Non-linear modeling and cascade control of an industrial pneumatic actuator system

Abstract:

In this paper, a nonlinear mathematical modeling based on fundamental physical derivation is presented. The mass flow rate, pressure dynamic and equation of motion are derived referring to the previous research. Simulation work is done to confirm the model based on this derivation. Cascade control based on PID and P controller is designed through simulation in SIMULINK where the parameters of the controller are obtained through PID with optimization toolbox. The results reveal that both step and sinusoidal response test, the cascade controller consistently indicates outperform performance compared to classical PID method. In future, it is recommended to apply this technique to the real-time implementation.