MODEL IDENTIFICATION AND CONTROLLER DESIGN FOR AN ELECTRO-PNEUMATIC ACTUATOR SYSTEM WITH DEAD ZONE COMPENSATION

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Abstract- Pneumatic actuator system is inexpensive, high power to weight ratio, cleanliness and ease of maintenance make it's a choice compared to hydraulic actuator and electromagnetic actuator. Nonetheless, the steady state error of the system is high due to the dead zone of the valve. In this paper, an Auto-Regressive with External Input (ARX) model structure is chosen to represent the pneumatic actuator system. The recursive least square method is used to estimate the model parameters. The pole-assignment controller is then developed for position tracking. To cater the problem of high in steady state error, the dead zone compensation is added to the system. The dead zone controller was designed based on the inverse dead zone model and the dead zone compensation designed based on the desired error. The proposed method is then experimentally with varies load and compares with Nonlinear PID controller. The result shows that the proposed

controller reduced the overshoot and steady state error of the pneumatic actuator system to no overshoot and 0.025mm respectively.

Index terms*:* System identification, recursive least square, ARX, dead zone compensator, pneumatic actuator.