Homework 2: Control

Active Learning for Robotics (ME 455), Spring 2023, Northwestern University.

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Due Wednesday, April 26th at 3:00pm, which is a weird time for a deadline... `Edit: Deadine time was fixed, thanks Muchen!`

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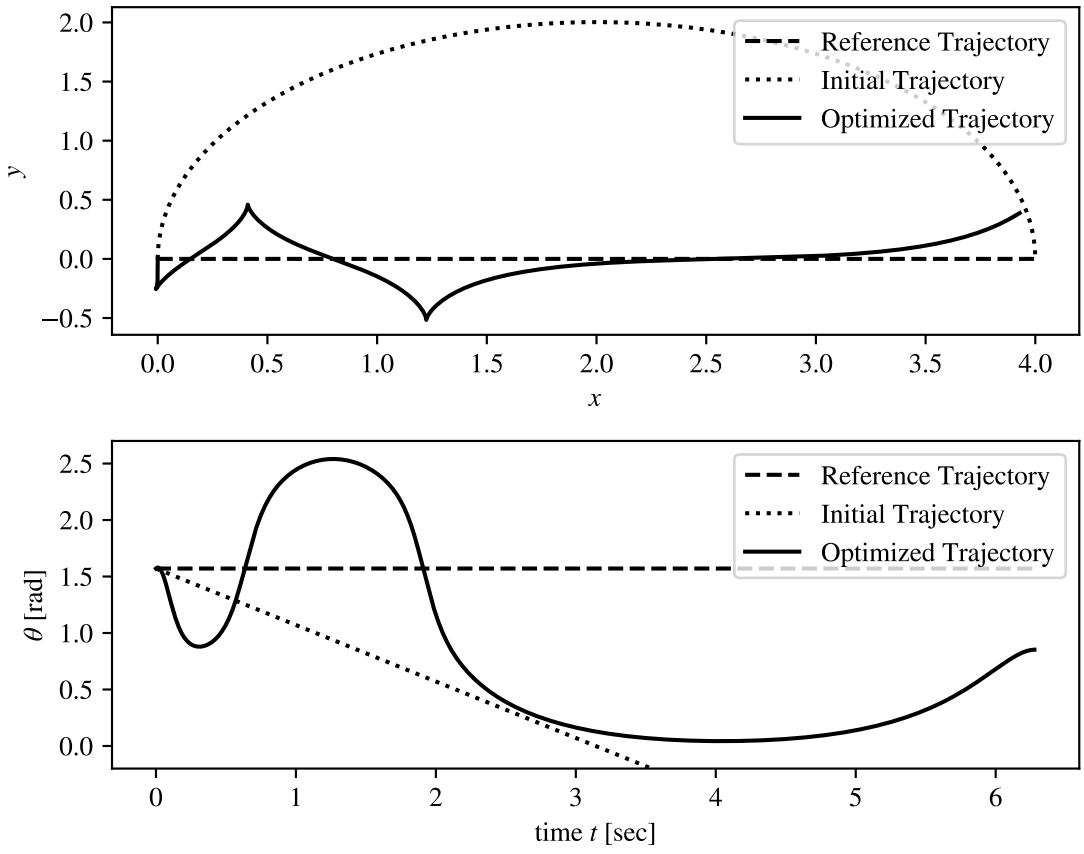

Figure 1.1: Reference trajectory, initial trajectory, and final optimized trajectory

Using a quadratic cost function as seen in the lectue:

$$J(u(\cdot)) = \frac{1}{2}\int_0^T x(t)^{\mathrm{T}} Q x(t) + u(t)^{\mathrm{T}} R u(t) \mathrm{d}t + \frac{1}{2} x(T)^{\mathrm{T}} M x(T)$$

with weight matrices $Q = \mathrm{diag}(100, 10, 1)$, $R = \mathrm{diag}(0.01, 0.01)$, $M = \mathrm{diag}(1, 0, 0)$.

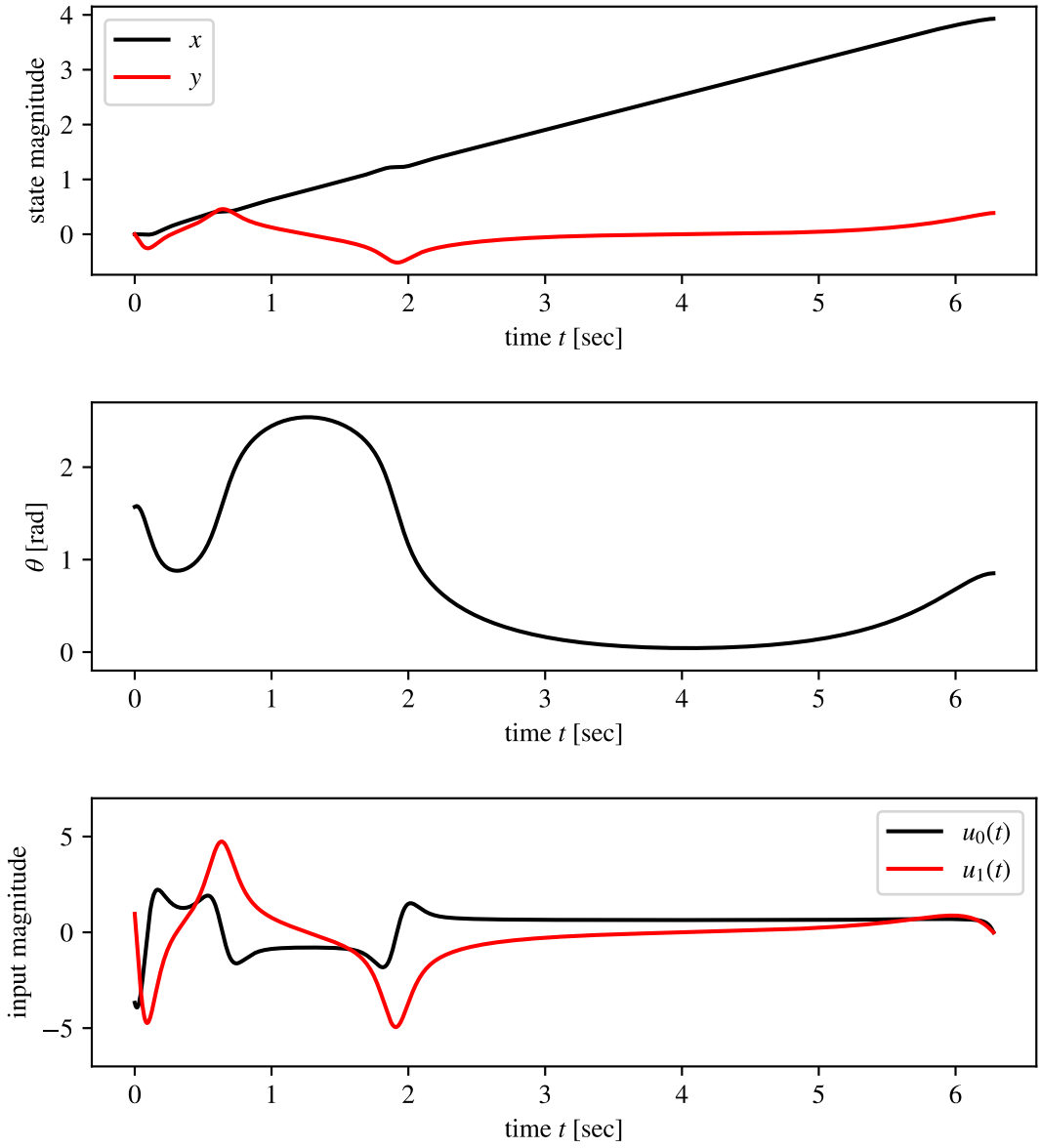

Figure 1.2: Final optimized state and input trajectory

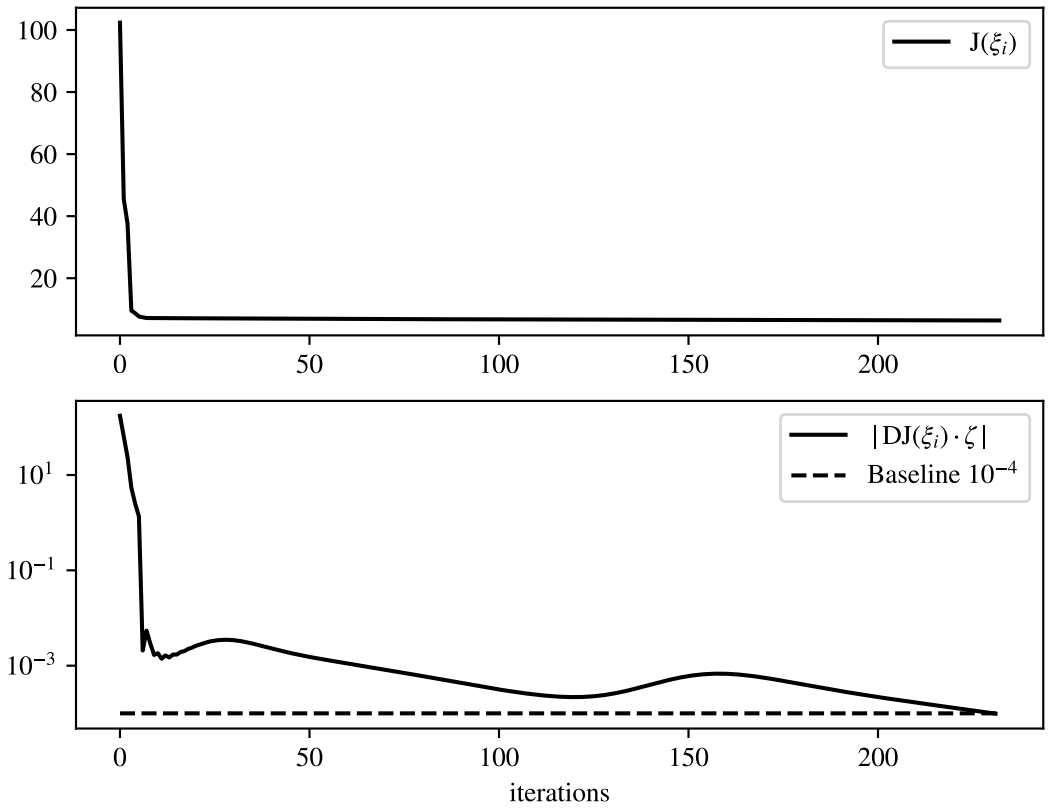

Figure 1.3: Convergence of Cost J(ξ_i) and Cost Derivative DJ(ξ_i) · ζ