

Robotics

Exercise 3

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In the tutorial we will first discuss again the last week's 2nd exercise.

1 Motion profiles

Construct a motion profile that accelerates constantly in the first quarter of the trajectory, then moves with constant velocity, then decelerates constantly in the last quarter. Write down the equation $MP : [0, 1] \mapsto [0, 1]$.

2 Multiple task variables & Peg in a Hole

In our `libRoboticsCourse.12.tgz` in `teaching/RoboticsCourse/02-pegInAHole` you find an example problem (rename `main.problem.cpp` to `main.cpp`), where the goal is to stick the green peg into the blue "hole".

The initial implementation fails: it does not find an appropriate path to insert the peg from the top; and it does not use `kinematicsVec(y, "peg")` with target `ARR(0, 0, -1)` to force the peg to point down.

Implement a nice peg-in-a-hole movement. You may divide the whole movement in several sections and use task space or joint space interpolations with a smooth motion profiles within each. The motion should reach the final position with very high accuracy in finite time and without collisions.

Bonus: How can we apply joint space interpolation? How could one avoid zero velocities at the junction of sections?