Title: Min-Max Game Problem over a finite time interval

Introduction: In this presentation, I discuss the existence and uniqueness of the optimal pair $\{u^*(t;y_0), w^*(t;y_0), y^*(t;y_0)\}$ for the cost functional

$$J(u,w,y(u,w)) = \int_0^T \{\|Ry(t)\|^2 + \|u(t)\|^2 - \gamma^2\|w(t)\|^2\}\mathrm{d}t$$

with the following min-max problem:

$$\sup_w \inf_u J(u,w,y(u,w))$$

of the abstract state equation:

$$\dot{y}(t) = Ay(t) + Bu(t) + Gw(t) \quad \text{in } [\mathcal{D}(A^*)]'; \quad y(0) = y_0 \in Y$$