Lab 4 Report: EXERCISES

Yilin Zhang [1]. Lab Group: 31.

I. Individual

A. Deliverable - Single-segment trajectory optimization

B. Deliverable - Multi-segment trajectory optimization

II. Team

III. Some words

References

[1] M. I. of Technology. Mit16.485 - visual navigation for autonomous vehicles. [Online]. Available: https://vnav.mit.edu/labs_2023/lab3/exercises.html

[2] T. Lee, M. Leok, and N. H. McClamroch, "Geometric tracking control of a quadrotor UAV on SE(3)," in *49th IEEE Conference on Decision and Control (CDC)*. IEEE, 2010, pp. 5420–5425.

Appendix A
Individual

A. Deliverable - Single-segment trajectory optimization

Consider the following minimum velocity ($r = 1$) single-segment trajectory optimization problem:

$$\min_{P(t)} \int_0^1 (P^{(1)}(t))^2 dt, \tag{1}$$
$$s.t. \quad P(0) = 0, \tag{2}$$
$$P(1) = 1, \tag{3}$$

$$\begin{aligned} \min_{P(t)} & \int_0^1 (P^{(1)}(t))^2 dt, \\ s.t. \quad & P(0) = 0, \\ & P(1) = 1, \end{aligned} \tag{4}$$

with $P(t) \in \mathbb{R}[t]$, i.e., $P(t)$ is a polynomial function in t with real coefficients:

$$P(t) = p_N t^N + p_{N-1} t^{N-1} + \cdots + p_1 t + p_0. \tag{5}$$

Appendix B
Team

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