Equilibrium for discontinuous games and optimal regulation in electricity markets

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In this presentation electricity markets are considered including a transmission network, producers generating electricity and an agent doing coordination (Independent System Operator, ISO). Production is organized by means of an auction. Once producers simultaneously bid cost functions, the ISO decides the quantity each generator produces and the flows through the network lines. Producers play strategically with the ISO. When bidding, each firm tries to obtain revenues as high as possible. We prove existence of equilibrium for this discontinuous game and then by using optimal mechanism design, we derive an optimal regulation mechanism for pricing and compare its performance with the bayesian version of the usual price equal to Lagrange multiplier. Finally, we develop the sensitivity analysis with respect to probabilities distributions involved.