Fuzzy Self-Adaptive PID for Pneumatic Piston Rod Motion Control

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ABSTRACT

This paper presents an integration control method for pneumatic piston rod position control using Fuzzy Self-Adaptive proportional, integral and derivative (FSAPID) controller. Motion control of the pneumatic piston rod is a complex task and highly nonlinear makes it difficult to handle the task involving precise positioning. Therefore, this research has designed FSAPID with fuzzy logic system as a tuner to the PID controller to overcome the fast response and high oscillation by the pneumatic piston actuation. Set of fuzzy rules was designed as a decision maker for PID gains according to the input tracking errors of the rod piston position The FSAPID was verfied through several simulations and compared with conventional PID control on the same double acting single piston pneumatic system plant. The results show FSAPID able to reduce the steady-state error as well as low vibration on a pneumatic stroke motion. Moreover, FSAPID performing low overshoot rate and fast settling time than PID controller.

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