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Greenhouse Climate Control Enhancement by Using Genetic Algorithms

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CONTROL ENGINEERING AND APPLIED INFORMATICS

Volume: 16 Issue: 3 Pages: 35-45

Published: SEP 2014

[View Journal Information](#)

Abstract

This paper develops a control system for greenhouse climate with PID controllers tuned by genetic algorithms. The greenhouse climate nonlinear model with time delay and measurable disturbances is decoupled by feedback-feedforward linearization method, tacking the feedback without delay from an internal model. The equivalent system consists in two integrator plus time delay channels for, temperature and humidity, suitable for PID control. The genetic algorithms (GA) with fitting objective cost functions are developed for PID tuning, including in initial population PID controllers tuned by four conventional tuning methods. Simulation results in representative scenarios show improved performances for PID tuning by GA comparing with conventional methods, where Ziegler-Nichols method is the best.

Keywords

Author Keywords: [greenhouses](#); [climate control](#); [nonlinear systems](#); [feedback linearization](#); [feedforward decoupling](#); [integrator plus time delay](#); [PID controllers](#); [genetic algorithms](#)

KeyWords Plus: [TUNING PID CONTROLLERS](#); [ENVIRONMENTAL-CONTROL](#); [INTEGRATING PROCESSES](#); [MODELS](#)

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Funding

Funding Agency	Grant Number
Sectoral Operational Program for Human Resources Development, Romania	POS DRU 107/1.5/S/77265 (2010)
European Social Fund - Investing in people	

[View funding text](#)

Publisher

ROMANIAN SOC CONTROL TECH INFORMATICS, 313 SPLAIUL INDEPENDENTEI, BUCHAREST, 060042, ROMANIA

Categories / Classification

Research Areas: Automation & Control Systems

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Document Information

Document Type: Article
Language: English
Accession Number: WOS:000342715400004
ISSN: 1454-8658

Journal Information

Impact Factor: [Journal Citation Reports®](#)

Other Information

IDS Number: AQ3TC
Cited References in Web of Science Core Collection: **25**
Times Cited in Web of Science Core Collection: 0