
MATT DAVISON, University of Western Ontario, Department of Applied Math
Some Optimal Control Problems in Natural Gas Storage

Real options theory is used to derive nonlinear partial integro-differential equations for valuing and optimally operating natural gas storage facilities. The equations incorporate a class of spot price models which exhibit the same time-dependent, mean-reverting dynamics and price spikes observed in energy markets. The operational characteristics of real storage units, including working gas capacities, variable delivery and injection rates, and cycling limitations, are incorporated. The model is illustrated with a solved numerical example of a salt cavern storage facility to illustrate the similarity between storage facilities and financial straddles. Depending on the amount of stored gas the relative influence of the put and call components vary.

This is joint work with Matt Thompson and Henning Rasmussen.