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Model Reference Adaptive Controller Design for Electrohydraulic Actuator System with Varying Disturbance

Abstract

The objective of this study is to design and analyze the performance of the designed controllers on the presence of varying mismatched disturbances. This research provides a clear the selected approaches for the controllers' design implementation of the electro-hydraulic actuator (EHA) system, an adaptive controller, the Model Reference Adaptive controller (MRAC). Subsequently, this research is considered another controller, the Proportional Integral Derivative (PID) for comparing the best control performance for the electro-hydraulic actuator system with varying mismatched disturbance. PID controller has been tuned by using two different tuning techniques. The Trial-and-error and Ziegler-Nichols tuning method have been proposed for attaining the desired control system response in this research. Simulation results show that the MRAC provides the best response performance among the designed methods for every specific disturbance setting at 0 N, 5000 N and 10,000 N. The MRAC method dominantly achieves the faster response in rise time for every disturbance respectively.

Keywords

Disturbance; Hydraulic actuator; MRAC; PID