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Comparison of Modified Smith Predictor and PID Controller Tuned by Genetic Algorithms for Greenhouse Climate Control

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Abstract

This paper develops a solution for greenhouse climate control employing a modified Smith predictor. For the well-known greenhouse climate model with dead-time, having high nonlinearities and strong coupling, a feedback-feedforward linearization & decoupling method employing measured disturbances is used. The equivalent process has an integrator plus dead time (IPDT) behavior. The undelayed process outputs, mandatory required in the linearized & decoupled method, are obtained by using a process internal model. A modified Smith predictor is employed to control the equivalent process that uses in its structure the same process internal model. The control system performances with two fitted controller types, i.e., the modified Smith predictor and a PID controller tuned by genetic algorithms, are analyzed and compared in nominal case and with parameter variations for robustness test.

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KeyWords Plus: ENVIRONMENTAL-CONTROL; TIME; INTEGRATOR

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