$$a = \arg\min \sum_{t'=t}^{t+H-1} c(\hat{s}_{t'}, a_{t'}) \tag{1}$$

$$c = \|a\|_2^2 + \|\dot{x}\|_2^2 \tag{2}$$

subject to:

$$s_{t+1} = s_t + f_\theta(s_t, a_t) \tag{3}$$

We discretize by linearizing:

$$\delta s_{t+1} = s_t + f_\theta(s_t, a_t) \tag{4}$$

We solve via SQP, i.e. we solve a sequence of the following QPs:

$$\min \sum_{i=0}^{N-1} \|c_i + J_i \begin{bmatrix} \Delta x \\ \Delta a \end{bmatrix} \| \tag{5}$$

$$\delta = \|a\|_2^2 + \|\dot{x}\|_2^2 \tag{6}$$

where J_i are the Jacobians of the residual function c at (s_i, a_i).