Abstract

This paper deals with the design of a fuzzy PID Controller (FPIDC) with dynamic gain through a fuzzy scheme. The gain factor of Proportional, Integral and Derivative is varied according to process of the proposed dead time. FPIDC is modified which depends on the normalized change of error of the controlled variable (ec) and its number of fuzzy partitions. The proposed scheme is tested for a wide variety of second-order systems with different dead-time (L) under both set-point change and load disturbance. Detailed performance comparison with a well-known fuzzy PD controller and fuzzy PID controller reported in the leading literature is provided with respect to a number of performance indices. The proposed controller is designed using a very simple control rule–base having seven rules and triangular membership functions.
Simulation results justify the effectiveness of the proposed scheme. The simulation results under MATLAB environment has predicted better performance with fuzzy PID controller with different values of Dead Time under all operating conditions of the drive. In results, Conventional PID Controller and Fuzzy Logic Based Controller implemented on first order and second order systems. The step input is taken as the reference input to obtain the transient and steady state response of the systems. The terms like peak time, maximum overshoot, settling time, rise time, Sum Squared Error (SSE), Integral Absolute Error (IAE) and Integral Absolute Time Multiplied Error (IATE) and sum square error are calculated and compared.

References


Index Terms

Computer Science  Fuzzy Systems

Keywords

Fuzzy Logic Controller  Scaling Factor  Non Linear Proportional Derivative Controller
Proportional Integral Derivative Controller