$$\min_x f(x) \qquad g(x)=0,\ h(x)\geq 0 \qquad \sim \qquad \min_x f(x,p)$$

$$g(x,p)=0,\ h(x,p)\geq 0$$

$x = x(p)$

$x = x(0)$ for $p = p^0$ fixed

$p \in P$

$\boxed{\text{Worst-case}}$

$$\min_x \bar{f}(x) = \begin{cases} \max\limits_{p\in P} f(x,p) \\ \boxed{g(x,p)=0,\ h(x,p)\geq 0} \end{cases}$$

$g(x,\bar{p})=0$

$$\left[\ \min_x \max_{p\in P} f(x,p) \quad g(x,p)=0,\ h(x,p)\geq 0 \right.$$

→ Training approach

$$\max_{p\in P} \ = \varphi(p) = \boxed{\underbrace{\min_x f(x,p) \quad g(x,p)=0,\ h(x,p)\geq 0}_{OCP}}$$

$l \leq p \leq u$

MUSCOD-II software

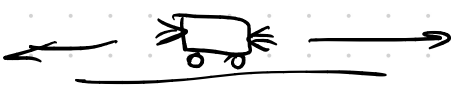
CASADI

Derivative free method with method M. Powell

Master thesis: quasi-Newton for (max min)

→ derivative $\frac{\partial \varphi}{\partial p}$

OCP: rocket car



$$\boxed{\max \varphi(p) \quad l \leq p \leq u} \leftarrow \text{quasi Newton}$$