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Trajectory tracking in quadrotor platform by using PD controller and LQR control approach

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Abstract

The purpose of the paper is to discuss a comparative evaluation of performance of two different controllers i.e. Proportional-Derivative Controller (PD) and Linear Quadratic Regulation (LQR) in Quadrotor dynamic system that is under-actuated with high nonlinearity. As only four states can be controlled at the same time in the Quadrotor, the trajectories are designed on the basis of the four states whereas three dimensional position and rotation along an axis, known as yaw movement are considered. In this work, both the PD controller and LQR control approach are used for Quadrotor nonlinear model to track the trajectories. LQR control approach for nonlinear model is designed on the basis of a linear model of the Quadrotor because the performance of linear model and nonlinear model around certain nominal point is almost similar. Simulink and MATLAB software is used to design the controllers and to evaluate the performance of both the controllers.

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