

Joint Conference 8th IFAC Symposium on **Mechatronic Systems**

11th IFAC Symposium on Nonlinear Control Systems

> September 4–6, 2019 TU Wien, Vienna, Austria

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Program at a Glance

Tuesday, September 3, 2019

18:00-21:00

Welcome Reception, Cafeteria of the TU Wien

Wednesday, September 4, 2019

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	Track T1	Track T2	Track T3	Track T4	Track T5	Track T6	Track T7	Track T8
08:00-08:45				Opening Ceremo	ny - Room FH1			
08:45-09:30			Usin	Plenary Talk We g Information to Stret	A1 - Room FH1 tch Powertrain Effici	ency		
09:30-10:00				Coffee	Break			
10:00-12:00	WeB1 - Room FH1	WeB2 - Room FH2	WeB3 - Room FH3	WeB4 - Room FH4	WeB5 - Room FH5	WeB6 - Room FH6	WeB7 - Room FH7	WeB8 - Room FH8
	Lyapunov-Based Methods in Control I	Control of Nonlinear PDEs I	Optical Systems and Machine Vision	Hybrid and Switched Systems	Optimal Control	MEMS/MOEMS Sensors and Actu- ators for Automo- tive Applications	Motion Planning and Stabilization of Nonholonomic Systems	Robotic Systems I
12:00-13:40				Lunch	Break			
13:40-14:30		Semi-plenary Talk / Lyapunov-based	WeC1 - Room FH1 d Reset Control		Atom	Semi-plenary Talk V iic Force Microscope	VeC2 - Room FH5 for Harsh Environme	ents
14:30-15:30	WeD1 - Room FH1	WeD2 - Room FH2	WeD3 - Room FH3	WeD4 - Room FH4 Set-Valued and	WeD5 - Room FH5	WeD6 - Room FH6	WeD7 - Room FH7	WeD8 - Room FH8
	Lyapunov-Based Methods in Control II	Control of Nonlinear PDEs II	System Identification	Nonsmooth Analysis in Systems and Control: Generalized	Biological and Biomedical Systems	lterative Learning Control	Automotive Systems I	Multi-Agent Robotics
				Lyapunov Methods and Beyond I				
15:30-16:00				Coffee	Break			
16:00-18:00	WeE1 - Room FH1	WeE2 - Room FH2	WeE3 - Room FH3	WeE4 - Room FH4 Set-Valued and	WeE5 - Room FH5	WeE6 - Room FH6	WeE7 - Room FH7	WeE8 - Room FH8
	Geometric Methods in Nonlinear Control I	Control of Nonlinear PDEs III	Mathematical Modeling and Model-Order Reduction	Analysis in Systems Analysis in Systems and Control: Generalized Lyapunov Methods and Bevond II	Model Predictive Control	Precision Scanning Systems in Metrology and Manufacturing I	Automotive Systems II	Robotic Systems II
18:15-19:15				Evening Lecture V Dante and the Cor	VeF1 - Room FH1 nstruction of Hell			

	Thursday, Sep	tember 5, 2019	6					
	Track T1	Track T2	Track T3	Track T4	Track T5	Track T6	Track T7	Track T8
08:45-09:30			Flexible Produc	Plenary Talk Th. ction for the Future -	A1 - Room FH1 - Technology Enabler	s for Creators		
09:30-10:00				Coffee	Break			
10:00-12:00	ThB1 - Room FH1	ThB2 - Room FH2	ThB3 - Room FH3	ThB4 - Room FH4	ThB5 - Room FH5	ThB6 - Room FH6	ThB7 - Room FH7	ThB8 - Room FH8
	Geometric Methods in Nonlinear Control II	Estimation and Observer Design	Integrated Virtualization Along Product Lifecycle Phases I	Dissipativity and Passivity	Turnpikes and Dissipativity in Control	Precision Scanning Systems in Metrology and Manufacturing II	Mechatronics and Intelligent Systems in Railways	Robotic Systems III
12:00-13:40				Lunch	Break			
13:40-14:30	Feedba	Semi-plenary Talk	ThC1 - Room FH1	ection	heilea	Semi-plenary Talk 1 A Simulations - Sten	ThC2 - Room FH5 se into a Virtualized M	/orld
14:30-15:30	ThD1 - Room FH1	ThD2 - Room FH2	ThD3 - Room FH3	ThD4 - Room FH4	ThD5 - Foyer FH5	ThD6 - Room FH6	ThD7 - Room FH7	ThD8 - Room FH8
	Output Regulation, Tracking and Disturbance Attenuation I	Networked Systems I	Integrated Virtualization Along Product Lifecycle Phases II	Electric Systems	Poster Session	Machine Learning	Aerospace Systems I	Bio-Inspired Robotics
15:30-16:00		Coffee	Break				Coffee Break	
16:00-18:00	ThE1 - Room FH1	ThE2 - Room FH2	ThE3 - Room FH3	ThE4 - Room FH4	ThE5 - Room FH5	ThE6 - Room FH6	ThE7 - Room FH7	ThE8 - Room FH8
	Output Regulation, Tracking and Disturbance Attenuation II	Networked Systems II	Isolation, Rejection, and Compensation of Vibrations in Mechatronic Systems I	Adaptive and Robust Control	Extremum Seeking Control: Theory and Applications I	Modeling and Design of Mechatronic Actuators	Control Design for Flight Systems	Human-Robot Interaction
19:30-23:00			Bant	quet Dinner, Orange	ry of Schönbrunn Pal	ace		

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	Friday, Septer	nber 6, 2019						
	Track T1	Track T2	Track T3	Track T4	Track T5	Track T6	Track T7	Track T8
08:45-09:30				Plenary Talk Fr/	A1 - Room FH1			
			Machine Learning	for Robots to Think I	Fast in the Face of U	nexpected Events		
09:30-10:00				Coffee	Break			
10:00-12:00		FrB2 - Room FH2	FrB3 - Room FH3	FrB4 - Room FH4	FrB5 - Room FH5	FrB6 - Room FH6	FrB7 - Room FH7	FrB8 - Room FH8
		Methods for Energy Efficient Processes and Applications	Isolation, Rejection, and Compensation of Vibrations in Mechatronic Systems II	Approximation- Methods, Discrete- Time Equivalents and Analysis of Sliding Mode Control Systems	Extremum Seeking Control: Theory and Applications II	Control of Mechatronic Actuators	Aerospace Systems II	Semiconductor Systems
12:00-13:40				Farewell Recepti	on, Room - FH1			

Contact

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Welcome from the Chairs

Dear Colleagues,

It is our great pleasure to welcome you to the joint conference 8th IFAC Symposium on Mechatronic Systems (MECHATRONICS 2019) and 11th IFAC Symposium on Nonlinear Control Systems (NOLCOS 2019) at TU Wien in Vienna, Austria. Both symposia have a long tradition, NOLCOS started in 1989 in Capri, Italy and thus celebrates its 30th anniversary, and the first MECHATRONICS symposium was held in Darmstadt, Germany, in 2000. We are pleased that the founding chairs of these successful conference series, *Alberto Isidori* for NOLCOS and *Rolf Isermann* for MECHATRONICS, will give a short welcome address during the opening ceremony.

Following the tradition, NOLCOS addresses significant challenges in various fields of nonlinear control by focusing on the latest developments in theory and applications, as well as related areas of research and engineering. MECHATRONICS deals with a synergistic approach to utilize advanced control, sensing and actuation methodologies in a variety of applications across many fields such as robotics and automation, motion and vibration control, automotive and aerospace systems, biomedical systems, micro and nanoscale systems, energy systems, and many others. The motto of this joint conference is "theory meets practice", bringing together scientists and researchers from both domains, the more theoretically oriented from NOLCOS with the more application oriented from the MECHATRONICS community.

351 full papers (217 NOLCOS For this symposium, and 134 MECHATRONICS) and 36 short papers and poster contributions (16 NOLCOS and 20 MECHATRONICS) were submitted. Finally, the program includes 55 regular and invited sessions with 247 full papers, which will be published in the IFAC-PapersOnLine series hosted on ScienceDirect, and 21 short papers including poster contributions. In total, these papers were written by 889 authors from 45 countries. Particularly interesting for the joint conference is the fact that 17 thematic sessions contain contributions from both NOLCOS and MECHATRONICS. Moreover, the program contains three plenary talks (Aude Billard, Jan Hill, Anna Stefanopoulou), four semi-plenary talks (Michael Baumann, Urs Staufer, Pierre Rouchon, Luca Zaccarian) and an evening lecture by Sebastian Schütze.

Moreover, an Award Ceremony will be part of the Banquet Dinner, which takes place on Thursday evening, September 5, 2019 in the Orangery of Schönbrunn Palace (former imperial summer residence). The following triennial awards by the IFAC Technical Committees on Non-Linear Control Systems and Mechatronic Systems will be presented: The 2019 IFAC TC 2.3 Award on Non-Linear Control Systems, the IFAC 2019 TC 4.2 Young Researcher Award, the IFAC 2019 TC 4.2 Mechatronic Systems Award, and the IFAC 2019 TC 4.2 Lifetime Achievement Award. In addition, a Best Paper Award and a Young Author Award for both NOLCOS and MECHATRONICS will be awarded during the conference banquet. The conference social program includes a welcome reception on Tuesday evening, an opening ceremony on Wednesday morning, an evening lecture with a buffet on Wednesday evening, the conference banquet on Thursday evening, and a farewell lunch on Friday.

The city of Vienna is the capital of Austria, with a population of about 2 million. Vienna's history dates back to the first century AD, when the Romans established the military camp Vindobona. In the center, the cityscape is characterized by the abundance of baroque buildings created mostly under the rule of Empress Maria Theresia and Emperor Franz Joseph, who was largely responsible for the monumental architecture round the Ringstraße. Vienna is known for its high quality of life and is described as Europe's cultural capital, a metropolis with unique charm, vibrancy and flair. It boasts outstanding infrastructure, is clean and safe, and has all the inspiration that you could wish for a European city. Vienna also attaches major importance to science and research with more than 25 public and private research institutions and universities.

Finally, we wish to express our gratitude to all the organizations and individuals who have contributed to this conference. Special thanks go to the International Program Committee who did a great job in organizing the review process and to the organizers of the 22 invited sessions, who contributed greatly to the overall program. We highly appreciate the support of our financial sponsors (Austrian Ministry for Transport, Innovation and Technology, AVL, B&R Industrial Automation, Robert Bosch, Engel Austria, Hoerbiger Wien. KEBA, MicroEpsilon Messtechnik. TTTech Computertechnik, voestalpine Stahl and of the co-sponsoring organizations (OVE - Austrian Electrotechnical Association, GMAR - Gesellschaft für Mess-, Automatisierungs- und Robotertechnik, VDI/VDE -Society Measurement and Automatic Control). In particular, we thank all the authors and speakers for preparing their paper, presenting talks, and posters. Last but not least, a big thank you goes to the Local Organizing Team for its excellent work and enthusiastic efforts that have turned this symposium into reality.

We sincerely hope that you will enjoy your stay in Vienna!



 Andreas Kugi (General Chair)
 Andrew Teel (IPC Chair
 Tsu-Chin Tsao Kurt Schlacher Georg Schitter (IPC Chair
 (NOC Chair

 NOLCOS)
 MECHATRONICS)
 NOLCOS)
 MECHATRONICS)

Scope

The IFAC MECHATRONICS & NOLCOS 2019 provides a forum for professionals, researchers, students, and experts in mechatronics, nonlinear control, and related fields. The idea behind this joint conference is bringing together experts with a more theoretical background in nonlinear systems theory and control with more application-oriented experts in mechatronics.

MECHATRONICS 2019

- Modelling and design methods
- System integration
- System analysis and optimization
- Identification and control
- Software tools
- Hardware-in-the-loop simulation
- Human-machine interaction
- Fault detection and diagnostics
- Education for mechatronic systems

NOLCOS 2019

- Modelling and identification
- Model order reduction and simulation
- System analysis and optimization
- Stability and stabilization
- System complexity and networking
- Hybrid systems
- System observation and observers
- Feedback and feedforward design methods
- Optimal control
- Condition monitoring
- Fault detection and isolation

Committees

MECHATRONICS 2019 International Program Committee

- Tsu-Chin TSAO, USA, IPC Chair
- Klaus JANSCHEK, Germany, IPC Co-Chair
- Laurent AUTRIQUE, France
- Giovanni CHERUBINI, Switzerland
- Garrett CLAYTON, USA
- Roger DIXON, UK
- Andrew FLEMING, Australia
- Tobias GLÜCK, Austria
- Knut GRAICHEN, Germany
- Tommy GRAVDAHL, Norway
- Marcel HEERTJES, Netherlands
- Mitsuo HIRATA, Japan
- Michael HOFBAUR, Austria
- Johann HOFFELNER, Austria
- Katerina HYNIOVA, Czech Republic
- Rolf ISERMANN, Germany
- Jung KIM, Korea
- C.R. (Bob) KOCH, Canada
- Martin KOZEK, Austria
- Kam K. LEANG, USA
- Boris LOHMANN, Germany

NOLCOS 2019 International Program Committee

- Andrew TEEL, USA, IPC Chair
- Christophe PRIEUR, France, IPC Co-Chair
- Zhiyong CHEN, Australia, IPC Co-Chair
- Frank ALLGÖWER, Germany
- Alessandro ASTOLFI, UK

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- Claudio MELCHIORRI, Italy
- Reza MOHEIMANI, USA
- Tom OOMEN, Netherlands
- Christian OTT, Germany
- Angeliki PANTAZI, Switzerland
- Thomas PARISINI, UK
- Andreas PICHLER, Austria
- Micky RAKOTONDRABE, France
- Oliver SAWODNY, Germany
- Rudolf SCHEIDL, Austria
- Klaus SCHILLING, Germany
- Hyo-Sang SHIN, UK
- Mahdi TAVAKOLI, Canada
- Masayoshi TOMIZUKA, USA
- Ansgar TRAECHTLER, Germany
- Michel VERHAEGEN, Netherlands
- Markus VINCZE, Austria
- Takashi YAMAGUCHI, Japan
- Bin YAO, USA
- Qingze ZOU, USA

- Ravi BANAVAR, India
- Jean-Pierre BARBOT, France
- Gildas BESANCON, France
- Alexey A. BOBTSOV, Russia
- John BURNS, USA
- Sergej CELIKOVSKY, Czech Republic

- Zheng CHEN, China
- Claudio DE PERSIS, Netherlands
- Rolf FINDEISEN, Germany
- Thor I. FOSSEN, Norway
- Alexander L. FRADKOV, Russia
- Kenji FUJIMOTO, Japan
- Lars GRÜNE, Germany
- Carlos GUARDIOLA, Spain
- Martin GUAY, Canada
- Rene HOFMANN, Austria
- Martin HORN, Austria
- Biao HUANG, Canada
- Jie HUANG, China
- Jun-ichi IMURA, Japan
- Alberto ISIDORI, Italy
- Hiroshi ITO, Japan
- Stefan JAKUBEK, Austria
- Zhong-Ping JIANG, USA
- Tor Arne JOHANSEN, Norway
- Wei KANG, USA
- Chris KELLETT, Australia
- Eric KERRIGAN, UK
- Ülle KOTTA, Estonia
- Costas KRAVARIS, USA
- Alexander KURZHANSKI, Russia

National Organizing Committee

- Andreas KUGI, General Chair
- Wolfgang KEMMETMÜLLER, General Co-Chair
- Andreas STEINBOECK, General Co-Chair
- Kurt SCHLACHER, NOC Chair NOLCOS
- Georg SCHITTER, NOC Chair MECHATRONICS

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- Bernard MASCHKE, France
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- Thomas MEURER, Germany
- Dragan NESIC, Australia
- Tom OOMEN, Netherlands
- Thomas PARISINI, UK
- Joachim RUDOLPH, Germany
- Rodolphe SEPULCHRE, UK
- Andrea SERRANI, USA
- Ralph C. SMITH, USA
- Zoltan SZABO, Hungary
- Sophie TARBOURIECH, France
- Nathan VAN DE WOUW, Netherlands
- Arjan VAN DER SCHAFT, Netherlands
- Stephan WEISS, Austria
- Frank WOITTENNEK, Austria
- Xiaohua XIA, South Africa
- Bin YAO, USA
- Luca ZACCARIAN, France

- Markus SCHÖBERL, NOC Co-Chair NOLCOS
- Ernst CSENCSICS, NOC Co-Chair MECHATRONICS
- Shingo ITO, NOC Co-Chair MECHATRONICS
- Lukasz JADACHOWSKI, Editor
- Sibylle KUSTER, Office

Sponsors

The financial and organizational support of the following sponsors is gratefully acknowledged.

Financial Sponsors

Federal Ministry Transport, Innovation and Technology









Co-sponsoring Organizations



















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About the Host Organization

TU Wien was founded as the Imperial and Royal Polytechnic Institute in 1815. In 1872, the university was renamed the "Technische Hochschule" (Technical University), with its first-ever doctorates awarded in 1902. In 1919, women were admitted for the first time as regular students. Since 1975, the university has officially been called the "Technische Universität Wien", in English simply TU Wien.

"Technology for people" – that is the mission statement of TU Wien. It incorporates academic excellence through research and wide-ranging competence through academic teaching. A major objective of TU Wien is to give all members an equal opportunity to realize their potential. Eight faculties with 51 institutes cover a wide range of engineering and scientific fields. Research at TU Wien is clustered in the five focal areas Computational Science and Engineering, Quantum Physics and Quantum Technologies, Materials and Matter, Information and Communication Technology, and Energy and Environment. For its 30 000 students, TU Wien offers a broad teaching spectrum, which includes 18 Bachelor studies, 31 Master studies, Doctoral studies, three PhD Schools, and several other postgraduate programs. For more details, see https://www.tuwien.at/en/.

The Automation and Control Institute (ACIN) belongs to the Faculty of Electrical Engineering and Information Technology at TU Wien. With more than 80 scientists, the institute conducts basic research, solves challenging practical problems in a number of cooperative projects with industry, develops engineering innovations, and offers students profound research-oriented courses in systems theory, automation, and control. For more details, see https://www.acin.tuwien.ac.at/en/.

Conference Location

The 8th IFAC Symposium on Mechatronic Systems (MECHATRONICS 2019) and the 11th IFAC Symposium on Nonlinear Control Systems (NOLCOS 2019) are hosted by Technische Universität Wien (TU Wien). TU Wien is Austria's largest scientific-technical research and education institution and is located in the city center of Vienna, the capital of Austria.

The conference will take place on the first and on the second floor (see floor plans, pp. 82-83) in the Freihaus Building of TU Wien. The Freihaus Building can be found at Wiedner Hauptstraße 8-10, 1040 Vienna (see mark in the map below).



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Public Transport to the Conference Location

The conference venue is located at the traffic junction Karlsplatz and can be reached with the following means of public transport:

- Metro stop Karlsplatz (lines U1, U2 & U4)
- Tram stop *Resselgasse* (lines 1 & 62)
- Bus stop Karlsplatz (line 4A)

Wiedner Haupstraße 8-10 is the light green building with the sign *TECHNISCHE UNIVERSITÄT WIEN FREIHAUS* above the main entrance. Pass through the red glass doors, and follow the signs to the conference.



Conference Office

The conference office is located on the first floor (red area, see floor plan, p. 82) in front of lecture room FH1 at Technische Universität Wien, Wiedner Hauptstraße 8-10, 1040 Vienna. The conference office will be open during the following times:

- September 3, 2019, 17:00 20:00
- September 4, 2019, 07:30 18:15
- September 5, 2019, 08:00 18:00
- September 6, 2019, 08:00 13:00

Upon registration at the conference office, you receive your personal registration package including a name badge, all conference material and a voucher for the Banquet Dinner. All participants are kindly requested to wear the name badge at all times during the conference and social events to ensure admission to the meeting. A certificate of attendance will be issued upon request at the conference office.

WLAN / Free Internet Access

For free wireless internet connection at the TU Wien campus, you may use your **eduroam** network account or the following configuration:

- WLAN Network (SSID): tunetguest
- No encryption
- Start a web browser, type any URL, and use your personal login credentials handed out with your personal conference package by the conference office

Printing Service

On the ground floor of the conference building (red area), the Grafische Zentrum offers printers with USB interface.

Lunch

The registration fee for MECHATRONICS 2019 and NOLCOS 2019 does not include lunch. However, in the surroundings of the conference location you find many restaurants and take-away facilities. A non-exhaustive list of lunch possibilities is given below:

Restaurants:

- Heuer am Karlsplatz (Int.) Treitlstraße 2 (Karlsplatz), 1040 Vienna www.heuer-amkarlsplatz.com Business lunch starting from 11€
- 2) Café-Restaurant Resselpark Wiedner Hauptstraße 1, 1040 Vienna www.restaurant-resselpark.at Business lunch starting from 8,50€
- Manzana (Spanish) Apfelgasse 1 (corner Paniglgasse), 1040 Vienna www.manzana.at Business lunch starting from 8€
- 4) Bistro Porto (Italian) Rilkeplatz 4, 1040 Vienna www.dastriest.at/triest/de/kulinarik/bistroporto Business lunch starting from 12€
- 5) Wiener Wirtschaft Wiedner Hauptstraße 27–29, 1040 Vienna www.wienerwirtschaft.com Business lunch for 12€
- 6) Santos (Mexican) Favoritenstraße 4–6, 1040 Vienna www.santos-bar.com Business lunch starting from 10,90€

7) Amacord

Rechte Wienzeile 15, 1040 Vienna www.amacord-cafe.at Business lunch starting from 10€

Take-away facilities:

(A) Nam (Indian) Faulmanngasse 1, 1040 Vienna www.nam-nam.at/dabba/

(B) BÁNH MÌ VIENNA (Vietnamese) Faulmanngasse 1, 1040 Vienna www.banh-mi4.eatbu.com/

(C) Kebabhaus (Turkish)

Operngasse 26, 1040 Vienna www.kebabhaus4.eatbu.com/

(D) Kenny's World of Poke (Int.)

Paniglgasse 15, 1040 Vienna www.kennys-world-of-juices.at/

(E) fein Essen

Wiedner Hauptstraße 19, 1040 Vienna www.feinessen.at/

(F) TeigWare (Pasta)

Rilkeplatz 7/2, 1040 Vienna www.teigware.at/

If not indicated differently, the places listed above have a focus on Austrian dishes. For a variety of international cuisines you can also visit one of the many restaurants on Naschmarkt - Vienna's biggest and most popular food market. You can also enjoy your lunch at the Cafeteria of the TU Wien (located in the conference building, on the first floor, yellow area, see floor plan, p. 82). On the map on p. 18 each of the lunch facilities is indicated.





Social Program

All registered conference participants and their registered accompanying persons are invited to join all social events.

Welcome Reception, Tuesday, September 3, 2019, 18:00-21:00

The Welcome Reception is given in the Cafeteria of the TU Wien (Wiedner Hauptstraße 8-10, 1040 Vienna). The Cafeteria is located on the first floor (yellow area, see p. 82).

Evening Lecture, Wednesday, September 4, 2019, 18:15

Some food and drinks will be served after the Evening Lecture entitled "Dante and the Construction of Hell" (for details, see p. 31). The lecture is given in the conference room FH1 (first and second floor, red area, see pp. 82-83, Wiedner Hauptstraße 8-10, 1040 Vienna).

Banquet Dinner, Thursday, September 5, 2019, 19:30

The Banquet Dinner takes place in the Orangery of Schönbrunn Palace, located in Schönbrunner Schloßstraße 47, 1130 Vienna. The route to this location is described below. At the Banquet Dinner, a buffet with a variety of local and international specialities is offered. This event includes the Award Ceremony and is also accompanied by classical music. Please, **do not forget** your personal voucher that allows the admission to the Banquet Dinner.

Closing Session, Friday, September 6, 2019, 12:00

The conference is concluded with a closing session in FH1 in connection with a reception in front of the conference room FH1 (second floor, red area, see p. 82, Wiedner Hauptstraße 8-10, 1040 Vienna).

Route to the Banquet Dinner (Schönbrunner Schloßstraße 47, 1130 Vienna)

From conference venue walk to the metro station Karlsplatz and take the metro line U4 (green line) in the direction Hütteldorf. Get off at the metro station Schönbrunn and take the exit Schönbrunn Palace. Follow the signs to Schönbrunn Palace, see p. 20.

Your registration package comprises two single tickets for the Vienna metro. It is recommended to use these tickets for your journey to the Banquet Dinner and back. Each ticket needs to be punched upon entering the metro station (look out for blue ticket validators) and is valid for one trip in one direction (including changes of the train).



Touristic Information

Vienna offers a wide variety of stunning attractions: from the magnificent Baroque buildings over "golden" Art Nouveau to the latest architecture. Over 100 museums attract more than eight million visitors per year.

The Vienna Tourist Board provides comprehensive information about sights, cultural program, dining locations and leisure activities in Vienna. This website gives visitors a structured overview of the many events and attractions in the city:

https://www.wien.info/en

IFAC Meetings

The following IFAC side meetings will take place during the joint conference IFAC MECHATRONICS & NOLCOS 2019 in Vienna, Austria:

- IFAC TC 2.3 Non-Linear Control Systems meeting September 4, 12:00-13:40, Freihaus Building, room DA03A (third floor, green area, see p. 83)
- IFAC TC 4.2 Mechatronics Systems meeting September 4, 12:00-13:40, Freihaus Building, room DA03B (third floor, green area, see p. 83)
- Mechatronics Editorial Board meeting September 5, 12:00-13:40, Freihaus Building, room DA03A (third floor, green area, see p. 83)
- NOLCOS 2019 Awards Selection Committee meeting September 5, 17:00-18:00, Freihaus Building, room DA03A (third floor, green area, see p. 83)
- MECHATRONICS 2019 Awards Selection Committee meeting September 5, 17:00-18:00, Freihaus Building, room DA03B (third floor, green area, see p. 83)

Types of Contributions and Presentations

- Full contribution: 6 pages paper & 20 minutes oral presentation, full paper peer review, paper published in IFAC-PapersOnLine Proceedings Series (open access, ISSN and individual DOI assigned, indexed in SCOPUS, Web of Science, Google Scholar, and other databases)
- Short contribution: 2 pages paper & 20 minutes oral presentation or 2 pages paper and poster, short paper peer review, paper published in Electronic Preprints, authors can indicate a preference for poster (size DIN A0, portrait, 841 x 1189 mm) or oral presentation (20 min), intended for student and industry contributions
- Plenary and semi-plenary talks: short abstract & 45 minutes plenary / semi-plenary talk, invited

Presentation Guidelines

Oral presentation

On-site technical support (staff wearing a red name badge) is provided in each conference room to facilitate a smooth course of oral presentation. You are asked to adhere to the following guidelines:

- A 20 minutes time slot (approximately 15 minutes talk and 5 minutes discussion) is allocated for each contribution. Please, strictly observe these time limits.
- Each conference room is equipped with a laptop (Windows 10, 64bit, Microsoft Office 2019, Adobe Acrobat Reader DC), a beamer (HDMI interface) and a laser pointer.
- Please prepare your slides with an aspect ratio of 16:9 in the usual PowerPoint file formats or as pdf-file. There are no slide templates for this conference. Please only use standard TrueType fonts as otherwise legibility on the presentation laptops cannot be guaranteed.
- The conference laptops should be used for presentation. Please bring your presentation file on a USB flash drive and copy it to the presentation computer. The speaker should thus be present at the conference room at least 10 minutes before the beginning of the respective session.
- The conference language is English. Please, use only English in your oral presentation and on all slides.

Poster presentation

- Authors of posters are themselves responsible for printing the poster and for mounting it on the billboards. Adhesive tape will be available at the conference office. The conference organizers cannot print your poster at the conference site.
- The maximum size of a poster is DIN A0 (portrait, 841 x 1189 mm).
- All posters are to be presented during the Poster Session ThD5 on Thursday, September 5, 2019 from 14:30 to 16:00 in the foyer of Room FH 5 (second floor, gren area, see, p. 83). The authors should be at their billboard for presentation and discussion of their poster during the whole session.
- The billboards will be available during the whole conference. The posters can be mounted on the billboards at any time before the Poster Session and may stay there until the end of the conference.
- The conference language is English. Please, use only English on your poster.

Publications

Electronic Preprints

Electronic Preprints of accepted contributions (6 pages papers or 2 pages papers) and talks (abstracts) are provided on a **USB flash drive**, which is part of the personal conference package. These preprints are not published anywhere else.

Post-Conference Publications

All accepted **full contributions** that were presented at the symposium will be published in the open-access **IFAC-PapersOnLine proceedings series** at **www.sciencedirect.com**. This series has an open access license, is ISSN and individual DOI assigned, and indexed in SCOPUS, Web of Science, Google Scholar, and other databases.

Keynote Talks

Plenary Talks

The following three plenary talks will be held at IFAC MECHATRONICS & NOLCOS 2019.

Title:	Using Information to Stretch Powertrain Efficiency
Speaker:	Prof. Anna STEFANOPOULOU , William Clay Ford Professor of Manufacturing and Director of the Energy Institute at the University of Michigan, USA
Time & Location:	08:45-09:30, Wednesday, September 4, Room FH 1

Abstract: Connectivity, even with low-level of automation, is being touted as the enabler for reaching higher safety and lower congestion in our transportation systems across the entire globe. In this presentation, I will highlight how load preview, through connectivity, can improve powertrain efficiency across many vehicle platforms (from light duty to eighteenwheelers), type of powertrains (from electric to plug-in, from diesel to gasoline) and diverse terrains. I will also present how inconvenient realities like inaccurate or insufficient information in the control horizon can deteriorate the performance so much that fuel consumption and emissions can be worse than the baseline human-driven vehicle.



Biography: Prof. Anna Stefanopoulou is the William Clay Ford Professor of Manufacturing and the Director of the Energy Institute at the University of Michigan. She was an assistant professor at the University of California, Santa Barbara and a technical specialist at Ford Motor Company. She is an ASME (08), an IEEE (09) and a SAE (18) fellow, an elected member of the Executive Committee of the ASME

Dynamics Systems and Control Division and the Board of Governors of the IEEE Control Systems Society. Her innovation in powertrain control technology has been recognized by multiple awards and has been documented in a book, 21 US patents, 280 publications (7 of which have received awards) on estimation and control of internal combustion engines and electrochemical processes such as fuel cells and batteries. She was a member of the 2016 National Research Council (NRC) committee on fuel efficient technologies and their cost effectiveness in meeting the 2025 US

national vehicle fuel economy standards. She is working now with an NRC committee on the "beyond-2025" fuel economy standards.

Title:	Flexible Production for the Future – Technology Enablers for Creators
Speaker:	Jan HILL , Senior Director Platform Innovation – adidas FUTURE Team
Time & Location:	08:45-09:30, Thursday, September 5, Room FH 1

Abstract: Jan Hill will give a brief overview of adidas and the FUTURE team he is a part of to set the background for his talk. He will continue with an overview of the current status in the sporting goods industry and describe the profile of a creator consumer who is the brands focus for innovation. He will provide insights into the holistic approach adidas is taking to better serve the needs and wishes of today's consumers by delivering unique products and experiences, enabled through manufacturing innovations, automation and digitization. This will be followed by some concrete examples of how a combination of those enablers helped to create new product, production methods and business models to address the needs of the modern athlete.



Biography: Jan Hill can look back at 20 years of working experience at adidas. Since joining the company in 1999, he held different positions in the field of product and process innovation. In 2018, Jan Hill was appointed Senior Director Platform Innovation within the adidas FUTURE team. In this role Jan is responsible for various technology innovation programs. In this context, Jan Hill has ever since been an

important driving force to the adidas SPEEDFACTORY project, by leading the eponymous research project and later bringing the commercial factory to life. Jan Hill holds a degree in mechanical engineering. Jan Hill is part of the adidas FUTURE Team. This is a cross functional research and development team of Designers, Engineers and Sports Scientists, that is creating cutting-edge technologies and concepts for footwear, apparel and hard goods that fuel the horizon of the adidas brand. The team collaborates with the world's best academic and industrial partners to help bring consumer centric innovation to life in the fields of product-, process- and business model innovation.

Title:	Machine Learning for Robots to Think Fast in the Face of Unexpected Events
Speaker:	Prof. Aude BILLARD , Full Professor, School of Engineering, EPFL, Switzerland
Time & Location:	08:45-09:30, Friday, September 6, Room FH 1

Abstract: The next generation of robots will soon get out of the secure and predictable environment of factories and will face the complexity and unpredictability of our daily environments. To avoid that robots fail lamely at the task they are programmed to do, robots will need to adapt on the go. I will present techniques from machine learning to allow robots to learn strategies to enable them to react rapidly and efficiently to changes in the environment. Learning the set of feasible solutions will be preferred over learning optimal controllers. I will review methods we have developed to allow instantaneous reactions to perturbation, leveraging on the multiplicity of feasible solutions. I will present applications of these methods for compliant control during human-robot collaborative tasks and for performing fast motion, such as catching flying objects.



Biography: Aude Billard is full professor and head of the LASA laboratory at the School of Engineering at the Swiss Institute of Technology Lausanne (EPFL). She was a faculty member at the University of Southern California, prior to joining EPFL in 2003. She holds a B.Sc and M.Sc. in Physics from EPFL (1995) and a Ph.D. in Artificial Intelligence (1998) from the University of Edinburgh. She was the recipient of the Intel

Corporation Teaching award, the Swiss National Science Foundation career award in 2002, the Outstanding Young Person in Science and Innovation from the Swiss Chamber of Commerce and the IEEE-RAS Best Reviewer Award. Her research spans the fields of machine learning and robotics with a particular emphasis on learning from sparse data and performing fast and robust retrieval. Her work finds application to robotics, human-robot / human-computer interaction and computational neuroscience. This research received best paper awards from IEEE T-RO, RSS, ICRA, IROS, Humanoids and ROMAN and was featured in premier venues (BBC, IEEE Spectrum, Wired).

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Semi-plenary Talks

The following four semi-plenary talks will be held at IFAC MECHATRONICS & NOLCOS 2019.

Title:	Lyapunov-based Reset Control
Speaker:	Prof. Luca ZACCARIAN , Directeur de Recherche at the LAAS-CNRS, Toulouse and Associate Professor at the University of Trento, Italy
Time & Location:	13:40-14:30, Wednesday, September 4, Room FH 1

Abstract: More than 50 years ago, J.C. Clegg proposed a modified version of the analog integrator introducing suitable state resets and showing improved performance in terms of phase lag, at least as seen from a describing function analysis of the intricate nonlinear phenomenon behind state resets. With certain modern tools arising from recent hybrid dynamical systems representations, it is now possible to revisit that strategy, provide Lyapunovbased (therefore robust) guarantees of its stability and performance, and reach beyond stable linear filters involving resets. This talk covers 15 years of research activity within this framework, emphasizing the advantages and the challenges. A number of reset control strategies, stemming from generalizations of the original paradigm of Clegg, will be discussed. Among other things, we will emphasize the suggestive idea of homogeneous closed loops with reset controllers whose solutions converge exponentially to zero by way of exponentially unstable branches. The talk will be mostly focused on stabilization, but will hopefully also touch upon set-point regulation and reference tracking. Theoretical results will be discussed, together with some experimental and industrial validations within the automotive field.



Biography: Luca Zaccarian received the Laurea and the Ph.D. degrees from the University of Roma Tor Vergata (Italy) in 1995 and 2000, respectively. He has been Assistant Professor in control engineering at the University of Roma, Tor Vergata (Italy), from 2000 to 2006 and then Associate Professor. Since 2011 he is Directeur de Recherche at the LAAS-CNRS, Toulouse (France) and since 2013 he holds a

part-time associate professor position at the University of Trento, Italy. Luca Zaccarian's main research interests include analysis and design of nonlinear and hybrid control systems, modeling and control of mechatronic systems. He has served in the organizing committee and TPC of several IEEE and IFAC conferences. He has been a member of the IEEE-CSS Conference Editorial Board and an associate editor for Systems and Control Letters and IEEE Transactions on Automatic Control. He is currently a member of the EUCA-CEB and an associate editor for the IFAC journal Automatica. He was a nominated member of the Board of Governors of the IEEE-CSS in 2014, where he is an elected member in 2017-2019. He was Student Activities Chair for the IEEE-CSS in 2015–2017 and is currently Associate Editor of Electronic Publications (Conference Information) for the IEEE-CSS. He was a recipient of the 2001 O. Hugo Schuck Best Paper Award given by the American Automatic Control Council. He is a fellow of the IEEE, class of 2016.

Title:	Atomic Force Microscope for Harsh Environments
Speaker:	Prof. Urs STAUFER , Delft University of Technology, Netherlands
Time & Location:	13:40-14:30, Wednesday, September 4, Room FH 5

Abstract: Our attempt to build an atomic force microscope (AFM) for in-line metrology began with a simple question: Can you build an AFM that works on Mars? Of course! Really? Operating any instrument on Mars means running it in an autonomous way – radio signals require several minutes to reach Earth, hence, an operator's intervention would always be too late! The environmental conditions on planet Mars are another challenge, likewise is the journey to Mars especially in the beginning and at the end rough, not to mention the costs for this travel. Lucky enough, we were offered a free trip if we contribute and deliver the instrument in time. Once landed on Mars, it turned out that temperature variations were our biggest enemies. After having identified and circumvented them, we produced unsurpassed measurements and contributed to the scientific results of the Phoenix Mars Mission.

Space proved technology, one might think, would make an instrument fit for industrial applications as well. However, while demonstrated robustness and autonomy are indeed an advantage, we were confronted with more and completely different requirements when we tried making this step back from Mars to Earth. Quick time to data and their traceability were the most important operational requirements; vibrations during measurements, which were very low on Mars, and potentially moving samples were prominent environmental challenges we faced, and which we addressed with mechatronic means.



Biography: Urs Staufer, Professor of Micro and Nano Engineering at the Delft University of Technology, specialized in micro-instrumentation, studied experimental Solid-State Physics, Mathematics and Philosophy at the University of Basel, Switzerland, where he received his PhD summa cum laude in 1990. He started his activities on planetary exploration in 1998 with the development of an

AFM for the MECA payload on the Mars Mission 'Surveyor 2001', which was cancelled about one year before launch. He then led the AFM experiment of the successor Mission 'Phoenix' of which he was Co-Investigator in 2008, and which produced the first extra-terrestrial particle size distribution measurements in the clay and silt size range. Later, he participated also in design studies of instruments for Lunar exploration plans of ESA. His broader research interest is in applying fundamental knowledge from nanoscience and microtechnology for scientific instrumentation, and advanced instrumentation for material characterization and modifications, and for biohealth applications.

Title:	Feedback Issues Underlying Quantum Error Correction
Speaker:	Prof. Pierre ROUCHON , Mines-ParisTech, PSL Research University, France
Time & Location:	13:40-14:30, Thursday, September 5, Room FH 1

Abstract: Quantum Error Correction (QEC) relies on feedback schemes stabilizing quantum superposition and coherence. This lecture investigates QEC with a control perspective. Firstly, we present the structure of the stochastic non-linear state equations governing the classical input/output relationships for open quantum systems. Then, we describe two feedback schemes: measurement based-feedback where the controller is a classical system; coherent feedback where the controller is another open quantum system (autonomous feedback or reservoir/dissipation engineering). We explain how these feedback schemes underlay recent experimental results in super-conducting quantum circuits to protect quantum states stored in an harmonic oscillator (cat-qubit). We conclude by proposing a time-scale combination of these feedback schemes in order to stabilize and protect quantum information, the objective of QEC.



Biography: Pierre Rouchon is professor with the Centre Automatique et Systemes at Mines-ParisTech, PSL Research University. He graduated from Ecole Polytechnique in 1983, has obtained a PhD in 1990 and an "habilitation à diriger des recherches" in 2000. From 1993 to 2005, he was associated professor at Ecole Polytechnique in Applied Mathematics. From 1998 to 2002, he was the head of the Centre

Automatique et Systèmes. From 2007 to 2018, he was the chair of the department "Mathématiques et Systèmes" at Mines-ParisTech. Since 2015, he is a member of the Quantic Research team between Inria, Ecole Normale Supérieure de Paris and Mines-ParisTech. His fields of interest include nonlinear control and system theory with applications to physical systems. His contributions include differential flatness and its extension to infinite dimensional systems, non-linear observers and symmetries, quantum filtering and feedback control. In 2017, he received the "Grand Prix IMT – Académie des sciences de Paris."

Title:	Reliable Simulations – Steps into a Virtualized World
Speaker:	Michael BAUMANN , Product Manager for Virtualized Release, Robert Bosch GmbH, Renningen, Germany
Time & Location:	13:40-14:30, Thursday, September 5, Room FH 5

Abstract: The increasing complexity of systems requires the consideration of simulations in the product development process. At Bosch, simulations are widely used in many different areas, from Powertools to Engine Control Units for powertrain, steering and braking systems, to highly complex systems, like autonomous driving functions. Still, results of simulation models are limited used in release decisions due to missing trust in their reliability. In this contribution, the approach for simulation-based release developed at Bosch in the project Virtualized Release will be presented. First, the main challenges are briefly discussed, i.e., model based system design and automated driving. Then, meaningful elements necessary for increasing trust in simulations, e.g. methods, tools, processes and qualification concepts, are presented. In the focus on technologies I will show approaches for determination of simulation and model quality which is applicable for a wide range of applications. To implement these approaches successfully, harmonized quality criteria between supplier and OEM are essential and will be discussed.



Biography: Michael Baumann is Product Manager in the agile project Virtualized Release at Bosch. He received the diploma degree (2011) and Ph.D. degree (2016) in mechanical engineering from the University of Stuttgart (Germany). In his research from 2011-2016 at the Institute of Engineering and Computational Mechanics he focused on model reduction of flexible multibody systems. He received the Multibody Young

Researcher Award at ECCOMAS Multibody Dynamics 2015 for his work on parametric model order reduction for material removal simulations in elastic multibody systems. Additionally to his research, he managed the development and optimization of powertrain simulations for 24 Hours of Le Mans racecars in industrial cooperation with Porsche. Michael Baumann joined Bosch in 2016 and developed co-simulation frameworks for vehicle simulations, applied in the development of x-domain functions for automated driving. As the Product Manager and Product Owner in a project focusing on future approaches for simulation-based releases at Bosch with multiple business units, he is currently responsible for the content of the artificial release train with four teams.

Evening Lecture

IFAC MECHATRONICS & NOLCOS 2019 features an Evening Lecture that is open to all conference participants including their registered accompanying persons. The lecture is compliemented with food and drinks.

Title:	Dante and the Construction of Hell
Authors:	Prof. Sebastian SCHÜTZE , Professor of Art History the University of Vienna, Austria
Time & Location:	18:15-19:15, Wednesday, September 4, Room FH 1

Abstract: Throughout the ages hell has been a central theological concept as well as a hugely emotional concern of popular culture. But how do we imagine in concrete terms such place in the underworld where damned souls suffer for their sins committed during lifetime? At least in the western hemisphere, the imagination of hell has been largely dominated by the poet Dante Alighieri (1265-1321) and his detailed account in the "Divine Comedy". According to Dante, hell consists of a deep pit with nine consecutive circles, which accommodate different types of sinners afflicted by appropriate punishments. Based on Dante's description scholars and scientists like Galileo Galilei, but also artists, architects and engineers have attempted to map the

geography of hell and to come up with ever more precise reconstructions. The lecture explores Dante's impact on our collective imagination and the constructive principles of hell, a kind of system analysis over seven centuries.



Biography: Sebastian Schütze is Professor of Art History and Dean of the Faculty of Historical and Cultural Studies at the University of Vienna and member of the Austrian Academy of Sciences. Before joining the University of Vienna in 2009 he has been a long-term research fellow at the Bibliotheca Hertziana (Max-Planck-Institute for Art History) in Rome, has taught at the Universities of Münster, Leipzig and Dresden

and as Bader Chair in Southern Baroque Art at Queen's University in Canada. His research interests focus on Italian baroque art and art patronage as well as on processes of exchange and dialogue between figurative arts and poetry from Dante, Petrarch and Tasso to Stefan George, Hugo von Hofmannsthal and Friedrich Nietzsche. He has published widely on Caravaggio, Poussin and Bernini, on the Vatican Basilica and its decorations, on the art patronage of Pope Urban VIII and on the Dante drawings of William Blake, and has curated international exhibitions such as "Bernini the Sculptor" (Rome, Villa Borghese), "Caravaggio and his Followers in Rome" (Ottawa, National Gallery of Canada), "The Divine Michelangelo" (Bonn, Bundeskunsthalle), "Bernini. The Inventor of Baroque Rome" (Leipzig, Museum der bildenden Künste) and, most recently, "Nietzsche and the Artists of the New Weimar" (Ottawa, National Gallery of Canada). Scientific Program

Wednesday, September 4, 2019

WeA1 Room FH 1 **Plenary Session** Chair: Teel, Andrew R. (Univ. of California at Santa Barbara) 08:45-09:30 Using Information to Stretch Vehicle Efficiency Stefanopoulou, Anna G. (Univ of Michigan)

For details, see p. 24.

WeB1

Lyapunov-Based Methods in Control I

Chair: Dashkovskiv, Sergev (University of Würzburg)

Co-Chair: Garofalo, Gianluca (German Aerospace Center (DLR))

10:00-10:20

Practical Examples of ISS Systems

Dashkovskiv, Sergev (University of Würzburg)

10:20-10:40

Coexistence of Hidden Attractors and Multistability in Counterexamples to the Kalman Coniecture.

Kuznetsov, Nikolay (Saint-Petersburg State Univ), Kuznetsova, Olga (St. Petersburg State University), Mokaey, Ruslan (St. Petersburg State University), Mokaey, Timur (St. Petersburg State University), Yuldashev, Marat (St. Petersburg State University), Yuldashev, Renat (St. Petersburg State University)

10:40-11:00

A Note on Converse Lyapunov-Krasovskii Theorems for Nonlinear Neutral Systems in Sobolev Spaces

Efimov, Denis (Inria), Fridman, Emilia (Tel-Aviv Univ)

11:00-11:20

Homogeneous Discrete-Time Approximation

Sanchez, Tonametl (Inria Lille - Nord Europe), Efimov, Denis (Inria Lille - Nord Europe), Polyakov, Andrey (Inria Lille - Nord Europe), Moreno, Jaime A. (Universidad Nacional Autonoma De Mexico-UNAM)

11:20-11:40

Global Asymptotic Stabilization with Smooth High-gain/Low-Gain Transitions: AVA -Adaptive Variance Algorithm

Garofalo, Gianluca (German Aerospace Center (DLR))

11:40-12:00

Non-Linear Analysis of a Modied QPSK Costas Loop

Kuznetsov, Nikolay (Saint-Petersburg State Univ), Blagov, Mikhail (Saint Petersburg State University), Kudryashova, Elena (Saint Petersburg State University), Ladvanszky, Janos (Ericsson), Yuldashev, Marat (Saint Petersburg State University), Yuldashev, Renat (St. Petersburg State University)

WeB1.2

WeB1.1

WeA1.1

Room FH 1

WeB1.4

WeB1.3

WeB1.5

WeB1.6

WeB2 Room	FH 2
Control of Nonlinear PDEs I (Invited Session) Organizers: Meurer, Thomas (Christian-Albrechts-University Kiel), Tarbouriech, Sophie (LAAS- CNRS), Le Gorrec, Yann (FEMTO-ST, ENSMM)	
Chair: Tarbouriech, Sophie (LAAS-CNRS), Co-Chair: Kotyczka, Paul (Technical University of Munich)	
10:00-10:20 We	e B2.1
Stability Analysis of a 1D Wave Equation with a Nonmonotone Distributed Damping (I) Marx, Swann (LAAS-CNRS), Chitour, Yacine (Universit\'e Paris-Sud, CNRS, Centralesupel Prieur, Christophe (CNRS)	lec),
10:20-10:40 We	e B2.2
Discrete-Time Flatness-Based Feedforward Control for the 1D Shallow Water Equations Kotyczka, Paul (Technical University of Munich)	(I)
10:40-11:00 We	eB2.3
Bilateral Boundary Control of Moving Traffic Shockwave (I) Yu, Huan (Univ. of California at San Diego), Zhang, Liguo (Beijing University of Technolog Diagne, Mamadou (Rensselaer Polytechnic Institute), Krstic, Miroslav (Univ. of California San Diego)	ry), at
11:00-11:20 We	e B2.4
Two-Point Output Feedback Boundary Control for Semilinear Hyperbolic Systems Dolgopolik, Maksim (Institute for Problems in Mechanical Engineering of the RAS), Fradka Alexander L. (Russian Academy of Sciences), Andrievsky, Boris (Inst. for Problems of Mechanical Engineering of the RAS)	ov,
11:20-11:40 We	eB2.5
Flatness-Based Control Design for the Saint-Venant Equations with Experimental Results Kopp, Justus (UMIT), Woittennek, Frank (UMIT)	5 (I)
11:40-12:00 We	eB2.6
Beam Equation with Saturating Piezoelectric Controls Prieur, Christophe (CNRS), Tarbouriech, Sophie (LAAS-CNRS)	
WeB3 Room Optical Systems and Machine Vision	FH 3
Chair: Schitter, Georg (Vienna University of Technology) Co-Chair: Scholz, Steffen (Karlsruhe Institute of Technology)	
10:00-10:20 We	e B3.1
On Compensating Thermal Lensing in High-Power Lasers Using Intra-Cavity Deformable Mirrors Schmidt, Kevin (University of Stuttgart), Dietrich, Tom (University of Stuttgart), Danneck Benjamin (University of Stuttgart), Graf, Thomas (University of Stuttgart), Abdou Ahmed, Marwan (University of Stuttgart), Sawodny, Oliver (Univ of Stuttgart)	er,
10:20-10:40 We	eB3.2

Mechatronic Approach towards Lightweight Mirrors with Active Optics for Telescope Systems

Schwaer, Christian (TU Wien), Sinn, Andreas (TU Wien), Schitter, Georg (Vienna University of Technology)

WeB3.3

10:40-11:00

Vision System-Based Inspection and Alignment of Laminated Polymer Films for 3D-Integration of Microsystems

Elkaseer, Ahmed (Karlsruhe Institute of Technology), Salem, Mahmoud (Karlsruhe Institute of Technology), Hagenmeyer, Veit (Karlsruhe Institute of Technology), Scholz, Steffen (Karlsruhe Institute of Technology)

11:00-11:20 WeB3.4 Computer Vision Approach for the Automated Tool Alignment of an Orbital Sanding Robot Putz, Veronika (Linz Center of Mechatronics GmbH), Stangl, Michael (Linz Center of Mechatronics GmbH), Kohlberger, Christian (Linz Center of Mechatronics GmbH), Naderer, Ronald (FerRobotics Compliant Robot Technology GmbH)

11:20-11:40

Scanning Wavefront Sensor for Measurement of Highly Divergent Optics

Fuerst, Martin E. (Vienna University of Technology), Schitter, Georg (Vienna University of Technology)

WeB4

Hybrid and Switched Systems

Chair: Ferrante, Francesco (Université Grenoble Alpes) Co-Chair: Prandini, Maria (Politecnico Di Milano)

10:00-10:20

The Reach Control Problem with Input Constraints

Kerz, Sebastian (Technische Universität Darmstadt), Appel, Marcus Werner (TU Darmstadt), Konigorski, Ulrich (Technische Universität Darmstadt)

10:20-10:40

Robust Bounded Feasibility Verification of Piecewise Affine Systems Via Reachability Computations

Desimini, Riccardo (Politecnico Di Milano), Prandini, Maria (Politecnico Di Milano)

10:40-11:00

Hybrid Model Formulation and Stability Analysis of a PID-Controlled Motion System with Coulomb Friction

Bisoffi, Andrea (KTH Royal Institute of Technology), Beerens, Ruud (Eindhoven University of Technology), Zaccarian, Luca (LAAS-CNRS and University of Trento), Heemels, Maurice (Eindhoven University of Technology), Nijmeijer, Hendrik (Eindhoven Univ of Technology), van de Wouw, Nathan (Eindhoven Univ of Technology)

11:00-11:20

On the Existence of Lagrangians for Clarke and Park Transformed Switched-Mode Electrical Networks

Jeltsema, Dimitri (HAN University of Applied Sciences), Scherpen, Jacquelien M.A. (University of Groningen)

11:20-11:40

Global Optimization on the Sphere: A Stochastic Hybrid Systems Approach

Baradaran Hosseini, Matina (University of California, Santa Barbara), Poveda, Jorge I. (University of Colorado at Boulder), Teel, Andrew R. (Univ. of California at Santa Barbara)

11:40-12:00

Dynamic Reset Output Feedback with Guaranteed Convergence Rate

WeB3.5

Room FH 4

WeB4.1

WeB4.2

WeB4.3

WeB4.4

WeB4.5

WeB4.6

Ferrante, Francesco (Université Grenoble Alpes), Zaccarian, Luca (LAAS-CNRS and University of Trento)

WeB5 Room FH Optimal Control	5
Chair: Hammer, Jacob (Univ. of Florida)	_
Co-Chair: Meiringer, Martin (Vienna University of Technology)	
10:00-10:20 WeB5	.1
Minimal Time Control of Nonlinear Systems: Optimal Robust State-Feedback	
Hammer, Jacob (Univ. of Florida)	
10:20-10:40 WeB5	.2
Time-Optimal Fold Out of Large-Scale Manipulators with Obstacle Avoidance	
Meiringer, Martin (TU Wien), Kugi, Andreas (Vienna University of Technology), Kemmetmueller, Wolfgang (TU Wien, Automation and Control Institute)	
10:40-11:00 WeB5	.3
Discrete Optimal Control of Interconnected Mechanical Systems	
Nair, Siddharth (University of California, Berkeley), Banavar, Ravi (Indian Institute of Technology)	
11:00-11:20 WeB5	.4
Tube-Based Internal Model Control of Differentially Flat Input-Affine SISO Systems under Input Constraints	
Ben Jemaa, Karim (Ulm University, Robert Bosch GmbH), Kotman, Philipp (Robert Bosch GmbH; Vienna University of Technology), Reimann, Sven (Robert Bosch GmbH), Graichen, Knut (Friedrich-Alexander-University Erlangen-Nuremberg)	
11:20-11:40 WeB5	.5
Feedback Necessary Optimality Conditions for Nonlinear Measure-Driven Processes	
Samsonyuk, Olga (Matrosov Institute for Systems Dynamics and Control Theory of Si), Sorokin, Stepan (Matrosov Institute for System Dynamics and Control Theory SB RAS), Staritsyn, Maxim (Matrosov Institute for System Dynamics and Control Theory, Siber)	
WeB6 Room FH	6
MEMS/MOEMS Sensors and Actuators for Automotive Applications (Invited Session) Organizers: Yoo, Han Woong (TU Wien), Schroedter, Richard(Technische Universität Wien), Thurner, Thomas (Graz University of Technology)	
Chair: Yoo, Han Woong (TU Wien) Co-Chair: Janschek, Klaus (Technische Universität Dresden)	
10:00-10:20 WeB6	.1
Towards Synchronous Mode of Multiple Independently Controlled MEMS Mirrors (I)	
Strasser, Andreas (Graz University of Technology), Stelzer, Philipp (Graz University of	
Technology), Steger, Christian (Graz University of Technology), Druml, Norbert (Infnineon Technologies Austria AG)	
10:20-10:40 WeB6	.2
Silicone Oil Damping for Quasi-Static Micro Scanners with Electrostatic Staggered Vertical Comb Drives (I)	

Schroedter, Richard (Vienna University of Technology), Grahmann, Jan (Fraunhofer Institute for Photonic Microsystems), Janschek, Klaus (Technische Universität Dresden)
WeB6.3

WeB6.4

WeB6.5

1	0:4	40.	-1	1	:C	0
- 1	0:4	40.	-1	1	:0	C

Digital Asynchronous Phase Locked Loop for Precision Control of MOEMS Scanning Mirror (I) Brunner, David (TU Wien), Yoo, Han Woong (TU Wien), Schitter, Georg (Vienna University of Technology)

11:00-11:20

MEMS Test Bench and Its Uncertainty Analysis for Evaluation of MEMS Mirrors (I) Yoo, Han Woong (TU Wien), Brunner, David (TU Wien), Thurner, Thomas (Graz University of Technology), Schitter, Georg (Vienna University of Technology)

11:20-11:40

Fast Angle Adaption of a MEMS-Based LiDAR System (I)

Stelzer, Philipp (Graz University of Technology), Strasser, Andreas (Graz University of Technology), Steger, Christian (Graz University of Technology), Garcia, Alberto (Infineon Technologies Austria AG), Druml, Norbert (Infnineon Technologies Austria AG)

WeB7

Motion Planning and Stabilization of Nonholonomic Systems (Invited Session) Organizers: Zuyev, Alexander (Max Planck Institute for Dynamics of Complex Technical Systems), Grushkovskaya, Victoria (Julius Maximilian University of Würzburg)

Chair: Zuyev, Alexander (Max Planck Institute for Dynamics of Complex Technical Systems) Co-Chair: Zeng, Shen (Washington University in St. Louis)

10:00-10:20

Iterative Optimal Control Syntheses Illustrated on the Brockett Integrator (I) Zeng, Shen (Washington University in St. Louis)

10:20-10:40

A Riemannian Geometric Approach to Output Tracking for Nonholonomic Systems (I) Simha, Ashutosh (Tallinn University of Technology), Raha, Soumyendu (Indian Institute of Science)

10:40-11:00

Regulation of Nonholonomic Systems: A Smooth, Time-Invariant Approach

Yi, Bowen (Shanghai Jiao Tong University), Ortega, Romeo (Supelec), Zhang, Weidong (Shanghai Jiaotong Univ)

11:00-11:20

On Exponential Stabilization of Nonholonomic Systems with Time-Varying Drift (I) Grushkovskaya, Victoria (Julius Maximilian University of Würzburg), Zuyev, Alexander (Max Planck Institute for Dynamics of Complex Technical Systems)

11:20-11:40

Partial Stabilization of Stochastic Systems with Application to Rotating Rigid Bodies (I) Zuyev, Alexander (Max Planck Institute for Dynamics of Complex Technical Systems), Vasylieva, Iryna (Institute of Applied Mathematics and Mechanics of National Acade)

11:40-12:00

Affine Geometric Heat Flow and Motion Planning for Dynamic Systems (I)

Liu, Shenyu (University of Illinois at Urbana-Champaign), Belabbas, Mohamed Ali (Uniersity of Illinois, Urbana-Champaign), Fan, Yinai (University of Illinois at Urbana-Champaign)

Room FH 7

WeB7.2

WeB7.1

WeB7.3

WeB7.4

WeB7.5

WeB7.6

WeB8 Robotic Systems I

Chair: Lefeber, Erjen (Eindhoven Univ of Technology) Co-Chair: Simha, Ashutosh (Tallinn University of Technology)

10:00-10:20

Horizontal Trajectory Tracking Control of AUV Using Backstepping Approach

Cho, Gun Rae (Korea Institute of Robot and Convergence), Park, Daegil (Korea Institute of Robot Convergence(KIRO)), Kang, Hyungjoo (Korea Institute of Robot and Convergence), Lee, Mun-Jik (Korea Institute of Robot and Convergence), Li, Ji-Hong (Korea Institute of Robot and Convergence)

10:20-10:40

Event-Based Control for Differentially Flat Systems: Application to Autonomous Underwater Vehicle

Kaldmäe, Arvo (Tallinn University of Technology), Kotta, Ulle (Tallinn University of Technology), Meurer, Christian (Tallinn University of Technology), Simha, Ashutosh (Tallinn University of Technology)

10:40-11:00

H-Infinity Controller Synthesis for AGV Trajectory Tracking Using a Linearized Kinematic Model

Jacobs, Laurens (KU Leuven), De Preter, Andreas (Octinion Bvba), Anthonis, Jan (Octinion Bvba), Swevers, Jan (KU Leuven), Pipeleers, Goele (KU Leuven)

11:00-11:20

Almost Global Decentralised Formation Tracking for Multiple Distinct UAVs

Lefeber, Erjen (Eindhoven Univ of Technology), Nijmeijer, Hendrik (Eindhoven Univ of Technology), van de Westerlo, Marcel (Eindhoven University of Technology)

11:20-11:40

Distributed Leader-Follower Formation Control of Nonholonomic Mobile Robots

Lu, Qun (Yancheng Institute of Technology), Miao, Zhiqiang (Hunan University), Zhang, Dan (Zhejiang University of Technology), Yu, Li (Zhejiang University of Technology), Ye, Wenjun (Concordia University), Yang, Simon X. (Univ of Guelph), Su, Chun-Yi (Guangdong University of Technology)

11:40-12:00

Path Following Control for Articulated Intervention-AUVs Using Geometric Control of Reduced Attitude

Wrzos-Kaminska, Marianna (Norwegian University of Science and Technology), Pettersen, Kristin Y. (Norwegian Univ. of Science and Tech), Gravdahl, Jan Tommy (Norwegian University of Science and Technology (NTNU))

WeC1

Semi-Plenary Session

Chair: Prieur, Christophe (CNRS)

13:40-14:30

Lyapunov-Based Reset Control

Zaccarian, Luca (LAAS-CNRS and University of Trento) For details, see p. 27.

WeB8.1

WeB8.2

WeB8.3

WeB8.4

WeB8.5

WeB8.6

Room FH 1

WeC1.1

WeC2.1

Room FH 1

WeD1.1

WeD1.2

WeD1.3

Room FH 2

WeD2.1

WeD2.2

WeD2.3

Room FH 5

Atomic Force Microscope for Harsh Environments

Staufer, Urs (Delft University of Technology)

For details, see p. 28.

WeD1

Lyapunov-Based Methods in Control II

Chair: Rouchon, Pierre (Mines-ParisTech, PSL Research University) Co-Chair: Back, Juhoon (Kwangwoon University)

14:30-14:50

Continuous-Time Quantum Error Correction with Noise-Assisted Quantum Feedback Cardona, Gerardo (Mines-ParisTech, PSL Research University), Sarlette, Alain (INRIA), Rouchon, Pierre (Mines-ParisTech, PSL Research University)

14:50-15:10

On Stochastic Finite-Time Stabilization with Continuous State-Feedback Controllers Hoshino, Kenta (Kyoto University), Nishimura, Yuki (Kagoshima University)

15:10-15:30

Stabilization of MIMO Nonlinear Systems with Uncertain Input Gain: Nonlinear Nominal Gain Function

Ha, Wonseok (Kwangwoon University), Back, Juhoon (Kwangwoon University)

WeD2

Control of Nonlinear PDEs II

Chair: Woittennek, Frank (UMIT)

Co-Chair: Kostin, Georgy (Institute for Problems in Mechanics of the Russian Academy of Sciences)

14:30-14:50

High-Gain Observers for a Class of 2x2 Quasilinear Hyperbolic Systems with 2 Different Velocities

Kitsos, Constantinos (Grenoble INP (Grenoble Institute of Engineering), GIPSA Lab), Besancon, Gildas (Ense3, Grenoble INP), Prieur, Christophe (CNRS)

14:50-15:10

Well-Posedness of Non-Autonomous Semilinear Systems

Schmid, Jochen (Fraunhofer Institute for Industrial Mathematics), Dashkovskiy, Sergey (University of Würzburg), Jacob, Birgit (Bergische Universität Wuppertal), Laasri, Hafida (University of Wuppertal)

15:10-15:30

Optimization of the Stress Intensity in Controlled Evolution of a Continuously Inhomogeneous Solid

Lychev, Sergey (Ishlinsky Institute for Problems in Mechanics RAS), Kostin, Georgy (Ishlinsky Institute for Problems in Mechanics RAS), Koifman, Konstantin (Bauman Moscow State Technical University)

WeC2

Semi-Plenary Session

Chair: Schitter, Georg (Vienna University of Technology)

13:40-14:30

WeD3 System Identification

Chair: van de Wouw, Nathan (Eindhoven Univ of Technology) Co-Chair: Rauh, Andreas (University of Rostock)

14:30-14:50

Fast Identification of Continuous-Time Lur'e-Type Systems with Stability Certification Shakib, Mohammad Fahim (Eindhoven University of Technology), Pogromsky, A. Yu. (Eindhoven University of Technology), Pavlov, Alexey (Norwegian University of Science and Technology), van de Wouw, Nathan (Eindhoven University of Technology)

14:50-15:10

Differential Neural Network Identification for Homogeneous Dynamical Systems

Ballesteros, Mariana (Centro De Investigación Y Estudios Avanzados Del IPN), Polyakov, Andrey (INRIA Lille Nord-Europe), Efimov, Denis (Inria), Chairez, Isaac (UPIBI-IPN), Poznyak, Alexander S. (CINVESTAV-IPN)

15:10-15:30

Identifying Thermal Dynamics for Precision Motion Control

Evers, Enzo (Eindhoven University of Technology), van Tuijl, Niels (Eindhoven University of Technology), Lamers, Ronald (Thermo Fisher Scientific), Oomen, Tom (Eindhoven University of Technology)

WeD4

Set-Valued and Nonsmooth Analysis in Systems and Control: Generalized Lyapunov Methods and Beyond I (Invited Session)

Organizer: Goebel, Rafal (Loyola University Chicago)

Chair: Goebel, Rafal (Loyola University Chicago) Co-Chair: Ferrante, Francesco (Université Grenoble Alpes)

14:30-14:50

Optimality Conditions for the Minimal Time Problem for Complementarity Systems (I) Vieira, Alexandre (INRIA), Brogliato, Bernard (UR Rhone-Alpes), Prieur, Christophe (CNRS)

14:50-15:10

Certifying Optimality in Hybrid Control Systems Via Lyapunov-Like Conditions (I) Ferrante, Francesco (Université Grenoble Alpes), Sanfelice, Ricardo (University of Californ

Ferrante, Francesco (Université Grenoble Alpes), Sanfelice, Ricardo (University of California Santa Cruz)

15:10-15:30

A Lyapunov-Like Characterization of Robustness of Pointwise Asymptotic Stability for Differential Inclusions (I)

Goebel, Rafal (Loyola University Chicago)

WeD5

Biological and Biomedical Systems

Chair: Shim, Hyungbo (Seoul National University)

Co-Chair: Kawai, Yasunori (National Institute of Technology, Ishikawa College)

14:30-14:50

Bilateral Tele-Rehabilitation System Using Electrical Stimulation Applying Modulated Time-Domain Passivity Control

Kawai, Yasunori (National Institute of Technology, Ishikawa College), Shibano, Koshiro (National Institute of Technology, Ishikawa College), Kawai, Hiroyuki (Kanazawa Institute of

WeD3.1

WeD3.2

WeD3.3

Room FH 4

WeD4.1

WeD4.2

Room FH 5

WeD5.1

WeD4.3

WeD5.3

Room FH 6

WeD6.1

Technology), Miyoshi, Takanori (Tovohashi Univ, of Tech), Fujita, Masayuki (Tokyo Institute of Technology)

14:50-15:10 We	D5.2
Behavior of a Network of Heterogeneous Liénard Systems under Strong Output Coupling	5
Lee, Jin Gyu (Seoul National University), Shim, Hyungbo (Seoul National University)	

15:10-15:30

On Adaptive Estimation of Bacterial Growth in the Competitive Chemostat dos Reis de Souza, Alex (Inria Lille Nord Europe), Gouze, Jean-Luc (INRIA), Polyakov, Andrey (INRIA Lille Nord-Europe), Efimov, Denis (Inria)

WeD6

Iterative Learning Control

Chair: Oomen, Tom (Eindhoven University of Technology) Co-Chair: Kemmetmueller, Wolfgang (TU Wien, Automation and Control Institute)

14:30-14:50

Optimal Current Slew Rate Control for a Three-Phase MOSFET Inverter Driving a PMSM Büchl, Dominik (Vienna University of Technology, Automation and Control Institut), Kemmetmueller, Wolfgang (TU Wien, Automation and Control Institute), Glück, Tobias (Austrian Institute of Technology), Deutschmann, Bernd (Graz University of Technology), Kugi, Andreas (Vienna University of Technology)

14:50-15:10

Learning Control without Prior Models: Multi-Variable Model-Free IIC, with Application to a Wide-Format Printer

de Rozario, Robin (Eindhoven University of Technology), Oomen, Tom (Eindhoven University of Technology)

15:10-15:30

Multi-Layer Spatial Iterative Learning Control for Micro-Additive Manufacturing Aarnoudse, Leontine (Eindhoven University of Technology), Pannier, Christopher (University of Michigan), Afkhami, Zahra (University of Michigan), Oomen, Tom (Eindhoven University of Technology), Barton, Kira (University of Michigan)

WeD7

Automotive Systems I

Chair: Rinderknecht, Stephan (Technische Universitaet Darmstadt) Co-Chair: Traphöner, Phillip (University of Paderborn)

14:30-14:50

Investigation of the Driving Comfort of the DE-REX Powertrain Based on Vehicle Measurements

Viehmann, Andreas (Technische Universitaet Darmstadt), Rinderknecht, Stephan (Technische Universitaet Darmstadt)

14:50-15:10

Hardware-In-The-Loop Simulation for a Multiaxial Suspension Test Rig with a Nonlinear Spatial Vehicle Dynamics Model

Traphöner, Phillip (University of Paderborn), Olma, Simon (University of Paderborn), Kohlstedt, Andreas (University of Paderborn), Fast, Nikolai (Paderborn University), Jäker, Karl-Peter (University of Paderborn), Trächtler, Ansgar (University of Paderborn)

WeD6.2

WeD6.3

Room FH 7

WeD7.1

WeD7.2

WeD8	Room FH 8
Multi-Agent Robotics	
Chair: Gravdahl, Jan Tommy (Norwegian University of Science and Technology (NTNU))
Co-Chair: Aranda-Bricaire, Eduardo (CINIVESTAV)	

14:30-14:50

Optimization-Driven Control and Organization of a Robot Swarm for Cooperative Transportation

Ebel, Henrik (University of Stuttgart), Eberhard, Peter (University of Stuttgart)

14:50-15:10

UsBot: A Modular Robotic Testbed for Programmable Self-Assembly

Fiaz, Usman A. (University of Maryland, College Park), Shamma, Jeff S. (King Abdullah University of Science and Technology)

15:10-15:30

Formation Control with Collision Avoidance for First-Order Multi-Agent Systems: Experimental Results

Flores-Resendiz, Juan Francisco (Universidad Autónoma De Baja California), Meza-Herrera, Jessica (CINVESTAV-IPN), Aranda-Bricaire, Eduardo (CINVESTAV)

WeE1

Geometric Methods in Nonlinear Control I (Invited Session)

Organizers: Schöberl, Markus (Johannes Kepler University of Linz), Schlacher, Kurt (Johannes Kepler University Linz)

Chair: Schlacher, Kurt (Johannes Kepler University Linz) Co-Chair: Jadachowski, Lukasz (TU Wien, Automation and Control Institute)

16:00-16:20

A Linear Filtering Framework for Nonlinear Systems Based on Extended Output Injection (I) Simha, Ashutosh (Tallinn University of Technology), Kotta, Ulle (Tallinn University of Technology)

16:20-16:40

On Two Isomorphic Lie Algebroids Associated with Feedback Linearization (I) Muellhaupt, Philippe (Ecole Poly. Fed. De Lausanne)

16:40-17:00

Nonregular Feedback Linearization of a Class of Multi-Input Nonlinear Control Systems (I) Nicolau, Florentina (Ensea Cergy), Respondek, Witold (INSA - Rouen), Li, Shunjie (Nanjing University of Information Science and Technology)

17:00-17:20

Internal and External Linearization of Semi-Explicit Differential Algebraic Equations (I) Chen, Yahao (INSA - Rouen), Respondek, Witold (INSA - Rouen)

17:20-17:40

System-Theoretic Analysis of Nonlinear Infinite-Dimensional Systems with Generalized Symmetries (I)

Kolar, Bernd (Johannes Kepler University Linz), Schöberl, Markus (Johannes Kepler University of Linz)

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WeD8.1

WeD8.2

WeD8.3

Room FH 1

WeE1.1 ion (I)

WeE1.2

WeE1.3

WeE1.4

WeE1.5

WeF1.6

Room FH 2

17:40-18:00

On Path Following Control of Nonholonomic Port-Hamiltonian Systems Via Generalized **Canonical Transformations**

Shima, Ryotaro (Kyoto University), Okura, Yuki (Toyama Prefectural University), Fujimoto, Kenji (Kyoto University), Maruta, Ichiro (Kyoto University)

WeE2

Control of Nonlinear PDEs III (Invited Session)

Organizers: Meurer, Thomas (Christian-Albrechts-University Kiel), Tarbouriech, Sophie(LAAS-CNRS), Le Gorrec, Yann (FEMTO-ST, ENSMM)

Chair: Prieur, Christophe (CNRS) Co-Chair: Schaum, Alexander (Kiel University)

16:00-16:20

Obstruction to the Billinear Control of the Gross-Pitaevskii Equation: An Example with an Unbounded Potential (I)

Chambrion, Thomas (Université De Lorraine), Thomann, Laurent (Université De Lorraine, IECL)

16:20-16:40

Design of Saturated Controls for an Unstable Parabolic PDE

Mironchenko, Andrii (University of Passau), Prieur, Christophe (CNRS), Wirth, Fabian (University of Passau)

16:40-17:00

Dissipativity-Based Output-Feedback Control for a Class of Semilinear Unstable Heat Equations (I)

Schaum, Alexander (Kiel University), Meurer, Thomas (Christian-Albrechts-University Kiel)

17:00-17:20

High Order Approximations for LQR Control and LQG Estimation of Convection Diffusion Systems (I)

Burns, John A (Virginia Tech), Cheung, James (Virginia Tech)

WeE3 Room FH 3 Mathematical Modeling and Model-Order Reduction

Chair: Lohmann, Boris (Technische Universität München) Co-Chair: Pyta, Lorenz (RWTH Aachen University)

16:00-16:20

Nonlinear Moment Matching for the Simulation-Free Reduction of Structural Systems Cruz Varona, Maria (Chair of Automatic Control, Technische Universität München), Schneucker, Nico Daniel (Chair of Automatic Control, Technical University of Munich), Lohmann, Boris (Technische Universität München)

16:20-16:40

Bifurcation Analysis of a Hybrid Continuous Stirred Tank Reactor with Imperfect Mixing in the Cooling Jacket

Skupin, Piotr (Silesian University of Technology), Laszczyk, Piotr (Silesian University of Technology), Metzger, Mieczyslaw (Silesian University of Technology)

16:40-17:00

On the Dual Properties of Friction and Backlash in Servo Control Systems Lichtsinder, Arkady (Rafael Ltd), Gutman, Per-Olof (Technion - Israel Institute of Technology)

WeF2.2

WeF2.1

WeE2.3

WeE2.4

WeE3.1

WeE3.3

WeE3.2

17:00-17:20

Extended Validation of a Graph-Based Modelling Methodology for High-Pressure Networks Niederberger, Stefan (University of Applied Sciences Northwestern Switzerland), Orjuela, Rodolfo (Université De Haute-Alsace), Schleuniger, Pascal (University of Applied Sciences Northwestern Switzerland), Anderegg, Roland (University of Applied Sciences Northwestern

Switzerland), Basset, Michel (Université De Haute-Alsace)

17:20-17:40

Reduced-Order Modeling of a Radiative Heating Process with Movable Radiators Pyta, Lorenz (RWTH Aachen University), Deutschmann, Andreas (TU Wien), Roetzer, Florian (TU Wien), Abel, Dirk (RWTH-Aachen University), Kugi, Andreas (Vienna University of Technology)

17:40-18:00

Heat Transfer in Cylindrical Bodies Controlled by a Thermoelectric Converter

Kostin, Georgy (Ishlinsky Institute for Problems in Mechanics RAS), Rauh, Andreas (University of Rostock), Gavrikov, Alexander (Ishlinsky Institute for Problems in Mechanics RAS), Knyazkov, Dmitri (Ishlinsky Institute for Problems in Mechanics RAS), Aschemann, Harald (University of Rostock)

WeE4

Set-Valued and Nonsmooth Analysis in Systems and Control: Generalized Lyapunov Methods and Beyond II (Invited Session)

Organizer: Goebel, Rafal (Lovola University Chicago)

Chair: Goebel, Rafal (Lovola University Chicago) Co-Chair: Gruene, Lars (Univ of Bayreuth)

16:00-16:20

Stabilizability in Impulsive Optimization Problems (I)

Motta, Monica (University of Padova, Italy), Lai, Anna Chiara (Sapienza Universit\`a Di Roma)

16:20-16:40

Complete Control Lyapunov Functions: Stability under State Constraints (I) Braun, Philipp (University of Newcastle), Kellett, Christopher M. (University of Newcastle), Zaccarian, Luca (LAAS-CNRS and University of Trento)

16:40-17:00

Smooth Approximation of Patchy Lyapunov Functions for Switched Systems (I)

Della Rossa, Matteo (LAAS-CNRS, Toulouse), Tanwani, Aneel (LAAS -- CNRS, Université De Toulouse), Zaccarian, Luca (LAAS-CNRS and University of Trento)

17:00-17:20

Numerical Calculation of Nonsmooth Control Lyapunov Functions Via Piecewise Affine Approximation (I)

Baier, Robert (University of Bayreuth), Braun, Philipp (University of Newcastle), Gruene, Lars (University of Bayreuth), Kellett, Christopher M. (University of Newcastle)

WeE5

Model Predictive Control

Chair: Graichen, Knut (Friedrich-Alexander-University Erlangen-Nuremberg) Co-Chair: Hausberger, Thomas (Vienna University of Technology)

16:00-16:20

A Nonlinear MPC Strategy for AC/DC-Converters Tailored to the Implementation on FPGAs

WeE3.5

WeE3.6

Room FH 4

WeE4.2

WeE4.1

WeE4.3

Room FH 5

WeE4.4

WeE5.1

Hausberger, Thomas (TU Wien, Automation and Control Institute), Kugi, Andreas (Vienna University of Technology), Deutschmann, Andreas (TU Wien, Automation and Control Institute), Eder, Alexander (AVL), Kemmetmueller, Wolfgang (TU Wien, Automation and Control Institute)

16:20-16:40

Parameter-Varying Modeling and Nonlinear Model Predictive Control for Floating Offshore Wind Turbines

Okada, Yuga (Kyoto University), Haneda, Ken (National Maritime Research Institute), Chujo, Toshiki (National Maritime Research Institute), Ohtsuka, Toshiyuki (Kyoto University)

16:40-17:00

Nonlinear Model Predictive Control for a Maglev Vehicle Regarding Magnetic Saturation and **Guideway Irregularities**

Schmid, Patrick (University of Stuttgart, Institute of Engineering and Computatio), Eberhard, Peter (University of Stuttgart, Institute of Engineering and Computatio), Dignath, Florian (Thyssenkrupp Transrapid)

17:00-17:20

On Unconstrained MPC through Multirate Sampling

Elobaid, Mohamed (Università Degli Studi Di Roma La Sapienza), Mattioni, Mattia (Università Degli Studi Di Roma La Sapienza), Monaco, Salvatore (Università Degli Studi Di Roma La Sapienza), Normand-Cyrot, Marie-Dorothée (CNRS)

WeE6

Precision Scanning Systems in Metrology and Manufacturing I (Invited Session) Organizers: Csencsics, Ernst (Vienna University of Technology), Ohnishi, Wataru (The University of Tokyo)

Chair: Csencsics, Ernst (Vienna University of Technology) Co-Chair: Tomizuka, Masayoshi (Univ of California, Berkeley)

16:00-16:20

Trans-Scale Nanofabrication with Nanopositioning and Nanomeasuring Machines (I) Meister, Andreas (Technische Universität Ilmenau), Weidenfeller, Laura (Technische Universität Ilmenau), Kirchner, Johannes (Technische Universität Ilmenau), Hofmann, Martin (Technische Universität Ilmenau), Mastylo, Rostyslav (Technische Universität Ilmenau), Füßl, Roland (Technische Universität Ilmenau), Reger, Johann (Technische Universität Ilmenau), Manske, Eberhard (Technische Universität Ilmenau)

16:20-16:40

Data-Based Feedback Controller Tuning Utilizing Collocated and Non-Collocated Sensors (I) Ohnishi, Wataru (The University of Tokyo)

16:40-17:00

Intersample Behavior Analysis of MIMO Multirate Feedforward Control Depending on Selection of Input Multiplicities (I)

Mae, Masahiro (The University of Tokyo), Ohnishi, Wataru (The University of Tokyo), Fujimoto, Hiroshi (The University of Tokyo)

17:00-17:20

WeE6.4

Iterative Learning Control for Laser Scanning Based Micro 3D Printing (I) Yoo, Han Woong (TU Wien), Kerschner, Christoph Johannes (TU Wien), Ito, Shingo (TU Wien), Schitter, Georg (Vienna University of Technology)

Room FH 6

WeE6.1

WeE6.3

WeE6.2

WeE5.3

WeE5.2

WeE5.4

17:20-17:40

Adaptive Iterative Learning Control of Robot Manipulators for Friction Compensation (I) Lee, Richard (University of California, Berkeley), Sun, Liting (University of California, Berkeley), Wang, Zining (UC Berkeley), Tomizuka, Masayoshi (Univ of California, Berkeley)

WeE7

Automotive Systems II

Chair: Sawodny, Oliver (Univ of Stuttgart) Co-Chair: Tavares, Rafael (University of Agder)

16:00-16:20

Modeling of an Active Torsion Bar Automotive Suspension for Ride Comfort and Energy Analysis in Standard Road Profiles

Tavares, Rafael (University of Agder), Molina, Joan Vazquez (Tenneco Automotive BVBA), Sakka, Monzer (Tenneco Automotive BVBA), Dhaens, Miguel (Tenneco Automotive BVBA), Ruderman, Michael (University of Agder)

16:20-16:40

Optimization of Drivability Control Functions with Two-Stage Rate Limiters Figel, Korbinian Johann (Bundeswehr University Munich), Wobbe, Frank (IAV GmbH), Schultalbers, Matthias (IAV GmbH), Svaricek, Ferdinand (Bundeswehr University Munich)

16:40-17:00

Rail Pressure Estimation for Fault Diagnosis in High Pressure Fuel Supply and Injection System

Hartl, Florian (BMW Group), Brueckner, Jonas (BMW AG), Ament, Christoph (Universitaet Augsburg), Provost, Julien (Technical University of Munich)

17:00-17:20

Iterative Parameter Identication Method of a Vehicle Odometry Model Fazekas, Mate (MTA SZTAKI), Nemeth, Balazs (MTA SZTAKI), Gaspar, Peter (MTA SZTAKI)

17:20-17:40

Near Time-Optimal Two-Staged Flatness Based Feed-Forward Control of a Clutch Filling Process

Bauer, Michel (University of Stuttgart), Sawodny, Oliver (Univ of Stuttgart)

17:40-18:00

Energy-Efficiency Improvement Potential of Electric Vehicles Considering Transmission Temperature

Wei, Caiyang (Eindhoven University of Technology), Hofman, Theo (Eindhoven University of Technology), Ilhan Caarls, Esin (Bosch Transmission Technology), van Iperen, Rokus (Bosch Transmission Technology)

WeE8

Robotic Systems II

Chair: Fujita, Masayuki (Tokyo Institute of Technology) Co-Chair: Melik-Merkumians, Martin (Vienna University of Technology)

Co-Chair. Meik-Merkumans, Martin (Vienna Oniversity of Te

16:00-16:20

Stable Gain Adaptation for Time-Delay Control of Robot Manipulators

Lee, Junyoung (Korea Institute of Robot and Convergence (KIRO)), Chang, Pyung Hun (Daegu Gyeongbuk Institute of Science and Technology (DGIST)), Seo, Kap-Ho (Korea Institute of Robot and Convergence (KIRO)), Jin, Maolin (Korea Institute of Robot and Convergence (KIRO))

Room FH 7

WeE7.1

WeE7.2

WeE7.3

WeE7.4

WeE7.5

WeE7.6

Room FH 8

WeE8.1

WeE8.2

16:20-16:40

Automated Tripod Leveling and Parameter Estimation for a Granular-Fill Insulation Distributing Robot

Hurban, Milan (TU Wien), Melik-Merkumians, Martin (Vienna University of Technology), Steinegger, Tobias (TU Wien), Bibl, Matthias (ASA Astrosysteme GmbH), Gsellmann, Peter (TU Wien), Schitter, Georg (Vienna University of Technology)

16:40-17:00

Development and Control Experiment of a Snake-Like Robot with Controllable Side-Thrust Links

Takagi, Yuki (Osaka University), Ishikawa, Masato (Osaka University), Osuka, Koichi (Osaka University)

17:00-17:20

Pose Control for Rigid Body Motion with an Input-To-State Safe Control Barrier Function Murao, Toshiyuki (Kanazawa Institute of Technology), Kawai, Hiroyuki (Kanazawa Institute of Technology), Fujita, Masayuki (Tokyo Institute of Technology)

17:20-17:40

Generation of Strict Stealth Walking Gait Using Upper Body and Reaction Wheel Asano, Fumihiko (Japan Advanced Institute of Science and Technology), Kobayashi, Seiya (Japan Advanced Institute of Science and Technology)

17:40-18:00

Homogeneity for Shared Control in the Presence of Disturbances

von Ellenrieder, Karl (Libera Universita Di Bolzano), Henninger, Helen (Free University of Bozen Bolzano), Belotti, Roberto (Free University of Bolzano)

WeF1

Evening Lecture

Chair: Kugi, Andreas (Vienna University of Technology)

18:15-19:15

Dante and the Construction of Hell

Schütze, Sebastian (University of Vienna)

For details, see p. 31.

WeE8.3

WeE8.4

WeE8.5

WeE8.6

Room FH 1

WeC1.1

Thursday, September 5, 2019

ThA1 Room FH 1
Plenary Session
Chair: Tsao, Tsu-Chin (University of California Los Angeles)
08:45-09:30 ThA1.1
Flexible Production for the Future – Technology Enablers for Creators
Hill, Jan (Adidas AG)
For details, see p. 25.
ThB1 Room FH 1 Geometric Methods in Nonlinear Control II
Chair: Schöberl, Markus (Johannes Kepler University of Linz)
Co-Chair: Maschke, Bernhard (Univ Claude Bernard of Lyon)
10:00-10:20 ThB1.1
Dynamic State Feedback Decoupling of a DX A/C System
Mei, Jun (South-Central University for Nationalities), Xia, Xiaohua (University of Pretoria), Zhang, Lijun (University of Pretoria)
10:20-10:40 ThB1.2
A Symmetric Group Method for Controllability Characterization of Bilinear Systems on the Special Euclidean Group Zhang Wei (Washington University in St. Louis), Li, Jr-Shin (Washington University in St.
Louis)
10:40-11:00 ThB1.3
Structure Preserving Feedback of Port-Thermodynamic System Maschke, Bernhard (Univ Claude Bernard of Lyon), van der Schaft, Arjan J. (Univ. of Groningen)
11:00-11:20 ThB1.4
Dynamic Virtual Fixtures Based on Path Following Control
, Bischof, Bernhard (AIT, Austrian Institute of Technology), Kugi, Andreas (Vienna University of Technology)
11:20-11:40 ThB1.5
Stokes-Dirac Operator for Laplacian Nishida, Gou (Nihon University), Maschke, Bernhard (Univ Claude Bernard of Lyon)
ThB2 Room FH 2 Estimation and Observer Design
Chair: Eulimoto, Kenii (Kvoto University)
Co-Chair: Bernard, Pauline (MINES ParisTech)
10:00-10:20 ThB2.1
Differentiator-Based Velocity Observer with Sensor Bias Estimation: An Inverted Pendulum Case Study Rvadchikov. Igor (Kuban State University). Aranovskiv. Stanislav (CentraleSupelec - IETR).
Nikulchev, Evgeny (MIREA - Russian Techological University), Jian, Wang (Hangzhou Dianzi University), Sokolov, Dmitry (Université De Lorraine)
10:20-10:40 ThB2.2

Kristoffersen, Torstein Thode (Norwegian University of Science and Technology (NTNU)), Holden, Christian (Norwegian University of Science and Technology)

10:40-11:00

Adaptive Observer for State and Load Force Estimation for Dielectric Electro-Active Polymer Actuator

Bernat, Jakub (Poznan University of Technology), Kolota, Jakub (Poznan University of Technology)

11:00-11:20

Iterative Learning Approaches for Discrete-Time State and Disturbance Observer Design of Uncertain Linear Parameter-Varying Systems

Rauh, Andreas (University of Rostock), Kersten, Julia (University of Rostock), Aschemann, Harald (University of Rostock)

11:20-11:40

Redesign of Discrete-Time Nonlinear Observers with State Estimate Constrained in Prescribed Convex Set

Astolfi, Daniele (Université Claude Bernard Lyon 1), Bernard, Pauline (University of Bologna), Postoyan, Romain (CRAN, CNRS, Université De Lorraine), Marconi, Lorenzo (Univ. Di Bologna)

11:40-12:00

Generalized Lyapunov Demodulator for Amplitude and Phase Estimation by the Internal Model Principle

Ragazzon, Michael R. P. (NTNU, Norwegian University of Science and Technology), Messineo, Saverio (NTNU, Norwegian University of Science and Technology), Gravdahl, Jan Tommy (NTNU, Norwegian University of Science and Technology), Harcombe, David M. (The University of Newcastle, Australia), Ruppert, Michael G. (The University of Newcastle, Australia)

ThB3

Integrated Virtualization Along Product Lifecycle Phases I (Invited Session)

Organizers: Hoffelner, Johann (Linz Center of Mechatronics Gmbh), Nader, Manfred (Linz Center of Mechatronics GmbH), Scheidl, Rudolf (Institute of Machine Design and Hydraulic Drives, Johannes Kepler University Linz), Zeman, Klaus (Johannes Kepler University Linz)

Chair: Tamm, Christoph (Fraunhofer Institute for Structural Durability and System Reliability LBF) Co-Chair: Nader, Manfred (Linz Center of Mechatronics GmbH)

10:00-10:20

Modeling of Liquid Sloshing with Application in Robotics and Automation (I) Schörgenhumer, Markus (Linz Center of Mechatronics GmbH), Eitzlmayr, Andreas (Linz Center of Mechatronics GmbH)

10:20-10:40

Components for Simulation of Piezoelectrically Actuated Systems with SyMSpace (I) Reischl, Daniel (Linz Center of Mechatronics GmbH), Meindlhumer, Martin (Johannes Kepler University Linz), Trinkl, Martin (Linz Center of Mechatronics GmbH), Pechstein, Astrid Sabine (Johannes Kepler University Linz), Silber, Siegfried (Linz Center of Mechatronics GmbH)

10:40-11:00

Model Based Development of Fluid Transport Systems for Industrial Applications (I) Zehetleitner, Kurt (B&R Industrial Automation), Schröck, Johannes (Linz Center of Mechatronics GmbH), Klopf, Christoph (B&R Industrial Automation) ThB2.6

Room FH 3

ThB3.2

ThB3.1

ThB3.3

ThB2.3 olymer

ThB2.4

ThB2.5

	11:00-11:20
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Next Generation Digital Twin: An Ecosystem for Mechatronic Systems? (I)

Rosen, Roland (Siemens AG), Fischer, Jan (Siemens AG), Boschert, Stefan (Siemens AG)

11:20-11:40

Design and Optimization of Mechatronic Systems Using a Holistic and Parametric Simulation Approach (I)

Tamm, Christoph (Fraunhofer Institute for Structural Durability and System Reliab), Perfetto, Sara (Fraunhofer Institute for Structural Durability and System Reliab)

11:40-12:00

A Holistic Approach of Complexity Assessment for the Development of Product Variants of Mechatronic Products and Their Supply Chain Networks

Graessler, Iris (Heinz Nixdorf Institute), Yang, Xiaoiun (Heinz Nixdorf Institute)

ThB4

Dissipativity and Passivity

Chair: Scherpen, Jacquelien M.A. (University of Groningen) Co-Chair: Reger, Johann (TU Ilmenau)

10:00-10:20

Practical Stabilization of Passive Nonlinear Systems with Limited Control

Jayawardhana, Bayu (University of Groningen), Almuzakki, Muhammad Zaki (University of Groningen), Tanwani, Aneel (LAAS -- CNRS, Université De Toulouse)

10:20-10:40

Krasovskii's Passivity

Kosaraiu, Krishna Chaitanva (University of Groningen), Kawano, Yu (Hiroshima University), Scherpen, Jacquelien M.A. (University of Groningen)

10:40-11:00

Gradient and Hamiltonian Dynamics under Sampling

Moreschini, Alessio (Sapienza University of Rome), Monaco, Salvatore (Sapienza Università Di Roma), Normand-Cyrot, Marie-Dorothée (CNRS-Univ. Paris-Sud-Supélec)

11:00-11:20

Adaptive IDA-PBC for a Class of UMSs: The IWIP Analysis

Popayán A., Jhossep A. (TU Ilmenau), Cieza A., Oscar B. (TU Ilmenau), Reger, Johann (TU Ilmenau)

11:20-11:40

Using SOS and Sublevel Set Volume Minimization for Estimation of Forward Reachable Sets Jones, Morgan (Arizona State University), Peet, Matthew M (Arizona State University)

ThB5

Turnpikes and Dissipativity in Control (Invited Session)

Organizers: Faulwasser, Timm (Karlsruhe Institute of Technology), Worthmann, Karl (Technische Universität Ilmenau), Zanon, Mario (IMT Institute for Advanced Studies Lucca)

Chair: Worthmann, Karl (Technische Universität Ilmenau) Co-Chair: Gruene, Lars (Univ of Bayreuth)

10:00-10:20

Towards Velocity Turnpikes in Optimal Control of Mechanical Systems (I)

ThB4.5

ThB5.1

Room FH 5

ThB4.2

ThB4.1

ThB3.4

ThB3.5

ThB3.6

Room FH 4

ThB4.3

ThB4.4

Faulwasser, Timm (Karlsruhe Institute of Technology), Flaßkamp, Kathrin (University of Bremen), Ober-Blöbaum, Sina (University of Oxford), Worthmann, Karl (Technische Universität Ilmenau)

10:20-10:40

Turnpike in Optimal Shape Design (I)

Trelat, Emmanuel (University Pierre Et Marie Curie (Paris 6)), Zuazua, Enrique (Universidad Autónoma De Madrid), Lance, Gontran (Sorbonne Université)

10:40-11:00

Economic MPC Using a Cyclic Horizon with Application to Networked Control Systems (I) Wildhagen, Stefan (University of Stuttgart), Muller, Matthias A. (Leibniz University Hannover), Allgower, Frank (University of Stuttgart)

11:00-11:20

Approximate Computation of Storage Functions for Discrete-Time Systems Using Sum-Of-Squares Techniques (I)

Pirkelmann, Simon (University of Bayreuth), Angeli, David (Imperial College London), Gruene, Lars (University of Bayreuth)

ThB6

Precision Scanning Systems in Metrology and Manufacturing II (Invited Session) Organizers: Csencsics, Ernst (Vienna University of Technology), Ohnishi, Wataru (The University of Tokyo)

Chair: Ohnishi, Wataru (The University of Tokyo) Co-Chair: Moheimani, Reza (University of Texas, Dallas)

10:00-10:20

An Autonomous Design Method of a Cascade Structure Feedback Controller (I) Kuroda, Eitaro (Nagoya Institute of Technology), Maeda, Yoshihiro (Nagoya Institute of Technology), Iwasaki, Makoto (Nagoya Institute of Technology)

10:20-10:40

A Fast Piezo Actuated Tip/Tilt Mirror for Raster Scan Applications (I)

Csencsics, Ernst (Vienna University of Technology), Benjamin, Sitz (Automation and Control Institute, Vienna University of Technolog), Schitter, Georg (Vienna University of Technology)

10:40-11:00

A Feedback Controlled MEMS Probe Scanner for On-Chip AFM

Alemansour, Hamed (The University of Texas at Dallas), Maroufi, Mohammad (University of Texas at Dallas), Alipour, Afshin (The University of Texas at Dallas), Moheimani, Reza (University of Texas, Dallas)

11:00-11:20

Scanning Laser Triangulation Sensor Geometry Maintaining Imaging Condition (I) Schlarp, Johannes (Vienna University of Technology), Csencsics, Ernst (Vienna University of Technology), Schitter, Georg (Vienna University of Technology)

11:20-11:40

Increasing the SNR of Electrical AFM Methods by Active Mechanical Q-Control

Kohl, Dominik (TU Wien), Kerschner, Christoph Johannes (TU Wien), Mesquida, Patrick (King's College London), Schitter, Georg (Vienna University of Technology)

11:40-12:00

Integrated Planar 6-DOF Nanopositioning System (I)

ThB5.2

ThB5.3

ThB5.4

Room FH 6

ThB6.1

ThB6.2

ThB6.3

ThB6.4

ThB6.5

ThB6.6

52

Gorges, Stephan (IMMS Institut Für Mikroelektronik Und Mechatronik-Systeme Gemei), Hesse, Steffen (IMMS Institut Für Mikroelektronik Und Mechatronik-Systeme Gemei), Schaeffel, Christoph (IMMS Institut Für Mikroelektronik Und Mechatronik-Systeme Gemei), Ortlepp, Ingo (Technische Universität Ilmenau), Manske, Eberhard (Technische Universität Ilmenau), Langlotz, Enrico (SIOS Messtechnik GmbH), Dontsov, Denis (SIOS Messtechnik GmbH)

ThB7

Mechatronics and Intelligent Systems in Railways (Invited Session) Organizers: Dixon, Roger (University of Birmingham), Goodall, Roger (Loughborough Univ)

Chair: Dixon, Roger (University of Birmingham) Co-Chair: Keck, Alexander (German Aerospace Center, Institute of System Dynamics and Control)

10:00-10:20

Observer Synthesis for the Adhesion Estimation of a Railway Running Gear

Schwarz, Christoph (German Aerospace Center, Institute of System Dynamics and Contro), Keck, Alexander (German Aerospace Center, Institute of System Dynamics and Contro)

10:20-10:40

Observer Design for a Railway Running Gear with Independently Rotating Wheels Keck, Alexander (German Aerospace Center, Institute of System Dynamics and Contro), Schwarz, Christoph (German Aerospace Center), Meurer, Thomas (Christian-Albrechts-University Kiel)

10:40-11:00

REPOINT-Light Full-Scale Track Switch: Experimental Results at a Railway Testing Site (I) Olaby, Osama (University of Birmingham), Dutta, Saikat (University of Birmingham), Harrison, Tim (Loughborough University), Ward, Christopher Patrick (Loughborough University), Dixon, Roger (University of Birmingham)

11:00-11:20

Safety Verification of a Train Interlocking Timed Automaton Model Nazaruddin, Yul Yunazwin (Institut Teknologi Bandung (ITB)), Tamba, Tua Agustinus (Parahyangan Catholic University)

11:20-11:40

On Input-To-State Stability of Train Platoon under Moving Block Signalling

Tamba, Tua Agustinus (Parahyangan Catholic University), Nazaruddin, Yul Yunazwin (Institut Teknologi Bandung (ITB))

ThB8

Robotic Systems III

Chair: Graichen, Knut (Friedrich-Alexander-University Erlangen-Nuremberg) Co-Chair: Hartl-Nesic, Christian (TU Wien)

10:00-10:20

Synergy-Based Control of Anthropomorphic Robotic Hands with Contact Force Sensors Ortenzi, Davide (Università Politecnica Delle Marche), Scarcia, Umberto (University of Bologna), Meattini, Roberto (University of Bologna), Palli, Gianluca (University of Bologna), Melchiorri, Claudio (University of Bologna)

10:20-10:40

Swing-Up of a Spherical Pendulum on a 7-Axis Industrial Robot

Hartl-Nesic, Christian (TU Wien), Kretschmer, Jens (TU Wien), Schwegel, Michael (TU Wien), Glück, Tobias (Austrian Institute of Technology), Kugi, Andreas (TU Wien)

ThB7.2

ThB7.3

ThB7.1

Room FH 7

ThB7.4

ThB7.5

Room FH 8

ThB8.1

ThB8.2

10:40-11:00

External Torque Estimation for an Industrial Robot Arm Using Joint Torsion and Motor Current Measurements

Gold, Tobias (Friedrich-Alexander-Universität Erlangen-Nürnberg), Völz, Andreas (Friedrich-Alexander-Universität Erlangen-Nürnberg), Graichen, Knut (Friedrich-Alexander-University Erlangen-Nuremberg)

11:00-11:20 ThB8.4 A Nested-Loop Iterative Learning Control for Robot Manipulators Lee, Yu-Hsiu (University of California, Los Angeles), Hsu, Sheng-Chieh (Industrial Technology Research Institute), Du, Yan-Yi (Industrial Technology Research Institute), Hu, Jwu-Sheng (National Chiao Tung Univ), Tsao, Tsu-Chin (University of California Los Angeles) 11:20-11:40 ThB8.5 Modelling, Validation and Control of DELIAN Flexible Manipulator Comi, Fabio (Politecnico Di Milano), Orive Miguel, Aitor (Politecnico Di Milano), Cavenago, Francesco (Politecnico Di Milano), Ferretti, Gianni (Politecnico Di Milano), Magnani, GianAntonio (Politecnico Di Milano), Rusconi, Andrea (Leonardo S.p.A) 11:40-12:00 ThB8.6 Collision Detection for Flexible Link Robots Using Accelerometers Pucher, Florian (Johannes Kepler University Linz), Gattringer, Hubert (Johannes Kepler University Linz), Mueller, Andreas (Johannes Kepler University Linz) ThC1 Room FH 1 **Semi-Plenary Session** Chair: Schlacher, Kurt (Johannes Kepler University Linz) 13:40-14:30 ThC1.1 Feedback Issues Underlying Quantum Error Correction*. Rouchon, Pierre (Mines-ParisTech, PSL Research University) For details, see p. 29. ThC2 Room FH 5 **Semi-Plenary Session** Chair: Janschek, Klaus (Technische Universität Dresden) 13:40-14:30 ThC2.1 Reliable Simulations - Steps into a Virtualized World*. Baumann, Michael (Robert Bosch GmbH) For details, see p. 30. Room FH 1 ThD1 Output Regulation, Tracking and Disturbance Attenuation I (Invited Session) Organizers: Astolfi, Daniele (Université Claude Bernard Lyon 1), Scarciotti, Giordano (Imperial College London) Chair: Astolfi, Daniele (Université Claude Bernard Lyon 1)

Co-Chair: Peaucelle, Dimitri (LAAS-CNRS)

14:30-14:50

ThD1.1

Error-Feedback Output Regulation of Linear Stochastic Systems: A Hybrid Nonlinear Approach (I)

Mellone, Alberto (Imperial College London), Scarciotti, Giordano (Imperial College London)

ThB8.3

14:50-15:10

Emulation-Based Output Regulation of Linear Networked Control Systems Subject to Scheduling and Uncertain Transmission Intervals (I)

Astolfi, Daniele (Université Claude Bernard Lyon 1), Postoyan, Romain (CRAN, CNRS, Université De Lorraine), van de Wouw, Nathan (Eindhoven Univ of Technology)

15:10-15:30

Francis-Wonham Nonlinear Viewpoint in Output Regulation of Minimum Phase Systems (I) Astolfi, Daniele (Université Claude Bernard Lyon 1), Praly, Laurent (Ecole Des Mines), Marconi, Lorenzo (Univ. Di Bologna)

ThD2

Networked Systems I Chair: Ito, Hiroshi (Kyushu Institute of Technology) Co-Chair: Mironchenko, Andrii (University of Passau)

14:30-14:50

Small Gain Theorems for Networks of Heterogeneous Systems Mironchenko, Andrii (University of Passau)

14:50-15:10

A Closed Form Expression of Nonlinear Scalings for Lyapunov Functions of ISS Networks Ito, Hiroshi (Kyushu Institute of Technology)

15:10-15:30

Stability of Infinitely Many Interconnected Systems

Dashkovskiy, Sergey (University of Würzburg), Mironchenko, Andrii (University of Passau), Schmid, Jochen (Fraunhofer Institute for Industrial Mathematics), Wirth, Fabian (University of Passau)

ThD3

Integrated Virtualization Along Product Lifecycle Phases II (Invited Session)

Organizers: Hoffelner, Johann (Linz Center of Mechatronics Gmbh), Nader, Manfred (Linz Center of Mechatronics GmbH), Scheidl, Rudolf (Institute of Machine Design and Hydraulic Drives, Johannes Kepler University Linz), Zeman, Klaus (Johannes Kepler University Linz)

Chair: Nader, Manfred (Linz Center of Mechatronics GmbH) Co-Chair: Rosen, Roland (Siemens AG)

14:30-14:50

Improved EMD-Based Oscillation Detection for Mechatronic Closed-Loop Systems Gurtner, Markus (Austrian Institute of Technology GmbH), Zips, Patrik (Austrian Institute of Technology GmbH), Atak, Muhammed (Robert Bosch GmbH), Ophey, Julian (Robert Bosch GmbH), Kugi, Andreas (Vienna University of Technology)

14:50-15:10

Digital Twin Based Diagnosis and Condition Prediction (I)

Boschert, Stefan (Siemens AG), Khalil, Mohamed (Siemens AG), Rosen, Roland (Siemens AG)

15:10-15:30

Smart Machine Maintenance Enabled by a Condition Monitoring Living Lab (I)

Ooijevaar, Ted (Flanders Make), Pichler, Kurt (Linz Center of Mechatronics), Di, Yuan (University of Cincinnati), Devos, Steven (Flanders Make), Volckaert, Bruno (IDLab Ghent University - Imec), Van Hoecke, Sofie (IDLab Ghent University - Imec), Hesch, Clemens (Linz Center of Mechatronics)

ThD1.2

ThD1.3

Room FH 2

ThD2.2

ThD2.1

ThD2.3

Room FH 3

ThD3.1

ThD3.2

ThD3.3

Room FH 4

ThD4 **Electric Systems**

Chair: Xia, Xiaohua (University of Pretoria) Co-Chair: Steinboeck, Andreas (Vienna University of Technology)

14:30-14:50

Modeling of a RF Surgical Generator Based on a Push-Pull Oscillator

Neureuther, Philip L. (University of Stuttgart), Ederer, Michael (University of Stuttgart), Selig, Peter (Erbe Elektromedizin GmbH), Muller, Matthias A. (Leibniz University Hannover)

14:50-15:10

Multivariable Disturbance Observer Based Control with the Experiment on an Active Magnetic Bearing Spindle

Rouhani, Shahin (University of California Los Angeles), Tsao, Tsu-Chin (University of California Los Angeles), Speyer, Jason L. (Univ. of California at Los Angeles)

15:10-15:30

Robust Adaptive Sliding Mode Observer for Self-Sensing IPMSM Control Based on Optimized HF Injection Method

Messali, Amir (Ecole Centrale De Nantes), Hamida, Assaad (Ecole Centrale De Nantes), Ghanes, Malek (Centrale Nantes), Messali, Amir (Ecole Centrale De Nantes)

ThD5

Poster Session

Chair: Kugi, Andreas (Vienna University of Technology)

14:30-16:00

Full-State Observer for 1-DOF MagLev System

Bobtsov, Alexey (ITMO University), Pyrkin, Anton (ITMO University), Ortega, Romeo (Supelec), Vedyakov, Alexey (ITMO University)

14:30-16:00

Evaluation Based Policy Iteration

Fejlek, Jiří (Institute of Computer Science, Czech Academy of Sciences), Ratschan, Stefan (Institute of Computer Science, Czech Academy of Sciences)

14:30-16:00

An Application of Crawling-Like Locomotion Robot to Paper Feeding

Asano, Fumihiko (Japan Advanced Institute of Science and Technology), Li, Longchuan (Japan Advanced Institute of Science and Technology)

14:30-16:00

FES-Assisted Control for Standing-Up Motion from Squatting Position

Kushima, Yoshihiro (Kanazawa Institute of Technology), Nakamura, Koichi (Kanazawa Institute of Technology), Kawai, Hiroyuki (Kanazawa Institute of Technology), Murao, Toshiyuki (Kanazawa Institute of Technology), Kawai, Yasunori (National Institute of Technology, Ishikawa College), Kishitani, Miyako (Saiseikai Kanazawa Hospital), Suzuki, Ryoichi (Kanazawa Institute of Technology), Fujita, Masayuki (Tokyo Institute of Technology)

14:30-16:00

Development of a Wall Climbing Robot: Manoeuvring Experiments on a Vertical Wall Tokunaga, Takuya (Graduate School of Kindai University), Ioi, Kiyoshi (Kindai University)

14:30-16:00

Development of a Telescopic Mechanism for Narrow Space Photographing

ThD4.1

ThD4.2

ThD4.3

Foyer FH 5/6

ThD5.1

ThD5.2

ThD5.4

ThD5.7

ThD5.6

ThD5.3

Fujii. Fumiya (Graduate School of Science and Engineering Kindai University). Ioi. Kivoshi (Kindai University)

14:30-16:00

Management of Hybrid Maps for Localization in Mobile Robotics

Labián, Víctor (Universidad Politécnica De Madrid), Javierre, Patricia (Universidad Politécnica De Madrid), de la Puente, Paloma (TU Wien)

14:30-16:00

Exploring Mechatronic Guidance of Rail Vehicles through Track Switches (I) Farhat, Nabilah (Loughborough University), Ward, Christopher Patrick (Loughborough University), Dixon, Roger (University of Birmingham), Goodall, Roger (Loughborough Univ)

14:30-16:00

An Adaptive SVSF-SLAM Algorithm in Dynamic Environment for Cooperative Unmanned Vehicles

Demim, Fethi (École Militaire Polytechnique, EMP,), Nemra, Abdelkarim (Ecole Militaire Polytechnique, EMP), Abdelghani, Boucheloukh (Ecole Nationale Polytechnique, ENP), Elhaouari, Kobzili (Ecole Nationale Polytechnique, ENP, El Harrach), Hamerlain, Mustapha (Centre De Développement Des Technologies Avancées, CDTA), Bazoula, Abdelouahab (Ecole Militaire Polvtechniaue, EMP)

14:30-16:00

Mechatronic Design of a Flexure Based 6RSS Parallel Robot

Hakvoort, Wouter (University of Twente), Naves, M. (University of Twente), Vogel, D.W. (University of Twente), Brouwer, D.M. (University of Twente)

14:30-16:00

A Study on Frequency-Shaped Final-State Control for PWM-Type Input Systems Takizawa, Yuva (Utsunomiva University), Suzuki, Masavasu (Utsunomiva University), Hirata, Mitsuo (Utsunomiya University)

14:30-16:00

Smart Maintenance Education Using Augmented Reality

Kostoláni, Michal (Institute of Automotive Mechatronics FEI STU), Murín, Justín (Institute of Automotive Mechatronics FEI STU)

14:30-16:00

A Nonlinear Model of Heat Transfer in Cylinders Actuated by a Peltier Element

Gavrikov, Alexander (Ishlinsky Institute for Problems in Mechanics RAS), Kostin, Georgy (Institute for Problems in Mechanics of the Russian Academy of Sc), Aschemann, Harald (University of Rostock), Rauh, Andreas (University of Rostock)

14:30-16:00

Towards Output Krylov Subspace-Based Nonlinear Moment Matching

Cruz Varona, Maria (Chair of Automatic Control, Technische Universität München), Pak, Mikhail (Technical University of Munich), Lohmann, Boris (Technische Universität München)

ThD6

Machine Learning

Chair: Oomen, Tom (Eindhoven University of Technology) Co-Chair: Günther, Janine (University of Stuttgart)

14:30-14:50

Feature Selection for Thermal Comfort Modeling Based on Constrained LASSO Regression

ThD5.8

ThD5.10

ThD5.12

ThD5.11

ThD5.14

ThD5.15

ThD6.1

ThD5.13

Room FH 6

ThD5.9

14:50-15:10

From Batch-To-Batch to Online Learning Control: Experimental Motion Control Case Study Mooren, Noud (Eindhoven University of Technology), Witvoet, Gert (TNO), Oomen, Tom (Eindhoven University of Technology)

ThD7

Aerospace Systems I

Chair: Garone, Emanuele (Université Libre De Bruxelles) Co-Chair: Durand, Sylvain (INSA Strasbourg & ICube)

14:30-14:50

Stochastic Trajectory Optimization for Autonomous Soaring of UAV

Schermann, Emmanuel (ICube, Strasbourg), Omran, Hassan (Télécom Physique Strasbourg), Durand, Sylvain (INSA Strasbourg & ICube), Kiefer, Renaud (INSA Strasbourg & ICube)

14:50-15:10

Efficient Networked UAV Control Using Event-Triggered Predictive Control

Jang, Dohyun (Seoul National University), Son, Clark Youngdong (Seoul National Uiversity), Yoo, Jaehyun (Hankyong National University), Kim, H. Jin (Seoul National Univ), Johansson, Karl H. (Royal Institute of Technology)

15:10-15:30

Improved Area Covering in Dynamic Environments by Nonlinear Model Predictive Path Following Control

Ibrahim, Mohamed (Otto-Von-Guericke-Universität Magdeburg, Laboratory for Systems), Matschek, Janine (Otto-Von-Guericke University Magdeburg, Laboratory for Systems T), Morabito, Bruno (Otto-Von-Guericke University Magdeburg, Laboratory for Systems T). Findeisen, Rolf (Otto-Von-Guericke-Universität Magdeburg, Laboratory for Systems)

ThD8

Bio-Inspired Robotics

Chair: Aschemann, Harald (University of Rostock) Co-Chair: Ohtsuka, Toshiyuki (Kyoto University)

14:30-14:50

Extended Linearisation Control Approaches for a High-Speed Linear Axis with Pneumatic Muscles

Wache, Alexander (University of Rostock), Aschemann, Harald (University of Rostock)

14:50-15:10

Integrated Optimization of Climbing Locomotion for a Humanoid Robot

Omoto, Kohei (Kyoto University), Doi, Masahiro (Toyota Motors Corporation), Ohtsuka, Toshivuki (Kvoto University)

15:10-15:30

ROMERIN: A Modular Climber Robot for Infrastructure Inspection

Hernando, Miguel (Centre for Automation and Robotics (CAR UPM-CSIC)), Brunete, Alberto (Centre for Automation and Robotics (CAR UPM-CSIC)), Gambao, Ernesto (Centre for Automation and Robotics (CAR UPM-CSIC))

Room FH 7

ThD6.2

ThD7.3

Room FH 8

ThD8.1

ThD8.2

ThD8.3

ThD7.1

ThD7.2

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Output Regulation, Tracking and Disturbance Attenuation II (Invited Session) Organizers: Astolfi, Daniele (Université Claude Bernard Lyon 1), Scarciotti, Giordano (Imperial College London)

Chair: Scarciotti, Giordano (Imperial College London) Co-Chair: Schöberl, Markus (Johannes Kepler University of Linz)

Adaptive Output Regulation Via Nonlinear Luenberger Observers (I)

Bin, Michelangelo (University of Bologna), Bernard, Pauline (MINES ParisTech), Marconi, Lorenzo (Univ. Di Bologna)

16:20-16:40

16:00-16:20

Output-Feedback Adaptive Control for Systems with Time-Varying Parameters

Chen, Kaiwen (Imperial College), Astolfi, Alessandro (Imperial Col. London & Univ. of Rome Tor Vergata)

16:40-17:00

Adaptive Nonlinear Regulator Design Via Immersion and Invariance (I) Wang, Lei (University of Newcastle), Kellett, Christopher M. (University of Newcastle)

17:00-17:20

Asymptotic Tracking for Linear and Nonlinear Systems: A Two-Point Boundary Value Formulation (I)

Galeani, Sergio (Università Di Roma Tor Vergata), Possieri, Corrado (Politecnico Di Torino), Sassano, Mario (University of Rome, Tor Vergata)

17:20-17:40

Switching-Based Regulation of Uncertain Stable Linear Systems Affected by an Unknown Harmonic Disturbance (I)

Wang, Yang (Imperial College London), Serrani, Andrea (The Ohio State University), Pin, Gilberto (Electrolux Professional S.p.A), Parisini, Thomas (Imperial College & Univ. of Trieste)

InE2
Networked Systems II
Chair: Zaccarian, Luca (LAAS-CNRS and University of Trento)
Co-Chair: Schaum. Alexander (Kiel University)

16:00-16:20

Dynamic Coupling Enhances Network Synchronization

de Jonge, Willem (Eindhoven University of Technology), Pena Ramirez, Jonatan (Center for Scientific Research and Higher Education at Ensenada), Nijmeijer, Hendrik (Eindhoven Univ of Technology)

16:20-16:40

LMI Conditions for Contraction and Synchronization

Andrieu, Vincent (Université De Lyon), Tarbouriech, Sophie (LAAS-CNRS)

16:40-17:00

Synchronization of Interconnected Linear Systems Via Dynamic Saturation Redesign Casadei, Giacomo (École Centrale Lyon), Astolfi, Daniele (Université Claude Bernard Lyon 1), Alessandri, Angelo (Università Di Genova), Zaccarian, Luca (LAAS-CNRS and University of Trento)

ThE1

rial

ThF1.1

ThE1.2

Room FH 1

ThE1.3

ThE1.4

ThE1.5

ThE2.1

ThE2.2

ThE2.3

Room FH 2

17:00-17:20

Synchronization of Nonlinearly Coupled Networks of Chua Oscillators

Feketa, Petro (Christian-Albrechts-University Kiel), Schaum, Alexander (Kiel University), Meurer, Thomas (Christian-Albrechts-University Kiel), Michaelis, Dennis (Ruhr-University Bochum), Ochs, Karlheinz (Ruhr-University Bochum)

17:20-17:40

Synchronization of Coupled Nonlinear Systems with Bidirectional Sampled-Data Couplings Sakai, Kanako (Tokyo Metropolitan University), Oguchi, Toshiki (Tokyo Metropolitan University)

17:40-18:00

Desynchronization Control of FitzHugh-Nagumo Networks with Random Topology

Plotnikov, Sergej A. (ITMO University), Fradkov, Alexander L. (Russian Academy of Sciences)

ThE3

Isolation, Rejection, and Compensation of Vibrations in Mechatronic Systems I (Invited Session)

Organizers: Ito, Shingo (TU Wien), Heertjes, Marcel (Eindhoven University of Technology)

Chair: Heertjes, Marcel (Eindhoven University of Technology) Co-Chair: Hakvoort, Wouter (University of Twente)

16:00-16:20

Non-Collocated Position Control of Steel Strip with Electromagnetic Rejection of Unknown Multi-Harmonic Disturbances

Saxinger, Martin (Vienna University of Technology), Marko, Lukas (Vienna University of Technology), Steinboeck, Andreas (Vienna University of Technology), Kugi, Andreas (Vienna University of Technology)

16:20-16:40

Angular Velocity and Phase Shift Control of Mechatronic Vibrational Setup Andrievsky, Boris (Inst. for Problems of Mechanical Engineering of the RAS), Fradkov, Alexander L. (Russian Academy of Sciences), Tomchina, Olga (St.Petersburg State University of Architecture and Civil Enginee), Boikov, Vladimir I. (ITMO University, Saint Petersburg)

16:40-17:00

Multirate and Model Predictive Control of a Pneumatic Isolation Table with a Discrete Actuator (I)

Chida, Yuichi (Shinshu University), Ishihara, Nijihiko (Shinshu University), Tanemura, Masaya (Shinshu University)

17:00-17:20

Quadruple-Stage Actuator System for Hard Disk Drives (I)

Atsumi, Takenori (Chiba Institute of Technology), Yabui, Shota (Nagoya University)

17:20-17:40

Filtered-Error Recursive Least Squares Optimization for Disturbance Feedforward Control in Active Vibration Isolation (I)

Beijen, Michiel (DEMCON Advanced Mechatronics), Hakvoort, Wouter (University of Twente)

17:40-18:00

Hybrid Integrator-Gain System for Active Vibration Isolation with Improved Transient Response (I)

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ThE2.6

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ThE3.2

ThE3.1

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ThE3.4

Heerties, Marcel (Eindhoven University of Technology), van den Eiinden, Sebastiaan (Eindhoven University of Technology), Sharif, Bardia (Eindhoven University of Technology), Heemels, Maurice (Eindhoven University of Technology), Nijmeijer, Hendrik (Eindhoven Univ

of Technology)

ThE4

Adaptive and Robust Control

Chair: Aschemann. Harald (University of Rostock) Co-Chair: Hirata, Mitsuo (Utsunomiya University)

16:00-16:20

Error-Dynamics-Based Performance Shaping Methodology for Discrete-Time Sliding Mode Control with Disturbance Observer

Han, Ji-seok (Seoul National University), Kim, Tae-II (Seoul National Unviersity), Oh, Tae-Ho (Seoul National University), Kim, Young-Seok (Seoul National University), Lee, Ji-Hyung (RS Automation), Kim, Sang-Oh (RS Automation), Lee, Sang-Sub (RS Automation), Lee, Sang-Hoon (RS Automation), Cho, Dong-il Dan (Seoul National Univ)

16:20-16:40

Transformation of Uncertain Linear Fractional Order Differential Equations into a Cooperative Form

Kersten, Julia (University of Rostock), Rauh, Andreas (University of Rostock), Aschemann, Harald (University of Rostock)

16:40-17:00

Adaptive Actor-Critic Structure for Parametrized Controllers

Göhrt, Thomas (Technische Universität Chemnitz), Osinenko, Pavel (Technische Universität Chemnitz). Streif. Stefan (Technische Universität Chemnitz)

17:00-17:20

Order Tracking Based Least Mean Squares Algorithm

Jungblut, Jens (Technische Universität Darmstadt), Plöger, Daniel Fritz (Technische Universität Darmstadt), Zech, Philipp (Technische Universität Darmstadt), Rinderknecht, Stephan (Technische Universität Darmstadt)

17:20-17:40

Dominance Margins for Feedback Systems

Padoan, Alberto (University of Cambridge), Forni, Fulvio (University of Cambridge), Sepulchre, Rodolphe J. (University of Cambridge)

17:40-18:00

State Feedback Synthesis for Discrete-Time Linear Systems with Stochastic Parameters Guaranteeing Deterministic H_2 Performance and Stochastic Stability

Niwa, Keishi (Keio University), Hattaha, Kenichi (Keio University), Sato, Masayuki (Japan Aerospace Exploration Agency), Adachi, Shuichi (Keio University)

ThE5

Extremum Seeking Control: Theory and Applications I (Invited Session)

Organizers: Grushkovskaya, Victoria (Julius Maximilian University of Würzburg), Suttner, Raik (University of Wuerzburg)

Chair: Suttner, Raik (University of Wuerzburg) Co-Chair: Guay, Martin (Queen's Univ)

16:00-16:20

DEES: A Class of Data-Enabled Robust Feedback Algorithms for Real-Time Optimization (I)

ThF4.1

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Room FH 4

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ThF4.4

ThF4.5

ThE4.6

Room FH 5

ThE5.1

Poveda, Jorge I. (University of Colorado at Boulder), Vamvoudakis, Kyriakos G. (Georgia Tech), Benosman, Mouhacine (Mitsubishi Electric Research Laboratories (MERL))

Benosman, Mouhacine (Mitsubishi Electric Research Laboratories (MERL))
16:20-16:40 ThE5.2
Extremum Seeking Control for an Acceleration Controlled Unicycle (I) Suttner, Raik (University of Wuerzburg)
16:40-17:00 ThE5.3
Partial Stability Concept in Extremum Seeking Problems (I) Grushkovskaya, Victoria (Julius Maximilian University of Würzburg), Zuyev, Alexander (Max Planck Institute for Dynamics of Complex Technical Systems)
17:00-17:20 ThE5.4
Extremum Seeking Algorithms Based on Non-Commutative Maps (I)
Feiling, Jan (University of Stuttgart), Labar, Christophe (Université Libre De Bruxelles), Grushkovskaya, Victoria (Julius Maximilian University of Würzburg), Garone, Emanuele (Université Libre De Bruxelles), Kinnaert, Michel (Université Libre De Bruxelles), Ebenbauer, Christian (University of Stuttgart)
17:20-17:40 ThE5.5
Constrained Extremum Seeking: A Modified-Barrier Function Approach (I) Labar, Christophe (Université Libre De Bruxelles), Garone, Emanuele (Université Libre De Bruxelles), Kinnaert, Michel (Université Libre De Bruxelles), Ebenbauer, Christian (University of Stuttgart)
ThE6 Room FH 6 Modeling and Design of Mechatronic Actuators
Chair: Schitter, Georg (Vienna University of Technology) Co-Chair: Gurtner, Martin (Czech Technical University in Prague)
16:00-16:20 ThE6.1
Demonstrator for Nano-Precision Multi-Agent MagLev Positioning Platform for High Throughput Metrology Kramer, Lukas (TNO), van den Dool, Teun (TNO), Witvoet, Gert (TNO)
16:20-16:40 ThE6.2
Compensation of Hysteresis in Hybrid Reluctance Actuator for High-Precision Motion Cigarini, Francesco (TU Wien), Ito, Shingo (TU Wien), Konig, Julian (TU Wien), Sinn, Andreas (TU Wien), Schitter, Georg (Vienna University of Technology)
16:40-17:00 ThE6.3
Optimization-Based Feedback Manipulation through an Array of Ultrasonic Transducers Matous, Josef (Faculty of Electrical Engineering, Czech Technical University In), Kollarcik, Adam (Faculty of Electrical Engineering, Czech Technical University In), Gurtner, Martin (Czech Technical University in Prague), Michalek, Tomas (Czech Technical University in Prague), Hurak, Zdenek (Czech Technical University in Prague)
17:00-17:20 ThE6.4
Ontimal Actuator Placement and Static Load Compensation for Fuler-Bernoulli Beams with

Optimal Actuator Placement and Static Load Compensation for Euler-Bernoulli Beams with Spatially Distributed Inputs

Wagner, Julia Laura (University of Stuttgart), Schmidt, Kevin (University of Stuttgart), Böhm, Michael (University of Stuttgart), Sawodny, Oliver (Univ of Stuttgart) Constrained Port Hamiltonian Formulation of Multiscale Distributed Parameter IPMC Systems

Liu, Ning (Université Bourgogne Franche-Comté), Wu, Yongxin (ENSMM / Université Bourgogne Franche-Comté), Le Gorrec, Yann (FEMTO-ST, ENSMM)

17:40-18:00

Piezoelectric Actuators Characterization for Simultaneous Force and Displacement Self-Sensing by Detecting Impedance

Bafumba Liseli, Joël (Université De Bourgogne Franche-Comté), Mansour, Sepehr (University of British Columbia), Seethaler, Rudolf (University of British Columbia), Agnus, Joël (Femto-St - Sciences Et Technologies), Lutz, Philippe (Université De Franche Comté), Rakotondrabe, Micky (National Engineering School of Tarbes (ENIT))

ThE7

Control Design for Flight Systems (Invited Session)

Organizers: Botkin, Nikolai (Technische Universität München), Golubev, Alexey (Bauman Moscow State Technical University), Turova, Varvara (Technische Universität München)

Chair: Botkin, Nikolai (Technische Universität München) Co-Chair: Snyder, Steven (NASA)

16:00-16:20

On Some Approaches to Linearization of Affine Systems (I)

Fetisov, Dmitry (Bauman Moscow State Technical University)

16:20-16:40

Aircraft Guiding in Windshear through Differential Game-Based Overload Control (I)

Botkin, Nikolai (Technische Universität München), Golubev, Alexey (Bauman Moscow State Technical University), Turova, Varvara (Technische Universität München)

16:40-17:00

Backstepping Control of Aircraft Take-Off in Windshear (I)

Golubev, Alexey (Bauman Moscow State Technical University), Botkin, Nikolai (Technische Universität München), Krishchenko, Alexander (Bauman Moscow State Technical University)

17:00-17:20

L1 Adaptive Control for Switching Reference Systems: Application to Flight Control (I) Snyder, Steven (UIUC), Hovakimyan, Naira (UIUC), Zhao, Pan (UIUC)

17:20-17:40

Missile Angle of Attack Tracking Using Integrator Backstepping (I)

Golubev, Alexey (Bauman Moscow State Technical University), Krishchenko, Alexander (Bauman Moscow State Technical University), Utkina, Nadezhda (Bauman Moscow State Technical University)

17:40-18:00

Optimal Disturbance Generation for Flight Control Law Testing (I)

Diepolder, Johannes (Technical University of Munich), Botkin, Nikolai (Technische Universität München), Holzapfel, Florian (Technische Universität München)

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Room FH 8

Human-Robot Interaction

Chair: Nakamura, Hisakazu (Tokyo University of Science) Co-Chair: von Ellenrieder, Karl (Libera Universita Di Bolzano)

16:00-16:20

ThE8

Time-Varying Control Barrier Function and Its Application to Environment-Adaptive Human Assist Control

Igarashi, Motoi (Tokyo university of Science), Tezuka, Issei (Tokyo University of Science), Nakamura, Hisakazu (Tokyo University of Science)

16:20-16:40

Collaborative Synchronization of a 7-Axis Robot

Weingartshofer, Thomas (TU Wien), Schwegel, Michael (TU Wien), Hartl-Nesic, Christian (TU Wien), Glück, Tobias (Austrian Institute of Technology), Kugi, Andreas (TU Wien)

16:40-17:00

Contact Assist Control Barrier Function for Human Assist Control

Hayashi, Yuka (Tokyo University of Science), Igarashi, Motoi (Tokyo university of Science), Nakamura, Hisakazu (Tokyo University of Science)

17:00-17:20

Control of Bilateral Teleoperation System Consisting of Heterogeneous Manipulators with Communication Delay

Higashino, Akihisa (Hokkaido University), Yamashita, Yuh (Hokkaido University), Kobayashi, Koichi (Hokkaido University)

17:20-17:40

Demonstration-Based Programming of Multi-Point Trajectories for Collaborative Continuum Robots

Mayer, Annika (University of Stuttgart), Müller, Daniel (University of Stuttgart), Raisch, Adrian (University of Stuttgart), Hildebrandt, Alexander (Universitaet Stuttgart), Sawodny, Oliver (Univ of Stuttgart)

17:40-18:00

A Deadband-Based Method for User Effort Reduction in Human-Robot Shared Control Belotti, Roberto (Libera Universita` Di Bolzano), von Ellenrieder, Karl (Libera Universita` Di Bolzano), Henninger, Helen (Libera Universita` Di Bolzano)

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Friday, September 6, 2019

FrA1 Room Plenary Session	n FH 1
Chair: Kugi, Andreas (Vienna University of Technology)	
08:45-09:30 F	-rA1.1
Machine Learning for Non-Linear Dynamical Systems Control and Variable Impedance*. Billard, Aude (EPFL)	
For details, see p. 26.	
FrB2 Room Methods for Energy Efficient Processes and Applications (Invited Session) Organizer: Hofmann, Rene (TU Wien, Institute for Energy Systems and Thermodynamics)	n FH 2
Chair: Hofmann, Rene (TU Wien, Institute for Energy Systems and Thermodynamics) Co-Chair: Kemmetmueller, Wolfgang (TU Wien, Automation and Control Institute)	
10:00-10:20 F	-rB2.1
Voltage Regulation of DC-Microgrid with PV and Battery: A Passivity-Based Method Sun, Jiwei (Case Western Reserve University), Lin, Wei (Case Western Reserve Univ), Hor Mingguo (Case Western Reserve University), Loparo, Kenneth (Case Western Reserve University)	ng, niv)
10:20-10:40 F	FrB2.2
Modeling of Non-Linear Part Load Operation of Combined Cycle Units (I) Panuschka, Sophie (Austrian Institue of Technology), Hofmann, Rene (TU Wien, Institute Energy Systems and Thermodynamics)	e for
10:40-11:00 F	rB2.3
Data Driven Modeling and Nonlinear Model Predictive Control Design for a Rotary Ceme Kiln (I) Wurzinger, Andreas (Vienna University of Technology, Austria), Leibinger, Helmut (Südbayrisches Portland-Zementwerk Gebr. Wiesböck & Co. GmbH, Roh), Jakubek, Stefd (Vienne University of Technology, Austria) Kozak, Martin (Vienne University of Technology)	ent an M.
Austria)	Jgy,
11:00-11:20 F	rB2.4
Grey Box Modeling of a Packed-Bed Regenerator Using Recurrent Neural Networks (I) Halmschlager, Verena (TU Wien, Institute for Energy Systems and Thernodynamics), Kol. Martin (TU Wien, Institute for Energy Systems and Thernodynamics), Birkelbach, Felix (T Wien, Institute for Energy Systems and Thernodynamics), Hofmann, Rene (TU Wien, Inst for Energy Systems and Thermodynamics)	ler, ™ titute
FrB3 Room	n FH 3
Isolation, Rejection, and Compensation of Vibrations in Mechatronic Systems II (Invited Session)	
Organizers: ito, shingo (10 vvien), Heertjes, Marcei (Einanoven University of Technology)	
Cnair: ito, Sningo (TU Wien) Co-Chair: Atsumi, Takenori (Chiba Institute of Technology)	
10:00-10:20 F	-rB3.1
Reset Control for Vibration Disturbance Rejection (I)	

Akyuz, Erdi (TU Delft), Saikumar, Niranjan (TU Delft), HosseinNia, S. Hassan (Delft University of Technology)

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FrB3.5

10:20-10:40

Suppression of Vibration Induced by Reciprocal Motion of Displacer in Cryopump with an Active Dynamic Vibration Absorber (I)

Mizuno, Takeshi (Saitama University), Iida, Takahito (Saitama University), Ishino, Yuji (Saitama University), Takasaki, Masaya (Saitama University), Yamaguchi, Daisuke (Saitama University)

10:40-11:00

Sample-Tracking Vibration Isolation with Hybrid Reluctance Actuators for Inline Metrology (I) Ito, Shingo (TU Wien), Lindner, Bernhard (TU Wien), Schitter, Georg (TU Wien)

11:00-11:20

Active Damping of Dynamical Structures Using Piezo Self Sensing (I) Jansen, Bas (ASML), Butler, Hans (Eindhoven University of Technology), Di Filippo, Ruben (ASML)

11:20-11:40

High-Bandwidth Tip-Tilt Vibration Compensation in Telescope Systems (I)

Sinn, Andreas (TU Wien, Automation and Control Institute), Riel, Thomas (TU Wien, Automation and Control Institute), Deisl, Florian (TU Wien, Automation and Control Institute), Schachner, Stephan (TU Wien, Automation and Control Institute), Schitter, Georg (TU Wien, Automation and Control Institute)

11:40-12:00

Linear Parameter-Varying Models for Convertible Structures in Civil and Structural Engineering

Jirasek, Robert (Brandenburg University of Technology), Schauer, Thomas (Technische Universitaet Berlin), Bleicher, Achim (Brandenburg University of Technology)

FrB4

Approximation-Methods, Discrete-Time Equivalents and Analysis of Sliding Mode Control Systems (Invited Session)

Organizers: Reichhartinger, Markus (Graz University of Technology), Polyakov, Andrey (INRIA Lille Nord-Europe), Brogliato, Bernard (UR Rhone-Alpes)

Chair: Reichhartinger, Markus (Graz University of Technology) Co-Chair: Chairez, Isaac (UPIBI-IPN)

10:00-10:20

A First-Order Differentiator with First-Order Sliding Mode Filtering (I)

Kikuuwe, Ryo (Hiroshima University), Pasaribu, Rainhart (Institut Teknologi Bandung), Byun, Gyuho (Kyushu University)

10:20-10:40

Reaching Law Based DSMC with a Reference Model (I)

Latosinski, Pawel (Lodz University of Technology), Bartoszewicz, Andrzej (Lodz University of Technology)

10:40-11:00

Step-By-Step Implicit Discrete Super-Twisting Differentiator for Input-Output Linearizable Nonlinear Systems (I)

Chairez, Isaac (UPIBI-IPN)

11:00-11:20

Discrete-Time Super Twisting Controller for Networked Control Systems (I)

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FrB4.1

FrB4.2

FrB4.3

FrB4.4

Room FH 4

Ludwiger, Jakob (Graz University of Technology), Reichhartinger, Markus (Graz University of Technology), Steinberger, Martin (Graz University of Technology), Horn, Martin (Graz University of Technology)

11:20-11:40

Discrete-Time Sliding Mode Pressure Control of a Leak Testing Device (I)

Tafner, Robert (AVL DiTEST GmbH), Reichhartinger, Markus (Graz University of Technology), Schweigler, Johannes (Graz University of Technology)

FrB5

Extremum Seeking Control: Theory and Applications II (Invited Session) Organizers: Grushkovskaya, Victoria (Julius Maximilian University of Würzburg), Suttner, Raik (University of Wuerzburg)

Chair: Grushkovskaya, Victoria (Julius Maximilian University of Würzburg) Co-Chair: van de Wouw, Nathan (Eindhoven Univ of Technology)

10:00-10:20

Extremum Seeking Regulator for a Class of SISO Time-Varying Nonlinear Systems (I) Guay, Martin (Queen's Univ), Atta, Khalid (LTU)

10:20-10:40

A Sampled-Data Extremum-Seeking Approach for Accurate Setpoint Control of Motion Systems with Friction (I)

Hazeleger, Leroy (Eindhoven University of Technology), Beerens, Ruud (Eindhoven University of Technology), van de Wouw, Nathan (Eindhoven Univ of Technology)

10:40-11:00

Stochastic Averaging for Time-Varying Systems and Its Applications to Distributed Source Seeking (I)

Yang, Lin-Yu (Sichuan University), Liu, Shu-Jun (Sichuan University), Zhang, Peipei (Sichuan University)

11:00-11:20

Newton-Like Phasor Extremum Seeking Control with Application to Cooling Data Centers (I) Lucchese, Riccardo (Luleå University of Technology), Lionello, Michele (University of Padova), Rampazzo, Mirco (Universita Degli Studi Di Padova), Guay, Martin (Queen's Univ), Atta, Khalid (LTU)

FrB6

Control of Mechatronic Actuators

Chair: Sawodny, Oliver (Univ of Stuttgart) Co-Chair: Bitzer, Matthias (Robert Bosch GmbH)

10:00-10:20

Constrained Real-Time Swivel Angle Control for Hydraulic Axial Piston Motors

Joos, Steffen (Robert Bosch GmbH), Trachte, Adrian (Robert Bosch GmbH), Bitzer, Matthias (Robert Bosch GmbH), Graichen, Knut (Friedrich-Alexander-University Erlangen-Nuremberg)

10:20-10:40

Flatness-Based Feed-Forward Control Design for Solenoid Actuators Considering Eddy Currents

Braun, Tristan (ZF Friedrichshafen AG), Reuter, Johannes (University of Applied Sciences), Rudolph, Joachim (Saarland University)

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10:40-11:00

Stroke Oriented Controller Design for Dual-Stage Actuator of Head Positioning Control System in Hard Disk Drives

Yabui, Shota (Nagoya University), Atsumi, Takenori (Chiba Institute of Technology), Inoue, Tsuyoshi (Nagoya University)

11:00-11:20

Commutation Angle Iterative Learning Control: Enhancing Piezo-Stepper Actuator Waveforms

Strijbosch, Nard (Eindhoven University of Technology), Paul, Tacx (Eindhoven University of Technology), Verschueren, Edwin (Thermo Fisher Scientific), Oomen, Tom (Eindhoven University of Technology)

11:20-11:40

Similarity-Based Feedback Control with Reduced Capacitive Load for Linear Operation of Piezoelectric Actuators

Poik, Mathias (TU Wien), Kohl, Dominik (TU Wien), Schitter, Georg (TU Wien)

11:40-12:00

Flatness Based Optimal Control for Induction Machine Drives

Rolle, Bernhard (Univ. of Stuttgart), Sawodny, Oliver (Univ. of Stuttgart)

FrB7

Aerospace Systems II

Chair: Steinboeck, Andreas (Vienna University of Technology) Co-Chair: Pyrkin, Anton (ITMO University)

10:00-10:20

Scalar Reference Governor for Constrained Maneuver and Shape Control of Nonlinear Multibody Aircraft

O'Rourke, Ian (University of Michigan), Kolmanovsky, Ilya V. (University of Michigan), Garone, Emanuele (Université Libre De Bruxelles), Girard, Anouck (University of Michigan, Ann Arbor)

10:20-10:40

Multi-Mode Controller for Propellantless Spacecraft Translational Maneuvering through Orientation Changes Only

Castroviejo Fernandez, Miguel (Université Libre De Bruxelles), Kolmanovsky, Ilya V. (University of Michigan), Garone, Emanuele (Université Libre De Bruxelles), Girard, Anouck (University of Michigan, Ann Arbor)

10:40-11:00

Differential Flatness-Based Approach for Sensors and Actuators Fault Diagnosis of a Multirotor UAV

Saied, Majd (Lebanese University), Mahairy, Tamim (Lebanese University), Francis, Clovis (Lebanese University, Faculty of Engineering, Branch 1), Shraim, Hassan (LSIS, Univ AIX Marseille III), Mazeh, Hussein (Lebanese University), El Rafei, Maher (Lebanese University, Faculty of Engineering 1, CRSI Lab)

11:00-11:20

Application of Enhanced Extended Observer in Station-Keeping of a Quadrotor with Unmeasurable Pitch and Roll Angles

Borisov, Oleg (ITMO University), Pyrkin, Anton (ITMO University), Isidori, Alberto (University of Rome "La Sapienza")

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11:20-11:40

Sensitivity Analysis of Model-Based Impedance Control for Physically Interactive Hexarotor

Yao, Chao (Technische Universität Dresden), Schuster, Micha (Technische Universität Dresden), Jiang, Zijian (Technische Universität Dresden), Janschek, Klaus (Technische Universität Dresden), Beitelschmidt, Michael (Technische Universitaet Dresden)

11:40-12:00

Comparison of Design Approaches of Fully Actuated Aerial Robots Based on Maximum Wrench Generation and Minimum Energy Consumption

Schuster, Micha (Technische Universität Dresden), Bernstein, David (Technische Universität Dresden), Yao, Chao (Technische Universität Dresden), Janschek, Klaus (Technische Universität Dresden). Beitelschmidt, Michael (Technische Universitaet Dresden)

FrB8

Semiconductor Systems

Chair: Song, Kai-Tai (National Chiao Tung Univ) Co-Chair: Gengenbach, Ulrich (Karlsruhe Institute of Technology)

10:00-10:20

Automated Fabrication of Multi-Layer Printed Electronic Circuits Using a Novel Vector Ink-Jet Printing Process Control and Surface Mounting of Discrete Components

Gengenbach, Ulrich (Karlsruhe Institute of Technology), Ungerer, Martin (Karlsruhe Institute of Technology), Koker, Liane (Karlsruhe Institute of Technology), Reichert, Klaus-Martin (Karlsruhe Institute of Technology), Stiller, Peter (Karlsruhe Institute of Technology), Huang, Chengyuan (Karlsruher Institut Für Technologie), Hagenmeyer, Veit (Karlsruhe Institute of Technology)

10:20-10:40

Optimal Experiment Design for Multivariable Motion Systems: With Application to a Next-**Generation Wafer Stage**

Dirkx, Nic (ASML), Wijdeven, van de, Jeroen (ASML), Oomen, Tom (Eindhoven University of Technology)

10:40-11:00

Force Regulation for Pick-And-Place Units by Use of Adaptive Impedance Control in the Semiconductor-Industry with Experimental Results

Kronthaler, Phillip (UMIT - Private University), Woittennek, Frank (UMIT - Private University)

11:00-11:20

Scheduling and Control of a Wafer Transfer Robot for Foundry Equipment Innovation Competition

Song, Kai-Tai (National Chiao Tung Univ), Ou, Song-Qing (National Chiao Tung University), Yang, Cheng-An (National Chiao Tung University), Sun, Yu-Xuan (National Chiao Tung University), Kang, Li-Ren (National Chiao Tung University), Wang, Zhen-Yu (National Chiao Tung University), Wang, Yu-Shin (National Chiao Tung University), Lu, Pei-Chun (National Chiao Tung University), Ko, Chun-Long (National Chiao Tung University), Chen, Yao Hsiang (National Chiao Tung University)

FrB7.5

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