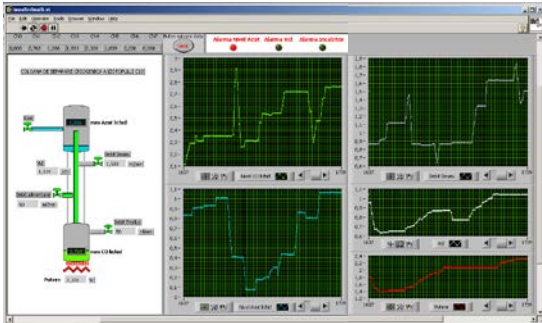
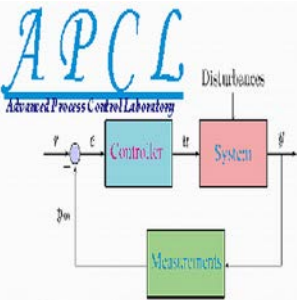


ADVANCED PROCESS CONTROL METHODS

Contact details

Name	Advanced Process Control Methods	
Acronym	MACP	
Logo		
Site	http://research.utcluj.ro/tl_files/research/Research%20Domain/Systems%20Engineering/8_Dulf.pdf	
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Areas of expertise

Complex process modeling and simulation

- Detailed models and simulations of various industrial applications

Tuning, design and testing of various control solutions including advanced control algorithms such as predictive, fractional or robust control

- Conceptual design of various control loops from classical PID to advanced control algorithms
- Control strategy implementation
- Control optimization

Particular advanced monitoring, supervising and control methods for non-conventional processes and technologies

- Conceiving of new, efficient technologies in isotopic and molecular processes
- Structural modeling, monitoring and control of isotopic and molecular processes
- Improved efficiency based on optimization; process maintenance

Team

Prof. Dr. Eng. Eva H. Dulf, Prof. Dr. Eng. Clement Festila, Assist. Prof. Dr. Eng. Cristina I. Muresan, Assist. Prof. Dr. Eng. Roxana Both, Eng. Marius Ticala, PhD, PhD students: Eng. Marius Gretinger, Eng. Adrian Cioloca, Eng. Sergiu Chetan, Eng. Ihor Slivinschi

Representative projects

“Robust, fault tolerant, fractional order control strategies with application to isotope separation cascades”, PNII TE, <http://evadulf.wix.com/pnii-ru-te-38-2015-2017>

“Noi Strategii de Control de Ordin Fractionar pentru Atenuarea Vibratiilor in Flancul Avioanelor”, PNII TE, (2015-2017)

“Distributed Control Strategies with Application to Robust Fractional Order Controllers for Distillation”, PNII CAPACITATI, <http://www.eng.ucy.ac.cy/hadjicostis/CyprusRomaniaProject/index.html> (2014-2015)

“Robust fractional control strategies for multivariable time delay processes”, PNII TE, <http://fractional-group.com/> (2013-2015)

SEPCAS-13C, “Modern Cascade for ¹³C Cryogenic Separation”, PNII PCCA, <http://roxana-eu.wix.com/sepcas-13c>, (2012-2015)

SCMISC, “Structural Complex Modeling of Isotope Separation Columns for Advanced Control Strategies”, PNII

IDEI, <http://fractional.webraptordesign.com/> (2009-2011)

CONDNER-13C, "Nonlinear robust control of cryogenic ^{13}C isotope separation column", PN II PCCA

<http://aut.webraptordesign.com/> (2007-2010)

Significant results

The most representative publications of the past 5 years:

1. E. H. Dulf, C. I. Muresan, M. Unguresan, „Modeling the (^{15}N) isotope separation column”, in
2. *Journal of Mathematical Chemistry*, vol. 52, 2014, pp. 115–131
3. C. I. Muresan, E. H. Dulf*, R. Both (2015), Vector Based Tuning and Experimental Validation of Fractional Order PI/PD Controllers, Nonlinear Dynamics, DOI: 10.1007/s11071-015-2328-2
4. C. I. Muresan, E. H. Dulf*, Roxana Both (2015), Comparative analysis of different control strategies for a train of cryogenic ^{13}C separation columns, *Chemical Engineering & Technology*, DOI: 10.1002/ceat.201400550
5. T. Szelitzky, E.-H. Dulf* (2015), The advantages of robust control of pulse amplitude modulation series-parallel load induction heating inverters, *Optimal Control, Applications and Methods*, DOI: 10.1002/oca.2175
6. C. I. Muresan, A. Dutta, E. H. Dulf*, Z. Pinar, C. M. Ionescu (2015), A New Tuning Algorithm for Fractional Order IMC Controllers for Multivariable Time Delay Processes, accepted to *International Journal of Control*
7. C. I. Muresan, E. H. Dulf*, C. Copot, R. De Keyser, C. Ionescu (2015), Design and analysis of a multivariable fractional order controller for a non-minimum phase system, accepted for *Journal of Vibration and Control*, DOI: 10.1177/1077546315575433
8. E.-H. Dulf, F.V. Dulf, C.I. Pop (2014), Fractional Model of the Cryogenic (^{13}C) Isotope Separation Column, *Chemical Engineering Communication*, ISSN 0098-6445, DOI: 10.1080/00986445.2014.968709
9. E. H. Dulf, C. I. Pop, F. V. Dulf, „Systematic Modeling of the (^{13}C) Isotope Cryogenic Distillation Process”, in *Separation Science and Technology*, Taylor & Francis, vol. 47, no. 8, 2012, 47:8, pp. 1234-1240
10. R. Both, E. H. Dulf*, C. Festila, „Robust control of a catalytic 2 ethyl-hexenal hydrogenation reactor”, in *Chemical Engineering Science*, vol. 74, 2012, pp. 300–309
11. E. H. Dulf, C.I. Pop, F.V. Dulf, „Fractional calculus in ^{13}C separation column control”, in *Signal, Image and Video Processing*, vol. 6, no. 3, 2012, pp. 479-485

Significant solutions:

Monitoring, modeling and control of isotope separation processes and separation cascade
Fractional order control strategies for time delay and MIMO processes

Products and technologies:

1. Mathematical models of complex chemical processes
2. Special transducer for cryogenic liquid nitrogen level in the condenser of an isotope separation column
3. Special transducer for carbon monoxide level in the boiler of an isotope separation column
4. Monitoring system for ^{13}C cryogenic isotope separation column
5. Advanced control strategies for ^{13}C cryogenic isotope separation column and a separation cascade
6. Frequency analyzer based on a direct, simplified algorithm

Patents:

R.A. Munteanu, E.H. Dulf, C. Festila, R. Munteanu, G. Todoran, “Analogue electronic transducer for measuring power in direct current circuits, has circuit for generating filling factor which is astable flip-flop circuit based on amplifier”, patent no. RO128666-A2, July 30, 2013

R.A. Munteanu, E.H. Dulf, C. Festila, R. Munteanu, “Level capacitive cryogenic transducer with coplanar plates for liquid nitrogen”, patent no. RO128052-A2, December 28, 2012

R.A. Munteanu, E.H. Dulf, C. Festila, R. Munteanu, “Intuitive method and electronic apparatus for determining phase shifting in frequency analyzers”, patent no. RO128067-A2, December 28, 2012

The offer addressed to the economic environment

Research & development	Identifying fundamental principles and methodologies that enable systems to exhibit intelligent, goal-oriented behavior, and developing innovative instruments to monitor, manipulate, and control systems Tuning, design and testing of various control solutions using advanced control algorithms, such as predictive, fractional or robust control Control of non-conventional processes Generation (and possible solution) of new theoretical formulations, appeared from the practice
Consulting	Consulting in simulation, design, implementation and maintenance of control systems for multiple industrial field; Consulting in structural and nonlinear modelling of complex processes Consulting in process management using different simulation environment
Training	Complex process modeling and simulation Tuning, design and testing of various control solutions including advanced control algorithms such as predictive, fractional or robust control