

# Genetic Algorithm Based Controller Design for CSTR Process

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Increasing complexities in industrial processes have compelled the control engineers to implement advanced control strategies to improve the efficiency of the process control system. Usage of PID controllers has become indispensable for its simplicity, reliability and flexibility [1]. The proportional term in the controller generally helps in establishing system stability and improving the transient response while the derivative term is often used when it is necessary to improve the closed loop response speed even further. Conceptually, the effect of the derivative term is to feed information on the rate of change of the measured variable into the controller action. The most important term in the controller is the integrator term that introduces a pole at  $s = 0$  in the forward loop of the process [5]. This makes the compensated open loop system a type 1 system for perfect steady state set point tracking. Technically, a [PID controller](#) reduces the steady state error, minimizes the overshoot and improves the settling rate [6]. They do, however, present some challenges to control and instrumentation engineers in the aspect of tuning of the gains required for stability and good transient performance [5]. These features can be attained only by proper tuning of the PID controller. Various tuning algorithms were proposed by many scientists- each algorithm having its own merits and demerits. PID controller is tuned using the algorithm

which is suitable for that particular process. Well known and widely implemented algorithms include ZN tuning, Cohen-Coon method, Tyreus Luyben technique and Internal model controller.

ZN method was proposed by John G. Ziegler and Nathaniel B. Nichols in 1942 [5]. ZN method is one of the most widely used...

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