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MTNS2010

19th International Symposium on Mathematical Theory of Networks and Systems

5–9 July, 2010
Budapest, Hungary

„Mathematics – a key technology in the 21st century”

General Chair:
György Michaletzky

IPC Chair:
László Gerencsér

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PROCEEDINGS

Welcome Messages

On behalf of the Organizing Committee of MTNS 2010, I welcome you to the 19th International Symposium on the Mathematical Theory of Networks and Systems (MTNS2010 in short).

The series of MTNS conferences has already a long history, full of highlights. The first conference was held 37 years ago, in 1973 at College Park, Maryland, USA.

Unfortunately this year a very tragic event casts a shadow on MTNS 2010. Christopher I. Byrnes, dean at Washington University of St. Louis, from 1991 to 2006, who was always vivacious and very energetic, full of new and brilliant ideas, passed away with tragic suddenness in February, 2010. No words can express our grief and sorrow. It is hard to imagine an MTNS conference without Chris. May his soul find peace in Heaven.

MTNS is a prime conference in the general area of mathematical systems theory. The symposium is interdisciplinary and attracts mathematicians, engineers and researchers working in any aspect of systems theory and its applications. MTNS traditionally covers areas involving a wide range of research directions in mathematical systems, networks and control theory, with emphasis on new challenges and potential applications. A prime objective of the MTNS 2010 Symposium is to explore and present mathematics as a key technology for the 21st century.

MTNS 2010 features 5 plenary and 15 semi-plenary talks, two mini-courses, 50 invited sessions and 54 regular sessions (in fourteen parallel tracks). I would like to express my thanks to the organizers of the invited sessions. Members of the Steering Committee were actively involved in organizing the program and I would like to thank for all members of the Committee for the efforts provided during the review process of MTNS 2010 conference.

MTNS 2010 is held at Eötvös Loránd University, Budapest. The university celebrates in this year the 375th anniversary of its foundation. The Campus of the Faculty of Science is situated in a picturesque environment on the bank of the Danube, in a walking distance from the city center. This wide and majestic river divides Budapest into two parts creating a perfect contrast between the right and left banks. Buda is built upon hills, Pest is as flat as a pancake. The UNESCO declared Budapest, 'the pearl of the Danube" a World Heritage site. After Iceland, Hungary has the world's largest reserve of surface thermal water, hundreds of springs help thousands in recovering.

Our ancestors settled in the Carpatian Basin 1100 years ago. Our language is unique from linguistic point of view. Hungarian folk songs, as one of our treasures, hardly bear resemblance to those of other nations in Europe.

We hope that you will find the conference interesting and enjoy the vibrant cultural life of the city.

György Michaletzky
General Chair

Welcome Messages

When I was invited to my first MTNS conference to Stockholm in1986 by Anders Lindquist, my strongest impression was that people participating there were serious about mathematics, not just using it. I hope this attitude is shared by most of us even today. Still, when choosing our motto, we defined mathematics as a key technology of the 21st century. I think we, as the MTNS community, certainly deserve to get this credit.

My role as IPC Chair (or more precisely, IPC co-chair) was, in addition to routine tasks, to give a bit of personal flavor to what we do. A small innovation we have introduced is that we experimented with structuring the topics of the scientific programme in a novel way. We decided to highlight 12 areas that we thought might define the current interest of MTNS community, both inside and outside. In this exercise we tried to attract attention to a few emerging fields along established semi-classical areas. Also the invitation of plenary and semi-plenary speakers followed this pattern.

Our initiative was partially successful. A particularly welcome feature of the present conference is the strong presence of research themes building bridges between the continuous and the discrete. Important application areas such as biology, mechanical systems or economics are also well represented. We hope to see that a good dose of inspiration for mathematical research can be obtained just by going to the frontiers along mathematics and application areas.

We have altogether 414 accepted submissions, requiring 14 parallel sessions, from Monday 9.a.m till Friday 5:30 p.m.. The credit for this tremendous response to our call should mainly go to our Advisory Board and International Program Committee. They helped us to identify potential plenary and semi-plenary speakers, and were carrying out 50% of the job by organizing 50 invited sessions. We are particularly thankful to members of the IPC for having done an excellent job in the reviewing process.

What would be the outcome of this conference is hard to guess this time. What we hope is that all of you will be fascinated by the beauty and vitality of mathematics. After all, paraphrasing Francis S. Collins, leader of the Human Genome Project, mathematics is the language of God.

László Gerencsér
IPC Chair

Christopher I. Byrnes †

Christopher I. Byrnes, Ph.D., dean of the School of Engineering & Applied Science at Washington University in St. Louis from 1991 to 2006 and the Edward H. and Florence G. Skinner Professor Emeritus of Systems Science and Mathematics, passed away unexpectedly in February, 2010 in Stockholm, Sweden. He was 60.

Byrnes, a resident of Ballwin, Mo., was a distinguished visiting professor in optimization and systems theory at the Royal Institute of Technology in Stockholm at the time of his death.

Byrnes joined the WUSTL faculty in 1989 as professor of systems and control and chair of the Department of Systems Science and Control. He became the eighth dean of the School of Engineering & Applied Science on July 15, 1991.

Byrnes' field of scholarship was systems science and control. Among his research interests were feedback design in automatic control, nonlinear dynamics and control, and statistical estimation and filtering. His research found application in electrical power systems, signal processing and speech synthesis, among other areas. He held four U.S. patents and received more than $5 million in competitively awarded grants.

Byrnes joined the Harvard University faculty in 1978 as an assistant professor and was promoted in 1983 to associate professor. He also taught at Arizona State University, where he founded the Center for Systems Engineering Research. At various times, he held visiting appointments at institutions in Europe, Japan and the former Soviet Union, as well as in the United States.

Byrnes was awarded an honorary doctor of technology degree by Sweden's Royal Institute of Technology in 1998. He was an adjunct professor at the institute from 1986 to 1990 and a visiting professor in 1985, 1991, and 2001. In 2001, Byrnes was installed as a foreign member of the Royal Swedish Academy of Engineering Sciences.
A fellow of the Institute for Electrical and Electronics Engineers, Byrnes won many best-paper awards, including the George Axelby Prize, which he received twice, and an award from the International Federation for Automatic Control.

In 2005 he received the W.T. and Idalia Reid Prize for excellence in the field of differential equations and control theory, and in 2008 he won the IEEE Hendrik W. Bode Lecture Prize for fundamental contributions to algebraic and geometric approaches to systems and control. He was the author or editor of several hundred technical articles and books.

Byrnes is survived by his wife Renee; his daughters Kathleen, now studying medicine at Tulane University in New Orleans, La.; and Alison, a student at Duke University in Durham, N.C.; and a son, Christopher, Jr., who attends Chaminade High School in St. Louis.

"Chris made me laugh every single day," Renee said. "He was the most wonderful conversationalist I've ever known, and he could talk to anyone at any level. I feel very honored to have been part of his life even for the short time we had."

May his soul rest in peace in heaven.

(Source: Washington University of St, Louis, Newsroom.)

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Monday, 5 July
Tuesday, 6 July
Wednesday, 7 July
Thursday, 8 July
Friday, 9 July

Program-at-a-Glance

	Sunday 4 July	Monday 5 July	Tuesday 6 July	Wednesday 7 July	Thursday 8 July	Friday 9 July
07.30		Registration				
08.00			Registration			
08.30		08.40 OPENING				
09.00		09.00 – 10.00 Plenary	09.00 – 10.00 Plenary	09.00 – 10.00 Plenary	09.00 – 10.00 Plenary	09.00 – 10.00 Plenary
09.30						
10.00		Coffee				
10.30		10.30 – 12.30 Parallel Sessions	10.30 – 12.30 Parallel Sessions	10.30 – 11.30 Semiplenaries	10.30 – 12.30 Parallel Sessions	10.30 – 12.30 Parallel Sessions
11.00						
11.30				11.30 – 12.30 Distinguished Lecturer		
12.00						
12.30		Lunch		Lunch	Lunch	
13.00						
13.30				13.30 -17.30 Afternoon Tours		
14.00		14,00 – 15.00 Semiplenaries	14,00 – 15.00 Semiplenaries		14,00 – 15.00 Semiplenaries	14,00 – 15.00 Semiplenaries
14.30						
15.00		Coffee			Coffee	
15.30		15.30 – 17.30 Parallel Sessions	15.30 – 17.30 Parallel Sessions		15.30 – 17.30 Parallel Sessions	15.30 – 17.30 Parallel Sessions
16.00	Registration					
16.30						
17.00						
17.30						
18.00		18.00-19.00 Opening Reception				
18.30						
19.00				19.00-22.00 Banquet		

Program-at-a-Glance

Monday, 5 July
Tuesday, 6 July
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Friday, 9 July

Monday

Room 1	08.40 – 10.00 Opening Ceremony Plenary Lecture: Béla Bollobás	10.30 – 12.30 Stochastic Model Predictive Control	14.00 – 15.00 Semiplenary Lecture: Manfred Deistler	15.30 – 17.00 Continuous-Time Model Identification
Room 2		10.30 – 12.30 Information and Markov Dynamics		15.30 – 17.30 Filtering, Estimation and Control
Room 3		10.30 – 12.00 Observers		15.30 – 17.30 PDE Systems
Room 4		10.30 – 12.30 Algebraic Systems Theory, Behaviors, and Codes: Stabilization and Interconnection		15.30 – 17.30 Algebraic Systems Theory, Behaviors, and Codes: New Developments Beyond Classical Algebraic Coding Theory
Room 6		10.30 – 12.30 Real Algebraic Geometry and Applications – 1		15.30 – 17.30 Systems Theory and the Economics of Pricing in New Markets
Room 7		10.30 – 12.30 Graph Processes		15.30 – 17.00 Biological Networks
Room 8		10.30 – 12.30 Communication		15.30 – 17.00 Signal Processing
Room 9		10.30 – 12.30 Piece-Wise Affine Systems		15.30 – 17.30 Switched Systems
Room 10		10.30 – 12.30 Advanced Linear Algebra – 1		15.30 – 17.30 Advanced Linear Algebra – 2
Room 11		10.30 – 12.30 Non-Linear Dynamics		15.30 – 17.30 New Results on Computation and Control
Room 12		10.30 – 12.30 Interpolation and Approximation in Linear Systems – 1		15.30 – 17.30 Interpolation and Approximation in Linear Systems – 2
Room 13		10.30 – 12.30 Linear Stochastic Systems, the White Noise Space, and Related Topics		15.30 – 17.00 Passive Network Synthesis
Room 14		10.30 – 12.30 LDPC and Applications	14.00 – 15.00 Semiplenary Lecture: Kenji Kashima	15.30 – 17.30 New Mathematical Methods in Multidimensional Systems Theory – 1
Room 15		10.30 – 12.30 2D Systems	14.00 – 15.00 Semiplenary Lecture: George Weiss	15.30 – 17.30 Recent Developments in Multidimensional Systems, Control and Signals – Theory and Applications – 1

regular session *invited session*

Program-at-a-Glance

Monday, 5 July
Tuesday, 6 July
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Friday, 9 July

Tuesday

Room 1	09.00 – 10.00 Plenary Lecture: In memory of Christopher I. Byrnes	10.30 – 12.30 Distributed Parameter Systems I: System Structure	14.00 – 15.00 Semiplenary Lecture: Marco C. Campi	15.30 – 17.30 Distributed Parameter Systems II: System Theoretical Properties
Room 2		10.30 – 12.30 Probabilistic Methods		15.30 – 18.00 System Identification
Room 3		10.30 – 13.00 Behaviors		15.30 – 17.30 Structural Properties of Realizations
Room 4		10.30 – 12.30 Sigma-Delta Modulators		15.30 – 17.30 New Mathematical Methods in Multidimensional Systems Theory – 2
Room 6		10.30 – 12.30 Noncommutative Rational Functions and Noncommutative Convexity – 1 (Mini-Course)		15.30 – 17.30 Noncommutative Rational Functions and Noncommutative Convexity – 2 (Mini-Course)
Room 7		10.30 – 12.30 Multi-Agent Systems		15.30 – 17.30 Networked Systems
Room 8		10.30 – 12.30 Recent Developments in Multidimen-sional Systems, Control and Signals – Theory and Applications – 2		15.30 – 17.30 Observer Theory
Room 9		10.30 – 12.30 Stability and Switching		15.30 – 17.30 Sampled Control
Room 10		10.30 – 12.30 Algebraic Structures – 1		15.30 – 17.30 Algebraic Structures – 2
Room 11		10.30 – 12.30 Stability and Dissipativity		15.30 – 17.30 Delay Systems
Room 12		10.30 – 12.30 Mechanical Systems		15.30 – 17.30 Basic and Recent Results on Quantized Control
Room 13		10.30 – 12.30 Moment Problems, Maximum Entropy, and Covariance Extension		15.30 – 17.30 Control of Distributed Stochastic Systems
Room 14		10.30 – 12.30 Codes and Rings	14.00 – 15.00 Semiplenary Lecture: Malcolm C. Smith	15.30 – 17.30 Crypto and Applications
Room 15		10.30 – 12.30 Max-Plus, Tropical and Idempotent Methods in Control – 1	14.00 – 15.00 Semiplenary Lecture: Li Qiu	15.30 – 17.30 Max-Plus, Tropical and Idempotent Methods in Control – 2

regular session *invited session*

Program-at-a-Glance

Monday, 5 July
Tuesday, 6 July
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Wednesday

Room 1	09.00 – 10.00 Plenary Lecture: Heide Glüsing-Lürssen	10.30 – 11.30 Semiplenary Lecture: Vivek S. Borkar	11.30 – 12.30 Distinguished Lecturer: László Lovász	Optional Tours
Room 14		10.30 – 11.30 Semiplenary Lecture: Raimund Ober		
Room 15		10.30 – 11.30 Semiplenary Lecture: Hitay Özbay		

regular session *invited session*

Program-at-a-Glance

Monday, 5 July
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Thursday

Room 1	09.00 – 10.00 Plenary Lecture: Joseph A. Ball		14.00 – 15.00 Semiplenary Lecture: John S. Baras	
Room 2		10.30 – 12.30 New Developments in Stochastic System Identification		15.30 – 17.30 Stochastic Adaptive Systems
Room 3		10.30 – 12.30 Linear Matrix Inequalities		15.30 – 17.30 Algebraic Systems
Room 4		10.30 – 12.30 Optimization Methods in Systems and Control		15.30 – 17.30 New Mathematical Methods in Multidimensional Systems Theory – 3
Room 6		10.30 – 12.30 Real Algebraic Geometry and Applications – 2		15.30 – 17.30 Real Algebraic Geometry and Applications – 3
Room 7		10.30 – 12.30 The Semigroup Approach to DPS		15.30 – 17.30 Operator Theoretic Approaches to DPS
Room 8		10.30 – 12.30 Riccati and Sylvester-Equations		15.30 – 17.30 Treatable H^2 Optimization for Infinite-Dimensional Systems
Room 9		10.30 – 12.30 Network Stability		15.30 – 18.00 Systems on Graphs
Room 10		10.30 – 12.30 Stability		15.30 – 17.30 Applications of Differential Geometry
Room 11		10.30 – 12.30 Port-Hamiltonian Systems		15.30 – 17.30 Structured Non-Linear Systems
Room 12				
Room 13		10.30 – 12.30 Stochastic Control – 1		15.30 – 17.30 Stochastic Control – 2
Room 14		10.30 – 12.30 Algebraic Systems Theory, Behaviors, and Codes: Recent Approaches to New System Classes	14.00 – 15.00 Semiplenary Lecture: Laurent Baratchart	15.30 – 17.30 Finite Geometry and Network Codes
Room 15		10.30 – 12.30 Geometric Control Theory for Linear Systems–1 (Mini-Course)	14.00 – 15.00 Semiplenary Lecture: M. Vidyasagar	15.30 – 17.30 Geometric Control Theory for Linear Systems–2 (Mini-Course)

regular session *invited session*

Program-at-a-Glance

Monday, 5 July
Tuesday, 6 July
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Friday

Room 1	09.00 – 10.00 Plenary Lecture: Hidde de Jong	10.30 – 12.30 Distributed Parameter Systems III: Optimal Control	14.00 – 15.00 Semiplenary Lecture: Ramon van Handel	15.30 – 17.30 Distributed Parameter Systems IV: Computational Issues
Room 2		10.30 – 12.30 Realization and Information		15.30 – 17.00 New Paradigms for Control
Room 3		10.30 – 13.00 Analysis of Physical Systems		15.30 – 16.30 Electrical Circuits
Room 4		10.30 – 12.30 Behavioral Systems and Control Theory		15.30 – 17.00 Computing
Room 6		10.30 – 12.30 Shadows of Multidimensionality: Multidimensional Systems with Applications to 1-D Systems – 1		15.30 – 17.30 Shadows of Multidimensionality: Multidimensional Systems with Applications to 1-D Systems – 2
Room 7		10.30 – 12.30 Systems on Graphs – Consensus		15.30 – 17.30 Consensus and Games
Room 8		10.30 – 13.00 Model Reduction		15.30 – 17.30 Robust Convex Control
Room 9		10.30 – 12.30 Networked Control – 1		15.30 – 17.00 Networked Control – 2
Room 10		10.30 – 12.00 Analytical Methods		15.30 – 17.30 Robust Control
Room 11		10.30 – 13.00 Quantum Systems		15.30 – 17.30 Quantum Systems and Control
Room 12		10.30 – 12.00 Applications in Medicine		15.30 – 17.30 Systems Biology
Room 13		10.30 – 12.30 Control for Markov and Nonlinear Markov Processes		15.30 – 17.00 Stochastic Control
Room 14		10.30 – 12.30 Algebraic Systems Theory, Behaviors, and Codes: Design, Analysis, and Decoding of Convolutional Codes	14.00 – 15.00 Semiplenary Lecture: Magnus Egerstedt	15.30 – 17.30 Economics and Systems Theory
Room 15		10.30 – 12.30 Differential Geometric Methods for Computational Engineering Applications – 1	14.00 – 15.00 Semiplenary Lecture: Ian R. Petersen	15.30 – 17.30 Differential Geometric Methods for Computational Engineering Applications – 2

regular session *invited session*