Risk-Averse Designs, Robustness, and Stochastic Games

Tamer Basar, University of Illinois at Urbana-Champaign

I will talk about the relationship between risk-averse designs based on exponential loss functions with or without an additional unknown (adversarial) term and a class of stochastic games. This leads to a robustness interpretation for risk-averse decision rules in the general context, through a stochastic dissipation inequality. I will show, in particular, the equivalence between risk-averse linear filter designs and saddle-point solutions of a particular stochastic differential game with asymmetric information for the players. One of the by-products of this analysis is that risk-averse filters for linear signal-measurement models are robust, through a stochastic dissipation inequality, to unmodeled perturbations in both the signal and the measurement processes. Extensions to nonlinear models, problems where the decision maker's and the adversary's goals are not totally conflicting, and also problems where there is an element of deception in the generation of the signal model will also be discussed.