

## **A comparative study of applying active-set and interior point methods in MPC for controlling nonlinear pH process**

### **ABSTRACT**

A comparative study of Model Predictive Control (MPC) using active-set method and interior point methods is proposed as a control technique for highly non-linear pH process. The process is a strong acid-strong base system. A strong acid of hydrochloric acid (HCl) and a strong base of sodium hydroxide (NaOH) with the presence of buffer solution sodium bicarbonate ( $\text{NaHCO}_3$ ) are used in a neutralization process flowing into reactor. The non-linear pH neutralization model governed in this process is presented by multi-linear models. Performance of both controllers is studied by evaluating its ability of set-point tracking and disturbance-rejection. Besides, the optimization time is compared between these two methods; both MPC shows the similar performance with no overshoot, offset, and oscillation. However, the conventional active-set method gives a shorter control action time for small scale optimization problem compared to MPC using IPM method for pH control.

**Keyword:** Model predictive control; Active-set method; Interior point method; pH neutralization process