

9th IFAC Workshop on Time Delay Systems 2010

**Prague, Czech Republic
7-9 June 2010**

Editors:

Tomáš Vyhlídal

Pavel Zítek

ISBN: 978-1-61782-559-0

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2010) by Elsevier Limited
All rights reserved.

Printed by Curran Associates, Inc. (2011)

For permission requests, please contact the publisher, Elsevier Limited
at the address below.

Elsevier Limited
The Boulevard, Langford Lane
Kidlington OX5 1GB, United Kingdom

Phone: +44 (0)1865 844640
Fax: +44 (0)1865 843912

Email: eurobkinfo@elsevier.com

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2634
Email: curran@proceedings.com
Web: www.proceedings.com

CONTENTS

Keynote papers

Identifiability and Algebraic Identification of Time Delay Systems 1
BELKOURA Lotfi

Nonlinear and adaptive control of Delay Systems

Invited Session organized by Miroslav KRSTIC and Andrey SMYSHLYAEV

Stabilization By Means of Approximate Predictors for Systems with Delayed Input 9
KARAFYLLIS Iasson

Stabilizing Controllers for Delay Systems subject to Positivity Constraints 15
MAZENC Frédéric, NICULESCU Silviu-Iulian

Separation Theorems for a Class of Retarded Nonlinear Systems 21
GERMANI Alfredo, MANES Costanzo, PEPE Pierdomenico

Time delay resistant adaptive control of mini-UAVs 27
DYDEK Zachary T., ANNASWAMY Anuradha M., SLOTINE Jean-Jacques E., LAVRETSKY Eugene

Lyapunov-based Adaptive Output-Feedback Control of MIMO Nonlinear Plants with Unknown, Time-varying State Delays 33
MIRKIN Boris, GUTMAN Per-Olof

Output Control Algorithm for Unstable Plant with Input Delay and Cancellation of Unknown Biased Harmonic Disturbance 39
PYRKIN Anton, SMYSHLYAEV Andrey, BEKIARIS-LIBERIS Nikolaos, KRSTIC Miroslav

Analysis and numerics of the spectrum of time delay system

Invited Session organized by Dimitri BREDÁ, Wim MICHIELS and Rossana VERMIGLIO

On roots and charts of delay equations with complex coefficients 45
BREDÁ Dimitri

A New Method for Delay-Independent Stability of Time-Delayed Systems 51
ERGENC Ali Fuat

An Arnoldi method with structured starting vectors for the delay eigenvalue problem 57
JARLEBRING Elias, MEERBERGEN Karl, MICHIELS Wim

Fast-Lifting Approach to the Computation of the Spectral Radius of Neutral Time-Delay Systems 63
HAGIWARA Tomomichi, FUJINAMI Tokuya

Comparison Between Collocation Methods and Spectral Element Approach for the Stability of Periodic Delay Systems 69
KHASAWNEH Firas A., MANN Brian P., BUTCHER Eric A.

<i>On discretizing the semigroup of solution operators for linear time invariant - time delay systems</i>	75
BREDA Dimitri, MASET Stefano, VERMIGLIO Rossana	
<i>Continuation Based Computation of Root-Locus for SISO Dead-Time Systems</i>	81
GUMUSSOY Suat, MICHELS Wim	
<i>Ultimate-Frequency based Dominant Pole Placement</i>	87
ZÍTEK Pavel, FIŠER Jaromír, VYHLÍDAL Tomáš	
<i>Dependence of Delay Margin on Network Topology: Single Delay Case</i>	93
QIAO Wei, SIPAHI Rifat	
<i>Stability Conditions for a System Modeling Cell Dynamics in Leukemia</i>	99
ÖZBAY Hitay, BENJELLOUN Houda, BONNET Catherine, CLAIRAMBAULT Jean	

Time delay systems in mechanical engineering applications

Invited Session organized by Tomáš VYHLÍDAL and Tamás INSPERGER

<i>Balancing using accelerometers and equations with advanced arguments</i>	103
INSPERGER Tamás, WOHLFART Richard, TURI Janos, STÉPÁN Gábor	
<i>Experimental and Theoretical Study of Distributed Delay in Machining</i>	109
DOMBOVARI Zoltan, STÉPÁN Gábor	
<i>Comparison of Time Delayed Tyre Models</i>	114
TAKÁCS Dénes, STÉPÁN Gábor	
<i>An iterative method for the multipliers of periodic delay-differential equations and the analysis of a PDE milling model</i>	120
ROTT Oliver, JARLEBRING Elias	
<i>Stability Analysis for a Consensus System of a Group of Second Order Dynamics with Time Delays</i>	126
CEPEDA-GOMEZ Rudy, OLGAC Nejat	
<i>Generalized H_2-Preview Control and its Application to Car Lateral Steering</i>	132
SALEH Louay, CHEVREL Philippe, LAFAY Jean-Francois	

Algebraic tools

Invited Session organized by Michael DI LORETO and Jean-Francois LAFAY

<i>Accelerating Convergence of Sum-of-Square Stability Analysis of Coupled Differential-Difference Equations</i>	138
GU,Keqin, ZHANG Yashun, PEET Matthew	
<i>Controller Design for Delay-Independent Stability of Multiple Time-Delay Systems via Descartes's Rule of Signs</i>	144
DELICE Ismail Ilker, SIPAHI Rifat	
<i>Consensus with constrained convergence rate and time-delays</i>	150
MORĂRESCU Irinel-Constantin, NICULESCU Silviu-Iulian, GIRARD Antoine	
<i>On the structure at infinity for linear time-delay systems</i>	156
DI LORETO Michael, LAFAY Jean-Francois, LOISEAU Jean-Jacques, LU Hao	

Affine parameterization design of cascade control for time delay plants 162
ZÍTEK Pavel, KUČERA Vladimír, VYHLÍDAL Tomáš

Efficient inversion of matrices over a non-commutative ring 168
MÁRQUEZ-MARTÍNEZ Luis Alejandro, BRIZUELA-RODRIGUES Carlos Alberto

Advances in neutral systems

Invited Session organized by Michael DI LORETO and Jean-Francois LAFAY

The Exact Controllability Property of Neutral Type Systems by the Moment Problem Approach Revisited 171
RABAH Rabah, SKLYAR Grigory M., BARKHAYEV Pavel Yu.

Computation of critical parameters for neutral type time delay systems 177
OCHOA Gilberto, MONDIÉ Sabine, KHARITONOV Vladimir

A numerical method to find stability windows and unstable poles for linear neutral time-delay systems 183
FIORAVANTI André Ricardo, BONNET Catherine, ÖZBAY Hitay, NICULESCU Silviu-Iulian

Global asymptotic stability for a class of nonlinear systems which are equivalent to neutral higher order Functional Differential Equations 189
RĂSVAN Vladimir, POPESCU Dan, DANCIU Daniela

Liapunov Criteria for Stability in L_p Norm of Special Neutral Systems 194
PEPE Pierdomenico, VERRIEST Erik I.

When classical nonlinear time-delay state-space systems admit an input-output equation of neutral type 200
ANGUELOVA Milena, HALÁS Miroslav

Lyapunov Techniques

Lyapunov Spectrum of Linear Delay Differential Equations with Time-Varying Delay 206
OTTO Andreas, RADONS Günter

Robust Delay-Dependent Stabilizing Control of Time-Delay Systems with State and Input Delays: Augmented L.K. Functional Approach 212
PARLAKCI Mehmet Nur Alpaslan, KÜCÜKDEMIRAL Ibrahim Beklan

H_∞ control of time-delay switched linear systems by state-dependent switching 218
GALBUSERA Luca, BOLZERN Paolo

Instability conditions for systems with distributed time delays via functionals of complete type 224
OCHOA Blanca M., MONDIÉ Sabine

Adaptive Mamdani fuzzy backstepping control for a class of strict- feedback nonlinear time-varying delay systems 229
HAMDY Mohamed, EL-GHAZALY Gamal, IBRAHIM M.

Applications

- Control of a Vacuum Coating Process with Long Dead-Time and an Integrator: a Case Study* 235
DEMENTJEV Alexander, HENSEL Burkhard, KUBIN Hellmuth, RIBBECKE Heinz-Dieter,
KABITZSCH Klaus
- Rejection of Unknown Biased Harmonic Disturbance for Nonlinear System with Input Delay* 241
PYRKIN Anton A., BOBTSOV Alexey A., KREMLEV Artem S.
- Feature-based Parametrization of Input Shaping Filters with Time Delays* 247
SCHLEGEL Miloš, GOUBEJ Martin
- Predictive Control Strategy with Online Time Delay Estimation Applied in General Anaesthesia* 253
HODREA Ramona, IONESCU Clara, DE KEYSER Robin
- Delay Variability Compensation for Combating the Bullwhip Effect in Periodic-Review
Inventory Systems with Multiple Suppliers* 259
IGNACIUK Przemyslaw, BARTOSZEWICZ Andrzej
- Controlling the bifurcation in friction induced vibrations using delayed feedback* 265
SAHA Ashesh, WAHI Pankaj

Networks

- Suboptimal state estimation under communication delays* 271
PACHNER Daniel, BARAMOV Lubomír, HAVLENA Vladimír
- Consensus in networks under transmission delays and the normalized Laplacian* 277
ATAY, Fatihcan M.
- Feedback stabilization and motion synchronization of systems with time-delay in the
communication network* 283
LOMBARDI Warody, LUCA Anamaria, OLARU Sorin, NICULESCU Silviu-Iulian,
CHEONG Joono
- Numerical Methods for Optimal Controls for Nonlinear Stochastic Systems With Delays and
Applications to Internet Regulation* 289
KUSHNER J. Harold

Stability and Stabilization

- Characteristic equation and stability analysis of linear periodic systems with delay* 295
LAMPE Bernhard P., ROSENWASSER Efim N.
- Exponential stability and stabilization of sampled-data systems with time-varying period* 301
SEURET Alexandre
- Adaptive Output Stabilization of Time-Delay Nonlinear System* 307
BOBTSOV Alexey A., PYRKIN Anton A.
- Delay dependent stability analysis of interval time-delay systems* 313
JIANG Wenjuan, KRUSZEWSKI Alexandre, FRIDMAN Emilia, RICHARD Jean-Pierre

A Necessary and Sufficient First Delay-Interval Stability Condition 319
SOUZA Fernando O., DE OLIVEIRA Maurício C., PALHARES Reinaldo M.

Stability Analysis and Controller Design for Discrete-Time Fuzzy Systems With Time-Varying Delay 325
VIANA Dimitri C., LEITE Valter J. S., MIRANDA Márcio F.

PID control

Autotuning for delay systems using meromorphic functions 331
PROKOP Roman, PEKAŘ Libor, KORBEL Jiří

Tuning the leading roots of a second order DC servomotor with proportional retarded control 337
VILLAFUERTE Raul, MONDIÉ Sabine

2DOF PI and PID Controllers Tuning 343
VÍTEČKOVÁ Miluše, VÍTEČEK Antonín

PI Controller design for time delay systems 349
BAKOŠOVÁ Monika, VANEKOVÁ Katarina, ZÁVACKÁ Jana

Design of PI and PID Controllers for Fractional Order Time Delay Systems 355
ÖZYETKIN M. Mine, YEROĞLU Celaeddin, TAN Nusret, TAĞLUK M. Emin

Robust, predictive and adaptive control

Stabilizing design parameters for model predictive control of constrained nonlinear time-delay systems 361
REBLE Marcus, ALLGÖWER Frank

Robustness of a discrete-time predictor-based controller for time-varying measurement delay 367
GARCIA Pedro, GONZALEZ Antonio, CASTILLO Pedro,
LOZANO Rogelio, ALBERTOS Pedro

Robust Simple Adaptive Control for Delayed Measurements Systems 373
BEN YAMIN Rabin, YAESH Issac, SHAKED Uri

Simple Robust Controllers for Delayed Systems 379
DLAPA, Marek

Explicit input-delay compensation for robustness improvement in MPC 384
SANTOS Tito Luís Maia, NORMEY-RICO Julio Elias, LIMÓN Daniel