Analytical Design of PI controller for Regular Optimal Control of First Order Process with Constraints

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In this paper, the analytical design method is considered to find the optimal PI parameters for regular optimal control of first order process with constraints. The objective function for the optimal design is to minimize both the rate of change of the manipulated variable and the controlled variable for a given step change of the disturbance input subject to the constraints of the maximum allowable limit in the controlled variable and the maximum allowable rate of change of the manipulated variable. The simulation results show the proposed method finds a global optimum point in an efficient manner and thus the resulting PI controller results in the optimal responses in any case.