

Definition of the tuning vector θ

The NMPC configuration is parametrized by the column vector

$$\theta^\top = [\text{Iter}_{\max}, \theta_p, \theta_m, q, r^{(u)}, r^{(\Delta u)}].$$

The components satisfy:

$$\begin{aligned}\text{Iter}_{\max} &\in \{1, 2, \dots, 300\}, \\ \theta_m &< 30 \in \mathbb{Z}_{\geq 0}, \\ \theta_p &< 60 \in \mathbb{Z}_{\geq 0}, \\ q &\in \mathbb{R}_{>0}^3, \\ r^{(u)} &\in \mathbb{R}_{>0}^3, \\ r^{(\Delta u)} &\in \mathbb{R}_{>0}^3.\end{aligned}$$

The weighting matrices are given by

$$Q = \text{diag}(10^q), \quad R_u = \text{diag}(10^{r^{(u)}}), \quad R_{\Delta u} = \text{diag}(10^{r^{(\Delta u)}}).$$

Horizons are

$$\begin{aligned}m &= \theta_m + 1 \\ p &= \theta_p + m\end{aligned}$$