

NMPC-PID based control structure design for avoiding uncertainties in attitude and altitude tracking control of quad-rotor (UAV)

Abstract

The extensive consideration in this research article is to utilize the advantages of two most popular control techniques which are Non-Linear Model Predictive Control (NMPC) and Proportional Integral and Derivative (PID) controller for better stabilizing of quad-rotor VAV under different noises and disturbance conditions. The idea is to satisfy the environmental and safety considerations and for that the study of noises and disturbance condition in VAV flight upon the performances of NMPC and PID respectively is being evaluated. Finally a new control method is developed by combining two techniques which can be able to handle different sort of uncertainties i.e. noises and external disturbances in quad-rotor type VAV systems. The simulation result proves that the proposed control structure technique works very well in altitude and attitude stabilization of quad-rotor under different perturbed and unperturbed conditions.

Keywords — Quad-rotor, Attitude and Altitude Control, Auto-tune PID, Model Predictive Control (MPC)