

Enhancing precision on pneumatic actuator positioning using cascaded finite-time prescribed performance control

Mohd Iskandar Putra Azahar, Addie Irawan

Robotics, Intelligent Systems & Control Engineering (RISC) Research Group Faculty of Electrical & Electronics Engineering Technology Universiti Malaysia Pahang, 26600, Pekan, Pahang, Malaysia
addieirawan@ump.edu.my

ABSTRACT

Cascading methods becoming widely used in practice especially on improving conventional control such as PID. Therefore, to enhancing the capability of cascaded PID control in handling highly nonlinear system, this research proposed a finite-time prescribed performance control with cascaded PID (FTPPC-CPID). The research is focused to cater the nonlinearities and uncertainties of pneumatic rod-piston positioning by considering both its displacement and velocity feedbacks. The pneumatic proportional valve with a doubleacting cylinder (PPVDC) model plant is employed as a targeted plant and comparison studies were done with the conventional cascade PID controller. The results show the proposed FTPPCCPID performing able reduce steady-state errors with fast response and a very minimum overshoot in transient of rod-piston positioning with different trajectory inputs and payload as extrinsic disturbance.

KEYWORDS

Cascaded control; Finite-time; Pneumatic system; Position control; Prescribed performance control

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