



Comparison of Quadrotor Performance Using Forwarding and PID-Backstepping Control

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Abstract: The purpose of this paper is to discuss a comparative evaluation of the performance of two different controllers, namely a controller based on the forwarding control and a hybrid controller based on the PID-backstepping control in the quadrotor dynamic system which is a sub-system actuated with a high non-linearity. 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 while the position and the three-dimensional rotation along the axis, called yaw movement, are taken into account.

This paper deals with the forwarding controller and the hybrid controller composed of PID controllers for attitude control and backstepping for controlling the position. The forwarding approach is applied for the nonlinear model of the quadrotor to track the trajectories. Meanwhile the hybrid controller approach for nonlinear model is designed on the basis of a linear model for the PID controller and a nonlinear model for the controller backstepping quadrotor because the performance of the linear model and the nonlinear model around some nominal points is almost similar. Simulink and MATLAB software are used to design the controllers and evaluate the performance of both controllers.

Keywords: *nonlinear systems; feedback control; perturbations; stability; boundedness; simulation.*

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