Multiloop Fractional Order PID Controller Tuned Using Cuckoo Algorithm for Two Interacting Conical Tank Process

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Abstract : The improvement of meta-heuristic algorithm encourages control engineer to design an optimal controller for industrial process. Most real-world industrial processes are non-linear multivariable process with high interaction. Even in sub-process unit, thousands of loops are available mostly interacting in nature. Optimal controller design for such process are still challenging task. Closed loop controller design by multiloop PID involves a tedious procedure by performing interaction study and then PID auto-tuning the loop with higher interaction. Finally, detuning the controller to accommodate the effects of the other process variables. Fractional order PID controllers are replacing integer order PID controllers recently. Design of Multiloop Fractional Order (MFO) PID controller is still more complicated. Cuckoo algorithm, a swarm intelligence technique is used to optimally tune the MFO PID controller with easiness minimizing Integral Time Absolute Error. The closed loop performance is tested under servo, regulatory and servo-regulatory conditions.