Geophysical Research Abstracts
Vol. 19, EGU2017-9695, 2017
EGU General Assembly 2017

Stability of Model Predictive Control applied to a Reservoir

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Abstract Modern water management needs to deal with contraints and needs to use forecasts to anticipate on extreme events. One of the most popular techniques to achieve this is Model Predictive Control. The approach is widely applied and fairly successful. However, the question of stability of the resulting system is often not explicitly demonstrated. To examine ths aspect we consider a reservoir that serves two purposes: shipping and short term storage for flood prevention. For shipping a more or less constant water level is desired, while for flood prevention additional storage space will need to be freed up when the need arises. Under the assumption that we have a reliable short term forecast of storage needs, we will implement a simple MPC controller and show that the resulting controlled system is stable.