



FEED FORWARD LINEAR QUADRATIC CONTROLLER DESIGN FOR AN INDUSTRIAL ELECTRO HYDRAULIC ACTUATOR SYSTEM WITH SERVO VALVE

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Submitted: Sep. 25, 2012

Accepted: Dec. 15, 2012

Published: Feb. 20, 2013

Abstract- Electro-hydraulic servo actuator (EHA) system consists of several dynamic parts which are widely used in motion control application. These dynamic parts need to be controlled to determine direction of the motion. In this research paper, system identification technique is used for system modeling and the model of the system is estimated by using parameter estimation technique. This process started with collection of input and output data from experimental procedure. The data collected is used for model estimation and Auto Regressive with eXogeneous input (ARX) model is chosen as model structure of the system. Based on the input and output data of the system, best fit criterion and correlation analysis of the residual is analyzed to determine the adequate model to represent the EHA system. Once the model is obtained, discrete PID and feed forward plus Linear Quadratic Regulator (LQR) controller is developed to improve the performance and position tracking performance of EHA system. In order to verify these controllers, it is applied to the real time system and the performance of the system is monitored. The

result obtained shows that the output of the system in simulation mode and experimental works is almost similar for both controllers. The output of the system also tracked the input given successfully. Finally, by comparing the best tuning output from these two different controllers, feed forward plus LQR controller proved to give a better output performance than the classical discrete PID controller by minimize the phase lag and reduce disturbance effect in the system.

Index terms: Electro-hydraulic system, System identification, ARX model, PID controller, LQR controller