of Model Predictive Control (MPC).

In this study, the applications of MPC to sewer systems has been explored, such as the mathematical formulations of MPC w.r.t. overflow from weirs.

Given that, weather forecasts are not 100% accurate, the forecasts contains uncertainties. The MPC control has to reflect this uncertainty in its formulation towards minimizing overflows. The study has explored several methods of uncertainty handling MPC, with the main focus being on Chance-Constrained MPC (CC-MPC).

In the study, two formulations of CC-MPC has been proposed, one for the formulation of sensible probabilistic constraints with respect to overflow definition and intrinsic feasibility. The other for the simplification of the CC-MPC with respect to the system propagation of stochastic distributions; utilizing ensemble-based forecasts to do distribution estimation.

Please email the summary to the PhD secretary at the department.