Homework 8: Motion Planning with Model Predictive Control

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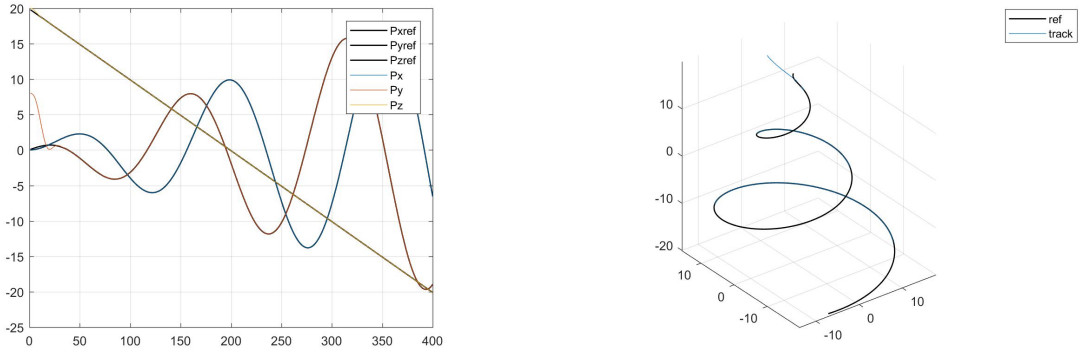
1. Matlab Part

Conical spiral track with QP-based MPC is showed in Figure 1. Maze problem is solved for two



(a) 3-axis positon and reference position

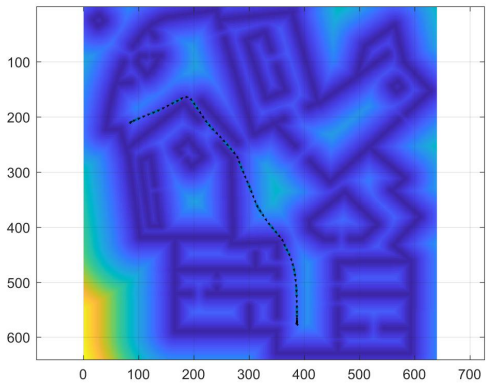
(b) Track the conical spiral

Figure 1: QP-based MPC to track the conical spiral

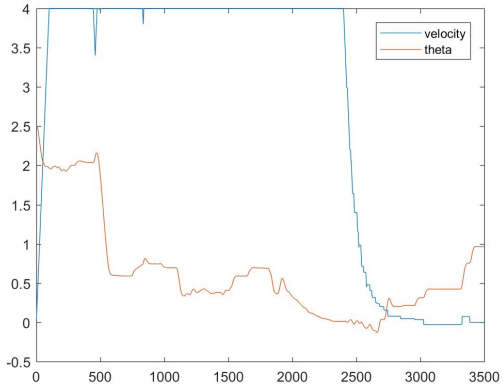
various start points, showed in Figure 2 and Figure 3

2. Main Takeaways

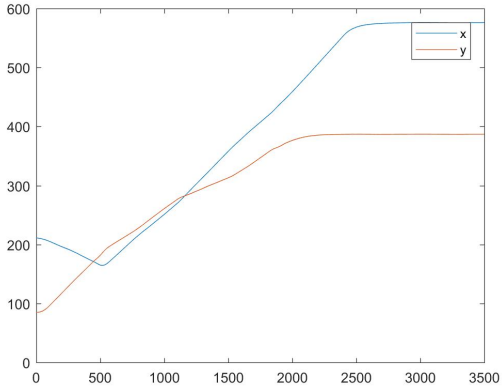
1. Model predictive control (MDP) components: model (system and problem), prediction, control.
2. Linear MPC with hard and soft constraints (slack variables).
3. Nonlinear MPC, particle swarm optimization (PSO).



(a) Trajectory

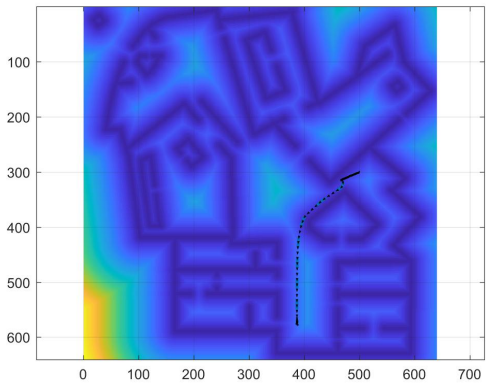


(b) Velocity change

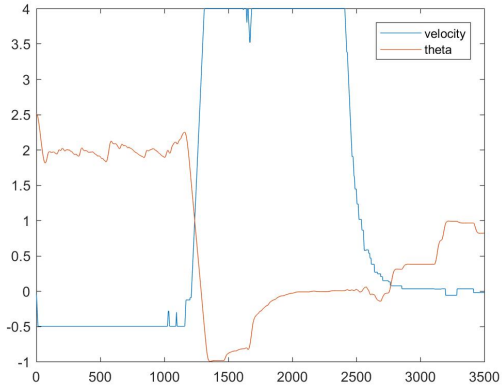


(c) Coordinates change

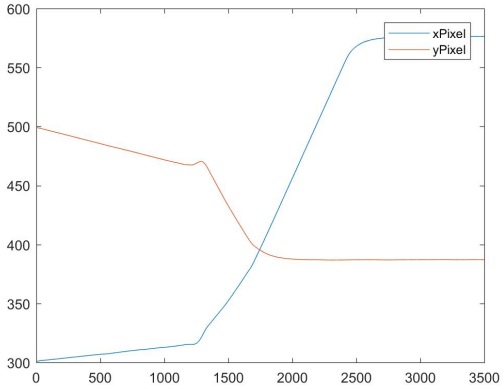
Figure 2: Maze problem: case 1.



(a) Trajectory



(b) Velocity change



(c) Coordinates change

Figure 3: Maze problem: case 2.