

Optimized proportional gain of PI controller using PSO algorithm for research reactor TRIGA PUSPATI

ABSTRACT

The controller for the TRIGA PUSPATI reactor console is a Proportional Integral controller. Although its signal response performance for power demand level is acceptable, some improvements are required. The power demand level is almost able to achieve the set point. However, the settling time, rise time, and steady state error can be enhanced to improve the response. This paper proposes an optimization technique to improve the proportional gain of the PI controller using the Particle Swarm Optimization technique. The optimization technique was confirmed using several analyses and plotted graphs. The results showed that with the PSO approach, the performance was improved with faster response compared to the non-optimized controller. The fast responses of settling time and rise time as well as smaller steady state errors confirmed the improved power demand level for each case. The percentage of improvement was measured between 60-90% for response performance and more than 90% of improvement was measured for the steady state.

Keyword: Research reactor; Particle Swarm Optimization (PSO); Power demand level; Proportional Integral Differential (PID) controller